Flemington-Raritan School District
Mathematics Curriculum
Grades K-6

Gregory Nolan, Superintendent
Daniel Bland, Assistant Superintendent
Sandra Pollock, Mathematics and Science Supervisor

Council of Instruction Review Date: April 18, 2012
BOE Curriculum Committee Review Date: April 18, 2012
Board of Education Approval Date: June 18, 2012

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Acknowledgements

Alsop, Linda
Amundsen, Karen
Bishop, Alison
Bogden, Beverly
Cagenello, Stacey
Gardner, Elizabeth
Gorka, Alaina
Hale, Kelly
Hecky, Carol
Hlinka, Jaclyn
Kalb, Kristina
Kuster, Kelly
Lake, Katie
Latanzio, Melissa
Madlinger, Marybeth
Mallory, Michelle
Mulholland, Joey
O'Leary, Katherine
Ricard, Debbie
Strunk, Carri
Teeple, Christine
Thompson, Carla
Tonge, Michele

Flemington-Raritan School District
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District Mission Statement

The Flemington-Raritan Regional School District provides our students with an exceptional education, empowering them to become problem solvers, collaborators and critical thinkers. The district creates a culture in which students act responsibly and communicate effectively in preparing to become productive citizens in a changing, global society.

It is the expectation of the Flemington-Raritan School District that all pupils achieve the New Jersey Core Curriculum content Standards at all grade levels.

Flemington-Raritan School District

Philosophy

The Grades K-6 Mathematics Curriculum is based on the belief that all students can learn mathematics. The mathematics program develops each child's mathematical reasoning in understanding the big ideas (concepts) of mathematics. The program sets high benchmarks and expectations for students to effectively express mathematical content, process, and skills through verbal and written communication.

The use of technological tools is a vital component of the program, not only to enhance the understanding of concepts, but an important tool used in the adult world to access and analyze real world data.

In accordance with the above beliefs, the program includes a comprehensive range of content in a variety of contexts. The program integrates skills, concepts, and applications based on the 2004 New Jersey Core Curriculum Content Standards for Mathematics, providing each student the opportunity to become an active participant in his/her mathematical education. Students explore the beauty of mathematics with confidence, with the aim to become a generation of mathematically literate adults.

The grades K-6 mathematics program is built on developmentally appropriate practice for elementary school students:

- All students can learn and understand mathematics;
- Students construct their own meaning based on prior experience;
- Learning occurs in social situations;
- Learning is tied to contextual, real-world situations;
- Learning involves numerous strategies involving higher order thinking skills. Students continually reflect on the following question: "Does this make sense?

The 21st Century Learning and Thinking Skills are an integral part of the K-6 mathematics program including:

- Critical Thinking and Problem Solving Skills
- Communication Skills
- Creativity and Innovation Skills
- Collaboration Skills
- Information and Media Literacy Skills
- Contextual Learning Skills

Flemington-Raritan School District

2004 New Jersey Core Curriculum Content Standards - Mathematics

The 2004 New Jersey Core Curriculum Content Standards contain Specific Cumulative Progress Indicators for each grade and the Mathematics Curriculum for grades K-6 reflects the relevant cumulative progress indicators. There are five standards altogether, each of which has a number of lettered strands. These standards and their associated strands, are enumerated below:

4.1 Number and Numerical Operations
- A. Number Sense
- B. Numerical Operations
- C. Estimation

4.2 Geometry and Measurement
- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measure
- E. Measuring Geometric Objects

4.3 Patterns and Algebra
- A. Patterns
- B. Functions and Relationships
- C. Modeling
- D. Procedures

4.4 Data Analysis, Probability, and Discrete Mathematics
- A. Data Analysis (Statistics)
- B. Probability
- C. Discrete Mathematics -- Systematic Listing and Counting
- D. Discrete Mathematics -- Vertex-Edge Graphs and Algorithms

4.5 Mathematical Processes
- A. Problem Solving
- B. Communication
- C. Connections
- D. Reasoning
- E. Representation
- F. Technology

Flemington-Raritan School District

Program Description

The curriculum emphasizes a balance between hands-on, inquiry based problem solving and traditional mathematical computation and arithmetic. Teachers focus on making connections between facts and fostering new understanding in students, and tailor their teaching strategies to student responses, encouraging students to analyze, interpret, and predict information. Teachers also rely heavily on open-ended questions and promote extensive dialogue among students through cooperative learning strategies.

Assessment consists of teacher made-quizzes, tests, teacher observations, students' responses, students' projects, students' daily work, district wide and state wide testing. In practice, assessment is ongoing and serves to provide feedback to students and to inform instruction. Teachers use a variety of assessment techniques, both quantitative and qualitative, to assess student development in the areas of mathematical conceptual understanding, mathematical procedures, and mathematical process. Multiple choice, short answer, and open-ended responses requiring written explanations are all components of the ongoing assessments in the classroom.

In grades K-5 all students are grouped heterogeneously and provided with differentiated math instruction within their classrooms. Additional support, as in teacher push-in, small group instruction, and/or special programs, is provided to those students who meet district criteria. A Gifted and Talented Mathematics Program begins in third grade. In grade 6 students are grouped homogeneously by ability and achievement in math. Various district wide tests, teacher recommendation, and student performance are considered when placing students for mathematics.

Mathematics textbooks, support materials, and teacher instruction are modified according to the different needs of students in order for students to meet the New Jersey Core Curriculum Standards for each grade level. Continual assessment and reflection upon student work and achievement drives instruction. All student data, performance and achievement are constantly monitored in order to move students forward to their fullest mathematical potential. Placement procedures include not only student ability and achievement in concepts and computation, but also the ability to work independently at an accelerated pace.

The following courses and textbooks are used in grades K-6 mathematics classes:

Level	**Textbook**
Grades K-6	**Everyday Mathematics**
Algebra IA	**Discovering Algebra**

Calculator Philosophy

The Flemington-Raritan mathematics program believes that calculators are a vital component of the mathematics program.

The following rationale from Texas Instruments covers many of the advantages of using calculators, as outlined by the NCTM and the 2004 New Jersey Core Curriculum Standards.

Calculators are valuable educational tools that allow students to reach a higher level of mathematical power and understanding. By reducing the time that, in the past, was spent on performing tedious paper-and-pencil arithmetic and algebraic algorithms, calculator use today allows students and teachers to spend more time developing mathematical understanding, reasoning, number sense, and applications. They afford students learning tools that complement, but do not replace, mental and paper-and-pencil skills, and they expand students' ability to solve problems by providing multiple solution techniques.

Calculator technology allows students who would ordinarily be frustrated or bored by tedious manipulations to have access to the real mathematics itself, thus gaining a higher level of mathematical understanding, rather than giving up. The fact is, calculators are better tools to do some of the computations and manipulations that were once done with paper and pencil. In the past, paper and pencil were the only tools available. Appropriate use of technology and associated pedagogy will get more students thinking and reasoning mathematically. Thus more students will develop useful mathematical understanding and mathematical power.

Despite all of their benefits and capabilities, calculators will never be able to replace the human mind when it comes to knowing how to read and understand a problem situation, writing an appropriate equation for the problem, choosing which operations to use to solve the problem, correctly interpreting the solution displayed on the calculator, and determining the appropriateness of the answer. Calculators are only as effective as the information students enter into them. Calculators, in conjunction with mental, paper-and-pencil, and estimation skills when appropriate, comprise the tools to help students work through the computations and manipulations necessary for solving problems. Calculators are like computer word processors to English students. Computer word processors do not "create" essays but they do facilitate the creation of an essay. Calculators do not "understand" mathematics but they do facilitate the understanding of mathematics. Despite all of their capabilities, however, they will never replace the important, complex thought processes of which only humans are capable.

Kindergarten Math
Pacing Guide

SEPTEMBER	*Everyday Kindergarten Math (EKM) **Unit 1**: Activities 1-1 thru 1-10; 1-12,1-14	FEBRUARY	**Unit 1**: 1-11 **Unit 2**: 2-8 **Unit 3**: 3-8; 3-11 **Unit 6**: 6-1; 6-2; 6-7 **Unit 7**: 7-1; 7-5 **Unit 8**: 8-7
OCTOBER	**Unit 2**: Activities 2-1 thru 2-7; 2-9; 2-13 thru 2-16 **Unit 3:** Activity 3-1 (numeral writing may vary in pacing sequence depending on class make-up and pre-requisite);3-1 4 **Unit 4:** Activities 4-10 *Developing Number Concepts – Chapter 1	MARCH	**Unit 3**: 3-7 **Unit 5**: 5-7; 5-11; 5-12 **Unit 6**: 6-3; 6-6; 6-9 thru 6-12; 6-14; 6-16 *Developing Number Concepts – Chapter 3
NOVEMBER	**Unit 3**: Activities 3-3 thru 3-6; 3-9 thru 3-12; 3-15 **Unit 4**: 4-13; 4-14 **Unit 5**: 5-3; 5-1 *Developing Number Concepts – Chapter 2	APRIL	**Unit 7**: 7-6 thru 7-7 thru 15 **Unit 8**: 8-5; 8-6 *Developing Number Concepts – Chapter 2
DECEMBER	**Unit 2:** Activities 2-10 thru 2-12 **Unit 3**: 3-16 **Unit 4**: 4-2; 4-3; 4-5;4-6 *Developing Number Concepts – Chapter 2	MAY	**Unit 6**: 6-4; 6-13 **Unit 8**: 8-2; 8-3; 8-9 thru 8-14
JANUARY	**Unit 4**: Activities 4-1; 4-4; 4-7; 4-8; 4-11; 4-12; 4-15 4-16 **Unit 5**: 5-2; 5-4; 5-5; 5-8; 5-9; 5-15; 5-16 **Unit 8**: 8-4*Developing Number Concepts – Chapter 2	JUNE	Review of concepts where needed or "catch-up" month

Grade: Kindergarten **Standard 4.1 Number and Numerical Operations**
Essential Question: How can problems in the real world be solved with mathematics?
How can estimation be useful to us?
How do numbers help us reason out solutions to problems?
How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real life experiences, physical materials, and technology to construct meaning for numbers.	Observation of students exploration with manipulatives Oral assessment Mid Year/End of Year Assessments	"Look and Find" (Numbers 1 -10) Egg-Carton Mathematics	*Everyday Math:* Teacher's Guide
**** Demonstrates understanding of one-one correspondence. (e.g., places one placement at each place, gives each child one cookie, places one animal in each trunk, hands out manipulatives to be shared with a friend saying "One for you, one for me.") (Preschool)***		Listen and Count	*Everyday Math:* Teacher's Guide
**Verbally counts 20 or more objects in a random arrangement.*	Mid-Year and Final: One-to-One Correspondence to 20	Teacher number cards Act. Making Towers Grow and Shrink Creations Unifix Cubes Digi-Blocks	*Everyday Math*: Teacher's Guide *Developing Number Concepts: Counting, Comparing, and Pattern,* Kathy Richardson
**Identifies small numbers without counting.*	Final: Subitizing with Finger Patterns	Finger Counting Say-It Fast Cards High Roller game	*Everyday Math*: Teacher's Guide *Developing Number Concepts: Counting, Comparing, and Patterns,* Kathy Richardson

**Performs verbal counting to 100.*	Mid-Year and Final: Forward counting 1...to 100	Interrupted skip counts Listen and Do Number line Interrupted Counts (0-50) Number Hunt and 100 chart Games on 100 Chart	*Everyday Math*: Teacher's Guide
**Count with calculator using the repeat key.*	Monitor correct use of calculator	Counting and CalculatorsCalculator DisplaysCounting with CalculatorsCounting Shortcut	*Everyday Math*: Teacher's Guide *Everyday Math*: Teacher's Guide
**Expose to ordinal numbers and terminology*		Ordinal Numbers: Standing in Line	
			****Learn to say counting numbers.***
(Preschool) **Reads any number, 30 or less.*	Teacher Observation Mid-Year and Final: Numeral Identification to 30	*EM Activity:* Monthly Calendar Number Board Teen Partner Game Monster Squeeze Game EM Game: Top It Teen Number Spin	*Everyday Math*: Teacher's Guide
2. Demonstrate an understanding of place value concepts.		Making a concrete number count collection	*Everyday Math*: Teacher's Guide
****Recognizes and names some written numerals.***	Oral assessment		*Everyday Math*: Teacher's Guide
(Preschool) **Understands teen numbers in terms of 10's and 1's.*	Student participation in whole class discussion	Teen Partner GameListen and Do (10-20)Digit GameDouble Digit Dice Game	*Everyday Math*: Teacher's Guide

**Writes numerals 0 -10.* **Reads and writes numbers, 100 or less.*	Final: Writes numerals 0 - 10, randomly. Oral / Slate Assessments	Slate writing activities Number Books: Writing 0 - 10 Number Hunt and 100 Chart Preparation for 100 Day 100 Number Grids Double Digit Dice Game Class Collection Project (100 poster) Writing on Backs Spin a number (1 -10) Interrupted Skip Counts (0 - 50) Number Grid Say the Next Number by 1 0s Countdown Counting Backwards with / without calculators Say the Next Number	*Everyday Math*: Teacher's Guide *Developing Number Concepts: Counting, Comparing and Pattern,* Kathy Richardson Teacher Number Cards Activities
**Counts backwards from 10.* **Counts backwards from 22.*	Mid-Year and Final: Counting Backwards 10 - 0		*Everyday Math*: Teacher's Guide
**Counts by 10's to 100. *Counts by 5's. *Counts by 2's.*	Final: Skip Counts by 10's	Skip count by 10's Counting on calculators Say the Next Number by 10s Introduction to Skip Counting by 2's Count Fingers by 5's Count using tally marks Count to 70 by 10s	*Everyday Math*: Teacher's Guide
**Introduce concept of zero*	Oral discussion		*Everyday Math*: Teacher's Guide

3. Understand that numbers have a variety of uses			
***Discriminates numbers from other symbols in the environment (e.g., street signs, license plates, room number, clock, etc.) (Preschool)**	Teacher observation		*Everyday Math*: Teacher's Guide
*Recognizes many non-computational uses of numbers through daily experiences	Teacher observation	Attendance Routine Recording daily temperature Weather Chart	*Everyday Math*: Teacher's Guide
*Demonstrates an understanding of simple fractions. (1/2, 1/4)	Teacher observation	Divide Groups into Half Groups	
4. Count and perform many simple computations with coins			
***Spontaneously counts for own purposes (e.g., counting blocks or cars, counting beads while stringing them, handing out napkins). (Preschool)**	Teacher Observation	Counters, "real" objects	*Everyday Math*: Teacher's Guide ongoing activities throughout the year
*Recognizes and names penny, nickel, and dime. *Knows the valued of a penny, nickel and dime. *Recognizes a quarter.	Ongoing informal Teacher assessment Observation of student while interacting with coins during play	Coins in the Classroom Matching Coin Game Exploring the Penny Using the cent sign Introduction of nickel and dime Coin Sorting Coin Dice Comparing Coins by Feel	*Everyday Math*: Teacher's Guide Portrait of Lincoln (Link with Social Studies)
*Record counted money amount using cents symbol	Oral assessment of cents label	Informally introduce the cents symbol as a label	*Everyday Math*: Teacher's Guide
*Use equivalency for money amounts-pennies/nickels/dimes	Oral assessments	Play Store	*Everyday Math*: Teacher's Guide

**Introduce the one-dollar bill*	Observation of students during play	Use play money	*Everyday Math*: Teacher's Guide
**Introduce the ten dollar bill*	Observation of students during play		*Everyday Math*: Teacher's Guide
5. Compare and order whole numbers.	Observation of student during play	Playing cards EM: Top -It Game Reading and Comparing Numbers Ascending and Descending Order	*Everyday Math*: Teacher's Guide
****Compares numbers in different contexts (e.g., using words such as more and less). (Preschool)***	Teacher Observation	Counters, Number line EM Game: Monster Squeeze	*Everyday Math*: Teacher's Guide
*******Sequence low to high.*	Mid-Year and Final: Ordering Numerals Final: Number After and Number Before	Give the Next Number Children's Number Cards Partner Match Ordinal Numbers: Standing in Line Reading and Comparing Numbers	*Everyday Math*: Teacher's Guide

B. Numerical Operations

1. Developing the meaning of addition and subtraction by concretely modeling and discussing a large variety of problems...	Student-teacher interviews	Number stories throughout the year Provide opportunities for experiences with multiple number stories throughout the year, develop meanings for operations and problem solving skills Disappearing Train Plus or Minus game "What Number Am I thinking Of?" High Roller Game	*Everyday Math*: Teacher's Guide
***Joining, separating and comparing.**	Oral / Slate assessment	Draw pictures, use models, manipulatives, counting objects Joining Objects	*Everyday Math*: Teacher's Guide
****Add two groups of concrete objects by counting the total (e.g., three blue pages, three yellow pages, six pegs altogether). (Preschool)***	Teacher Observation	Number line Mathematics Change to More number stories Dice Addition	*Everyday Math*: Teacher's Guide
****Subtracts one group of concrete objects from another by taking away and then counting the remainder (e.g., "I have four carrot sticks. I'm eating one! Now I have three!"). (Preschool)***	Oral communication with teacher	Change to Less number stories	*Everyday Math*: Teacher's Guide
**Understands equivalent expression as two or more different expressions of the same number.*	Teacher Observation	Dominoes Name Collections Bead String Name Collection Craft Stick Name Collection	*Everyday Math*: Teacher's Guide *Developing Number Concepts: Counting, Comparing and Pattern,* Kathy Richardson

**Developing the basic meaning of addition and subtraction in real situations, in children's own number stories, oral problems, concrete objects and number lines.*	Teacher Observation	Joining Objects Change to Less Pocket Game Disappearing Train High Roller What Number Am I Thinking of?	*Everyday Math*: Teacher's Guide *Developing Number Concepts: Counting, Comparing and Pattern,* Kathy Richardson
**Participates in solving oral number stories.*	Oral assessment Student sharing of own stories and solutions	Number Stories throughout the Year	*Everyday Math*: Teacher's Guide
**Divide even groups in half*	Observation of student while exploring task with manipulatives	Divide Groups into Half Groups use manipulatives	*Everyday Math*: Teacher's Guide
3. Develop proficiency with basic addition and subtraction number facts using a variety of strategies.			
**Develop proficiency with basic addition using the strategy of counting on.*		High Roller Top It	*Everyday Math*: Teacher's Guide
**Explore counting one more or one less)*	Oral / Slate Assessment	One More or One less	*Developing Number Concepts: Counting, Comparing, and Pattern,* Kathy Richardson
C. Estimation			
1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.			
**Determines which of two groups is more and which is less.*	Final: Weather Graph	More or Less Activities (DNC) Stack, Tell, Spin and Win	*Everyday Math*: Teacher's Guide *Developing Number Concepts: Counting, Comparing, and Pattern*, Kathy Richardson

3. Explore a variety of strategies for estimating quantities.		Explore ways to develop strategies for estimating	*Everyday Math*: Teacher's Guide
Uses estimation as a method for approximating an appropriate amount (e.g., at snack time, deciding how many napkins to take from a large pile for the group, determining number of blocks to use when building a structure). (Preschool)	Teacher Observation	Estimation Activities	
**Estimates comfortably, using such language as about how many, about how much.*	Teacher Observation	Estimation Activities	*Everyday Math*: Teacher's Guide

Grade: Kindergarten **Standard 4.2 Geometry and Measurement**

Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Identify and describe spatial relationships among objects in space and their relative shapes and sizes.	Oral Discussions	Pattern Block Puzzles	*Everyday Math*: Teacher's Guide
Use positional words in a functional way. (ex. Put the red block on top of the cabinet.) (list words) (Preschool)	Teacher Observation	Classroom activities "Do the Hokey Pokey"	*Everyday Math*: Teacher's Guide
2. Use concrete objects and drawings to identify, classify and describe standard three-dimensional and two-dimensional shapes. *vertex, edge, face, side *3-D figures - cube, rectangular prism, sphere, cone cylinder, and pyramid *2-D figures - square, rectangle, circle, triangle *Relationships between three- and two-dimensional shapes (e.g., the face of a 3D shape is a 2D shape).	Observation of student while interacting with manipulatives	Using A Pattern Block Template Shapes By Feel Compare shapes "I Spy" Comparing four-sided polygon	*Everyday Math*: Teacher's Guide
Identifies basic shapes in the environment (e.g., circle, square, triangle, cube, sphere). (Preschool)		Name shapes in the environment	
Makes three-dimensional constructions and models (e.g., sculptures that have height, depth, and width). (Preschool)	Teacher Observation	Clay 3-D Blocks	
Makes connections between two-dimensional and three-dimensional forms (circle-sphere, square-cube, triangle-pyramid). (Preschool)	Teacher Observation		

**Has experience with and recognizes and names basic plane figures.*	Mid-Year and Final: Names shapes	Shape Designs Geoboard Shapes Feely Box Shapes I Spy Find the Block	*Everyday Math*: Teacher's Guide
3. Describe and identify and create instances of symmetry.	Observation of student exploration while interacting with manipulatives	Symmetry with Paints	*Everyday Math*: Teacher's Guide
**Has experiences with basic geometry shapes and symmetry concepts*	Whole class discussion	Symmetry in Nature Symmetry Fold and Cut Projects	*Everyday Math*: Teacher's Guide
4. Recognize, describe, extend and create designs and patterns with geometric objects of different shapes and colors.			
**Identifies, describes and uses pattern blocks.*	Teacher Observation	Using a Pattern Block Template Covering Shapes Patterns All Around Pattern Block Puzzles Making Pattern Block Pictures Covering Shapes	*Everyday Math*: Teacher's Guide
B. Transforming Shapes			
1. Use simple shapes to make designs, patterns and pictures.	Observation of student creations	Shape Designs Pattern Blocks	*Everyday Math*: Teacher's Guide

Identifies patterns in the environment (e.g., "Look at the rug. It has a circle, then a number, then a letter..."). (Preschool)	Teacher observation		
**Identifies, describes, and uses pattern blocks.*	Observation of student exploration during play with pattern blocks	Pattern Block Exploration Pattern Block Design Cards	*Everyday Math*: Teacher's Guide
C. Coordinate Geometry			
1. Give and follow directions for getting from one point to another on a map or grid.		Counting Walks	*Everyday Math*: Teacher's Guide
Use vocabulary to describe directional concept (e.g., "Watch me climb up the ladder and slide down.") (Preschool)	Teacher observation		
**Follows a simple map.*	Teacher observation	Following a Simple Map	*Everyday Math*: Teacher's Guide
D. Units of Measurement			
1. Directly compare and order objects according to measurable attributes.	Observation of student during play with attribute blocks	Attribute Blocks Make comparisons: how are they alike / different? "What My Rule?" Fishing with attribute blocks	*Everyday Math*: Teacher's Guide
		Find the Block Read My Mind Game More or Less on a Pan Balance	*Everyday Math*: Teacher's Guide
Seriates objects according to various properties including size, number, length, heaviness, texture (rough to smooth) or loudness. (Preschool)	Observation of student presentation of manipulatives	Arranging items by Length Volume- Exploration	

2. Recognize the need for a uniform unit of measure.	Whole Class discussion	Comparing Length: use parts of body as measures Marking off Lengths	*Everyday Math*: Teacher's Guide
**Estimates and compares length using non-standard and standard units.*	Teacher observation	Partner Match Building and Measuring in the Block Corner Comparing Lengths Arranging Items by Length Measuring with Children's Feet Marking Off Lengths Tools for Measuring Length	*Everyday Math*: Teacher's Guide
**Exploring volume and weight.*	Teacher observation	Sand and Water Play Rocker Balance Things that Float or Sink	*Everyday Math*: Teacher's Guide Make science connections
3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real-life problems.	Evaluation of classroom math center activity	Measuring Heights of Children Measuring with Children's Feet Need for a Standard Measure of Length Tools for Measuring Length	*Everyday Math*: Teacher's Guide
****Uses standard and nonstandard measurement units. (e.g., measuring body lengths with Unifix cubes, using a tape measure to gauge height of block construction, counting the number of cups it takes to fill a bucket with water). (Preschool)***		Rulers, Linking cubes Literature Links	How Big is a Foot?, Rolf Myller Inch by Inch, Leo Leonni
**Become familiar with the clock face*	Whole class discussion	Door Clock	*Everyday Math*: Teacher's Guide
**Explore shapes using constant perimeter*	Whole class participation		*Everyday Math*: Teacher's Guide
**Read hourly clock times*	Oral assessment	Hour clock Explore duration of an hour Hour Hand, Minute Hand Story Match Game: Analog and Digital Clock (o'clock)	*Everyday Math*: Teacher's Guide

4. Estimate measures.		Building and Measuring in the Block Corner	*Everyday Math*: Teacher's Guide
Uses vocabulary to describe distances (e.g., short, long) (Preschool)	Teacher Observation	Comparing Body Heights to Objects	*Everyday Math*: Teacher's Guide
**Estimates times on an analog clock using only the hour hand.*	Oral assessment	Make an Hour Hand Clock	*Everyday Math*: Teacher's Guide Judy Clock
**Explore timed activities*	Observation of student participation in activity	Beating out Time How Long is a Minute?	*Everyday Math*: Teacher's Guide

Grade: Kindergarten **Standard 4.3 Patterns and Algebra**
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend and create pattern.	Observation of students while exploring with manipulatives or models	Patterns with Craft Sticks Patterns with Colors Stand, Squat or Kneel Pattern Macaroni Necklaces BINGO Sing a pattern song Three Object Pattern ABC or other	*Everyday Math*: Teacher's Guide
**Matches, copies and extends simple patterns.*	Mid-Year: Identify a pattern. Final: Create and extend a pattern.	Give the Next Number Counting Patterns Class Patterning Follow My Pattern B-I-N-G-O What's My Rule?.....Fishing Patterning Activities (DNC) Shoe Pattern	*Everyday Math*: Teacher's Guide *Developing Number Concepts: Counting, Comparing and Patterns*, Kathy Richardson
B. Functions and Relationships			
1. Use concrete and pictorial models of function machines to explore the concept of a function.			
**Identify a function rule.*	Observation of student while exploring mathematical idea Oral assessment	What's My Rule?... Pairs of Numbers, Numbers in Sequence, Numbers out of Sequence, Large Numbers	*Everyday Math*: Teacher's Guide

C. Modeling

1. Recognize and describe changes over time (e.g., temperature, height).			
**** Describe the sequence of the daily routine and demonstrates understanding of basic temporal relations. (e.g., We will go outside after snack time.) (Preschool)***	Teacher /student discussion; teacher observation	Responsive Classroom, morning message, calendar activities	*Everyday Math*: Teacher's Guide

D. Procedures

Comparing numbers in different contexts. (e.g., using words such as more and less) (Preschool)	Student-teacher interview	Calendar activities, counters and other manipulatives	Teacher supplement
**Introduce the Number-Model format*	Oral / Slate assessment	Explore 3 +4 = ___ and simple open sentences	*Everyday Math*: Teacher's Guide

Grade: Kindergarten **Standard 4.4 Data Analysis, Probability, and Discrete Mathematics**

Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1. **Collect, generate record, and organize data in response to questions, claims or curiosity.**	Oral Assessment	Attendance Routine Recording Daily Temperature	*Everyday Math*: Teacher's Guide
***Data collected from students' everyday experiences.**	Student participation in collection and recording of data	Favorite Colors graph	*Everyday Math*: Teacher's Guide
***Data generated from chance devices, such as spinners and dice.**	Observation of students during play	Spinners, Dice games Graph sums of dice throws	*Everyday Math*: Teacher's Guide
2. Read, interpret, construct and analyze displays of data. ***Pictures, tally chart, pictograph, bar graph, Venn Diagram** **Smallest to largest, most frequent (mode)**		Calendar activities Reminder for Tally Marks	*Everyday Math*: Teacher's Guide
****Arrange pictures of events in temporal order. (Preschool)***	Teacher Observation		
*Read concrete, pictorial, and simple bar graphs.	Final: Read a graph	Weather Observation Routine Birthday Bar Graph Favorite Color Graph Building the Monthly Calendar Routine	*Everyday Math*: Teacher's Guide

***B.* Probability 2. Provide probability of specific outcomes.**	Teacher Observation	Graphing Sums of Dice Throws	
Everyday Math: Teacher's Guide			
C. Discrete Mathematics-Systematic Listing and Counting			
1. Sort and classify objects according to attributes. *** Venn diagrams**			
****Sorts objects into groups (e.g., separate basket of collected items into piles of pinecones, acorns and twigs.) (Preschool)***	Teacher Observation	Counters, "real" counting items	
****Classifies objects by sorting them into subgroups by one or more attributes (e.g., sorting counting bears by color into trays, separating a mixture of beans by individual size and shape). (Preschool)***	Teacher Observation	Counters, "real" counting items	
**Sorts objects using varying attributes; shares strategies.*	Final: Attribute Block Sorting	Read My Mind Sorting Boxes	*Everyday Math*: Teacher's Guide Attribute Block guide
****Describes an object by characteristics it does or does not process (e.g., "This button doesn't have holes."). (Preschool)***	Teacher observation, Student discussion	Counters, "real" counting items	
****Seriates objects according to various properties including size, number, length, heaviness, texture (rough to smooth) or loudness. (Preschool)***	Teacher observation, Student discussion	Counters, "real" counting items	
D. Discrete Mathematics - Vertex - Edge - Graphs and Algorithms			
1. Follow simple sets of directions (e.g., from one location to another, or from a recipe). **** Starts and stops on a signal (e.g., freezing in position when music stops). (Preschool)***	Teacher observation	Rug and classroom group activities	Classroom chime

Grade: Kindergarten **Standard 4.5 Mathematical Processes**

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference?
How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving, inquiry, and discovery.			*Best of Math I and II, Exemplars CD* *Teaching Student Centered Mathematics, K-3,* Lovin and Van de Walle
Uses emergent mathematical knowledge as a problem-solving tool (e.g., Maritza notices that Juan has more carrot sticks than she does. She says, "May I have some of yours? Then we will have the same amount." ***Jorge decided to fill his bucket by using small cups of water when he realizes that he cannot fit the bucket under the faucet). (Preschool)***	Teacher observation	Various whole group, small group and partner classroom activities	Teacher supplement *Everyday Math*: Teacher's Guide
3. Select and apply a variety of appropriate problem solving strategies. ***Describe how he/she solved mathematical problems in his/her own way. (Preschool)***	Teacher observation Student Discussion	Classroom Playing Cards Meet the Calculator	*Teacher supplement*
B. Communication			
1. Use communication to organize and clarify their mathematical thinking.	Teacher observation	What's My Rule? Dismantling the Monthly Calendar	*Everyday Math*: Teacher's Guide
4. Use the language of mathematics to express mathematical ideas precisely.	Teacher observation Birthday Graph		*Everyday Math*: Teacher's Guide

Uses mathematical terms when conversing with others (e.g., "Which car is faster?" "My building is taller than yours." "I have more sand in my bucket."). (Preschool)	Teacher observation	Model appropriate math vocabulary Calendar activities	
C. Connections			
2. Use connections among mathematical ideas to explain concepts.		Slow and Fast Compare activities with variable speeds	*Everyday Math*: Teacher's Guide The Tortoise and the Hare
Making connections between two dimensional and three dimensional forms (circle-sphere, square-cube, triangle-pyramid) (Preschool)	Student -teacher interview	2-D and 3-D Objects Ask questions what is same and different between a square and a cube, circle and cylinder	Teacher supplement with questions
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Teacher observation	Noticing Numbers in the environment Patterns All Around Simple Hopscotch Telephone Book 100th school day	*Everyday Math*: Teacher's Guide
D. Reasoning			
2. Use reasoning to support their mathematical conclusions and problem solutions.	Observation of partner play	"Feely" Bag or Box Partners	*Everyday Math*: Teacher's Guide
Use emergent mathematical knowledge as a problem-solving tool. (Preschool)	Teacher observation	Engage student in play that facilitates simple problem solving	Teacher supplement Use literature books
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Teacher observation		*Everyday Math*: Teacher's Guide

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas. -concrete representations -pictorial representations -symbolic representations	Observation of student while interacting with manipulatives as they explore math ideas	Provide opportunities for students to model mathematical ideas using manipulatives and other models	*Everyday Math*: Teacher's Guide NJ Mathematics Curriculum Framework, selected activities grades K-2
Identifying the meaning of common signs and symbols. (Preschool)	Teacher observation / Student responses	Classroom symbols, school symbols, bathroom symbols, street light	
2. Select, apply and translate among mathematical representations to solve problems.	Teacher observation	Classroom Playing Cards	*Everyday Math*: Teacher's Guide

F. Technology

4. Use calculators as problem-solving tools.	Teacher observation	Calculators Meet the Calculator How Many? Answer questions using the calculator EM Activities: Skip counting activity Counting Backwards with calculator	*Everyday Math*: Teacher's Guide

1st Grade Math
Pacing Guide

Unit	Number of Days (approximate)	Unit	Number of Days (approximate)
1 . Establishing Routines	18	**6** . Developing Fact Power	17
2 . Everyday Uses of Numbers	18	**7** . Geometry & Attributes	12
3 . Visual Patterns, Number Patterns, & Counting	19	**8** . Mental Arithmetic, Money and Fractions	14
4 . Measurement & Basic Facts	17	**9** . Place Value and Fractions	13
5 . Place Value, Number Stories & Basic Facts	18	**10** . Year-End Review	12
Mid-Year Benchmark Assessment	2	End-of-the-Year Benchmark Assessment	2

Grade: 1 **Standard 4.1 Number and Numerical Operations**
Essential Question: How can problems in the real world be solved with mathematics?
How do numbers help us reason out solutions to problems?
How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
		A. Number Sense	
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers. ***Whole numbers through hundreds** ***Ordinals** ***Proper fractions (denominators of 2, 3, 4, 8, 10)**	Oral / Slate Assessment Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks Place Value Mat Cuisenaire Rods Digi-blocks Base Ten Blocks Calendar skills Number line Slides Giant Floor Number Line EM Games and Activities Auntie Pasta's Fraction Game Coins Geometric shapes Number grid Pattern Blocks Calculator EM Skills Link	*Everyday Mathematics*, Lesson 1.2, 5.6, 8.3, 10.7
**Count by 2's to 100; Count by 5's to 100*		Choral skip counting, Stop and start counting Tallies & Nickels & Pennies	*Everyday Mathematics* Lesson 1.2, 1.12. 1.13, 2.7, 2.9, 2.10, 3.2, 3.3 ongoing throughout the year

**Count up and back by 1's on the number grid to 100*		*Everyday Mathematics*, Lesson 1.5, 1.7, 2.1, 9.1 EM Skills Link EM teacher resource for grid
** Writes any number 100 or less*	EM Project 5: Calendar for the New Year EM Project 6: Celebrate the Hundredth School day	*Everyday Mathematics*, Lesson 1.2, 1.3, 1.4, 1.9, 4.10 Fish Eye: A Book You Can Count On, Lois Ehlert 1, 2, 3, Tana Hoban Can You Count Ten Toes?: Count to 10 in 10 Different Languages, Leslie Evans City by Numbers, Stephen T, Johnson
**Count up and back by 10's starting with any given number up to and including 100*	Try to develop mental math for 10s	*Everyday Mathematics*, Lesson 6.6, 9.2
**Practice counting on a number line*		*Everyday Mathematics* , Lesson 3.2, 3.5, 3.6, 3.9, 5.4
**Write and count tallies*		*Everyday Mathematics* , Lesson 1.7, 2.9
**Find equivalent names for a number*		*Everyday Mathematics* , Lesson 6.2
**Explore parts and total relationships*		*Everyday Mathematics* , Lesson 3.14, 4.6, 5.8, 9.4 Fraction Action, Loreen Leedy

**Identify fractional parts of regions and sets with a focus on unit fractions*		*Everday Mathematics*, Lesson 8.6 - 8.9, 9.6, Eating Fractions, Bruce McMillian Gator Pie, Louise Mathews Ed Emberley's Picture Pie: A Circle Drawing Book, Ed Emberley *Elementary School with Pizzazz,* Creative Publications
**Find equivalent fractions*		*Everyday Mathematics* , Lesson 9.8 Teacher Supplement
**Develop an understanding of fractional parts of a whole, unit fraction notation*		*Everyday Mathematics*, Lesson 8.6 - 8.9, 9.6 EM Resource, Fraction Book
2. Demonstrate an understanding of whole number place value concepts.		*Everyday Mathematics*, Lesson 4.7, 4.10, 5.2, 8.3
** Understand place value for 10's and 1's*		*Everyday Mathematics* , Lesson 5.1-5.3, 8.3 *Mini Flip Chart Place Digit Game: About Teaching Mathematics,* Marilyn Burns
** Identify and use patterns on a number grid or base ten blocks*	Investigate number patterns for counting by 1s and 10s May explore patterns using a calculator to generate numbers	*Everyday Mathematics*, Lesson 3.2, 3.3, 5.2, 6.5, 9.1
3. Identify whether a number is even or odd.		*Everyday Mathematics*, Lesson 3.2, 3.4, 6.7 Even Steven, Odd Todd, Kathryn Cristaldi Bears Odd, Bears Even, Harriet Ziefert Splitting the Herd, Trudy Harris

Explore sums of even and odd numbers	Whole class exploration of Domino Sort for sum even or odd, *Everyday Mathematics*, Lesson 3.14
3. Understand that numbers have a variety of uses.	*Everyday Mathematics*, activities ongoing throughout the year Teacher supplement
4. Count and perform simple computations with coins. (Amounts up to $1.00, using cents notation)	*Everyday Mathematics,* Lesson 2.8-2.11, 3.11, 3.12, 8.1 Teacher supplement *Elementary School Mathematics with Pizzazz,* Creative Publications
** Exchange pennies for nickels*	*Everyday Mathematics* , Lesson 2.9, 2.10, 3.11, 3.12 The Magic Money Machine, by Joanne Nelson
** Calculate the values of various combinations of pennies, nickels, dimes and quarters*	*Everyday Mathematics* , Lesson 2.9, 2.10, 3.11, 3.12, 6.9, 8.1 EM Resource, Museum Store Mini-Poster
** Know the values of pennies, nickels, dimes, and quarters*	*Everyday Mathematics,* Lesson 2.9, 2.10, 3.11, 3.12
**Introduce the dollar bill*	*Everyday Mathematics,* Lesson 8.2
**Explore counting up as a strategy for making change*	*Everyday Mathematics,* Lesson 8.5, 10.3, 10.4
**Solve and write simple money stories problems*	*Everyday Mathematics* , Lesson 2.13, 8.2, 10.4

**Introduce the ten dollar, hundred dollar bill*	*Everyday Mathematics,* Lesson 10.3 Teacher supplement

5. Compare and order whole numbers.

**Order and compare numbers to 22*	*Everyday Mathematics* , Lesson 1.6
**Compare numbers using < and >*	*Everyday Mathematics* , Lesson 5.3, 5.6, 5.9
**Make the largest and smallest numbers using number cards*	*Everyday Mathematics, Lesson 9.1*
**Compare fractions less than 1*	*Everyday Mathematics* , Lesson 9.7
**Compare prices*	*Everyday Mathematics* , Lesson 10.4

B. Numerical Operations

By the end of first grade (MP4), 80% of Flemington-Raritan first graders will have basic fact mastery of sums to 10.

District timed test: 20 facts in 2 minutes
Marking period packets: addition separate

1. Develop the meanings of addition and subtraction by concretely modeling and discussing a large variety of problems.	Fact Triangles Dominoes Dice Flashcards Explore strategies used to help learn facts EM Games EM Activities EM Diagrams: Change to more, Change to less, Part/Part total	*Read It, Draw It, Solve It* *Teaching Student-Centered Mathematics, in K-3,* Lovin and Van de Walle Teacher supplement *Everyday Mathematics*, Lesson 6.1, 6.5
3. Develop proficiency with basic addition and subtraction number facts using a variety of fact strategies and then commit them to memory.		*Facts in a Flash* *Basic Fact Mastery,* Otter Creek *Everyday Mathematics*, Lesson 3.14, 4.11, 4.12, 5.9 -5.11, 6.1, 6.4 Website resources *NJ Mathematics Curriculum Framework,* Grade K-2, selected activities
** Know addition facts for +1, +0 doubles and sums of 10*		*Everyday Mathematics*, Lesson 5.11
**Find complements of 10*		*Everyday Mathematics* , Lesson 2.3, 2.4 Illuminations website (Activity: Ten Frames) Anno's Counting House, Mitsumasa
**Learn and know addition facts*		*Everyday Mathematics* , Lesson 4.11, 6.3, 6.4, 6.7, 7.2, 8.9, ongoing activities throughout the year

**Construct fact families for addition and subtraction*	*Everyday Mathematics,* Lesson 6.3, 6.4, 6.7
**Investigate number grid patterns to reinforce counting, adding, and subtracting by 1s and 10s*	*Everyday Mathematics,* Lesson 9.3
4. Construct, use and explain procedures for performing addition and subtraction problems with: paper-pencil, mental math, calculator.	*Everyday Mathematics*, activities, ongoing throughout the year
**Solve simple addition and subtraction number stories*	*Everyday Mathematics,* Lesson 1.13, 2.13, 5.7, 5.8, 8.4, 10.3, 10.4 Teacher supplement Website resources
**Solve simple addition and subtraction problems by skip counting on the number line*	*Everyday Mathematics,* Lesson 3.6
**Complete simple "Frames and Arrows diagrams (B/D)*	*Everyday Mathematics,* Lesson 3.8, 3.9, 6.8
5. Use efficient and accurate pencil and paper procedures for computation with whole numbers.	Teacher supplement as needed
**Explore and solve addition of 2-digit numbers*	*Everyday Mathematics* , Lesson 5.5, 9.4 10.3, 10.4
* Solve 2-digit addition and subtraction problems	*Everyday Mathematics*, Lesson 9.4, 10.3, 10.4

8. Understand and use the inverse relationship between addition and subtraction.		
* Find simple sums and missing addends		*Everyday Mathematics*, Lesson 5.10
* Find missing numbers and/or the missing rule in "What's My Rule?" problems		*Everyday Mathematics,* Lesson 5.12, 5.13, 6.8, 8.6
* Complete simple "Frames and Arrows" diagrams		*Everyday Mathematics,* Lesson 3.8, 3.9, 6.8, 9.2
C. Estimation		
1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.	Project 3: Pumpkin Math	EM Teacher's guide
3. Explore a variety of strategies for estimating both quantities (ex. The number of marbles in a jar) and results of computation.	Estimation Jar	Teacher supplement

Grade: 1 Standard 4.2 Geometry and Measurement
Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Identify and describe spatial relationships among objects in space and their relative shapes and sizes.	Oral / Slate Assessment Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Pattern Blocks 3D shapes Geometric template Geoboards Polygons EM Activities EM Games Attribute blocks Mira/Reflection Mirrors Fraction Pieces Rulers/Master Rulers Yardstick/Meter stick Inchworms Judy clocks Stopwatch Thermometer Scales/Pan balance/Weights Create 3-D objects Anglegs	Make appropriate connections to Science Curriculum
* Sort and identify objects by attributes			*Everyday Mathematics,* activities ongoing Unit 7

2. Use concrete objects, drawings, and computer graphics to identify, classify, and describe standard three-dimensional and two-dimensional shapes.		*Everyday Mathematics,* Lesson 7.1, 7.2, 7.5, 7.6 and ongoing activities throughout the year Website resources
* Identify polygons and know their characteristics		*Everyday Mathematics,* Lesson 4.7, 6.7, 7.3. 7.4, 10.5 The Greedy Triangle, Marilyn Burns Lois Ehlert's Color Zoo, Lois Ehlert
* Identify three dimensional shapes and know their characteristics		*Everyday Mathematics,* Lesson 7.5, 7.6, 10.5
3. Describe, identify and create instances of line symmetry.		
* Identify symmetrical figures	Face symmetry project	*Everyday Mathematics,* Lesson 7.7, 9.5 *NJ Mathematics Curriculum Framework, K-2, selected activities*
4. Recognize, describe, extend and create designs and patterns with geometric objects of different shapes and colors.		*Everyday Mathematics,* Lesson 7.2, 7.3
B. Transforming Shapes 1. Use simple shapes to make designs, patterns and pictures.		*Everyday Mathematics,* Lesson 3.4, 7.2, 7.3
2. Combine and sub-divide simple shapes to make other shapes.		*Everyday Mathematics*, Lesson 7.2, 7.3
C. Coordinate Geometry 1. Give and follow directions for getting from one point to another on a map or grid.		*See map skills unit in Social Studies Curriculum*

D. Units of Measurement

1. Directly compare and order objects according to measurable attributes.	Everyday Mathematics, Lesson 2.7, 4.7, 7.1, 7.2 Teacher supplement
2. Recognize the need for a uniform unit of measure.	*Everyday Mathematics*, Lesson 4.3 Groundworks for Measurement, Creative Publications
*** Use standard units for measuring length (centimeters/inches)** ***Centimeter measures (Grade 2 secure)**	*Everyday Mathematics*, Lesson 4.3 - 4.6, 6
3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real life problems.	*Everyday Mathematics*, Lesson 4.2, 4.3, 4.6, 4.7, 6.6 How Big is a Foot?, Rolf Myller Measuring Penny, Loreen Leedy Teacher supplement Website resources
*** Measure objects to the nearest centimeter**	*Everyday Mathematics,* Lesson 6.6, activities, ongoing throughout the year Teacher supplement
**Introducing the meter*	*Everyday Mathematics* , Lesson 6.6

**Measuring to the nearest inch and half inch*	*Everyday Mathematics* , Lesson 4.5 Tom Thumb (story about inchlings), Margaret Read MacDonald Inch By Inch, Leo Lionni Jack and the Beanstalk, Traditional Folktale
**Introducing the yard*	*Everyday Mathematics* , Lesson 4.2
**Use a tape measure to measure curved and flat objects in inches*	*Everyday Mathematics* , Lesson 4.6
**Explore area by counting units*	*Everyday Mathematics* , Lesson 5.4
** Introduce and tell time using the analog clock* **Tell time to the nearest hour and half hour*	*Everyday Mathematics* , Lesson 2.5, 2.6, 3.7, 10.2 Teacher supplement with clock songs
**Telling time on the quarter hour*	*Everyday Mathematics, Lesson 4.8*
**Telling time to five minutes*	*Everyday Mathematics,* Lesson 10.2 Big Book: "What Time Is It?"
** Understand digital notation for time*	*Everyday Mathematics* , Lesson 6.10
**Introduce the use of the second hand for timing tasks*	*Everyday Mathematics* , Lesson 2.5

**Introduce Fahrenheit Thermometer* **Measure temperature to the nearest 2 degrees*		*Everyday Mathematics*, Lesson 1.12, 4.1, 10.6 Use appropriate science curriculum links www.weather.com Welcome to Green House; Welcome to Ice House, Jane Yolen Cactus Desert, Artic Tundra, Tropical Rain Forest, Donald Silver
**Explore capacity and compare*		*Everyday Mathematics,* Lesson 9.5
**Weigh objects with a pan balance* **Order by weight*		*Everyday Mathematics,* Lesson 5.4, 5.6
4. Estimate Measures	Project 3: Pumpkin Math	*Everyday Mathematics*, Lesson 4.5, 9.5 Teaching Student-Centered Mathematics, K 3, Lovin and Van de Walle
E. Measuring Geometric Objects		Teacher supplement
**Measuring and drawing line segments*		*Everyday Mathematics* , Lesson 4.2 - 4.5, 6.6,

Grade: 1 **Standard 4.3 Patterns and Algebra**

Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns.	Oral / Slate Assessment Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Pattern Blocks Attribute blocks Craft sticks Dominoes EDM Activities EDM Games Number girds Frames and Arrows	NJ Mathematics Curriculum Framework, selected activates for grades K-2 *Everyday Mathematics*, Lesson 3.1, 3.4, 3.5, 7.3 Website resources
**Count by 2's, 5's and 10's to 100*			*Everyday Mathematics,* Lesson 2.1, 2.8, 2.9, 3.2, 3.3, 3.12
** Identify and complete patterns*			*Everyday Mathematics,* Lesson 3.1, 3.4, 3.13, 7.3 National Library of Virtual Manipulatives website activities
**Identify and use patterns on a number grid*			*Everyday Mathematics,* Lesson 3.3

B.Functions and Relationships

1. Use concrete and pictorial models of function machines to explore the basic concept of a function.	*Navigations through Algebra in Grades K-2,* NCTM selected activities
**Complete simple Frames and Arrows diagrams*	*Everyday Mathematics,* activities ongoing throughout the year 3.8, 3.9
* Find simple sums and missing addends	*Everyday Mathematics*, Lesson 3.14 ongoing throughout the year
* Find missing numbers and/or the missing rule in "What's My Rule?" problems	*Everyday Mathematics*, Lesson 5.10, 5.12, 5.13, 6.8 Function Machine from Lakeshore Teacher supplement

C.Modeling

1. Recognize and describe changes over time.	
* Interpreting pictographs, bar graphs	*Everyday Mathematics* Lesson 4.5, 4.7, 6.12 *Teaching Student-Centered Mathematics, K-3*, Lovin and Van de Walle
2. Construct and solve simple open sentences involving addition or subtraction.	
* Find simple sums and missing addends	*Everyday Mathematics* Lesson 6.2 - 6.5 *Elementary School Mathematics with Pizzazz,* Creative Publications

D. Procedures

1. Understand and apply (but do not name) the following properties of addition.	Teacher supplement *Elementary School Mathematics with Pizzazz,* Creative Publications
*** Zero Identity: knows +0 addition facts**	*Everyday Mathematics*, Lesson 5.11 Teacher supplement
*** Commutative: identify simple Turn-around addition facts**	Everyday Mathematics, Lesson 5.10 Activities, ongoing throughout the year Teacher supplement
***Explore associative property when adding three numbers**	Everyday Mathematics, Activities, ongoing throughout the year Teacher supplement
**Introduce, understand and apply symbols <, > =*	Everyday Mathematics, Lesson 5.3, 5.6
**Write number model stories using more than or less than*	*Everyday Mathematics* , Lesson 5.6

Grade: 1 **Standard 4.4 Data Analysis, Probability, and Discrete Mathematics**

Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis **1. Collect, generate, record and organize data in response to questions, claims or curiosity.** ***Data collected from students' everyday experiences**	Oral / Slate Assessment Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Calendar, Weather, Morning Meeting Procedures EDM Activities EDM Games EDM Project 2: Autumn Leaves EDM Project 7: Amaryllis Plant EDM Activity: Birth-Month graph Fraction Pieces Rulers/Master Rulers Yardstick/Meter stick Judy clocks Stopwatch Thermometer Scales/Pan balance/Weights Spinners, dice, coins Attribute Blocks	*Navigations in Data Analysis, Probability in Grades K-2*, NCTM, selected activities *Everyday Mathematics*, Lesson 1.7, 1.12, 2.5, 3.13, 6.12, 10.1
2. Read, interpret, construct, and analyze displays of data.		Calendar, Weather, Morning Meeting Procedures	
**Pictures, tally chart, pictograph, bar graph, Venn diagram.*			*Everyday Mathematics*, Lesson 1.12, 3.13, 4.7, 6.12, 7.4, 7.5, 10.1 Teacher supplement Website resources
**Introduce line plots*			*Everyday Mathematics* , Lesson 3.13, 4.7, 10.1

**Smallest to largest, most frequent (mode)*		*Everyday Mathematics* , Lesson 3.13, 4.7, 6.12, 10.1
**Introduce statistical landmarks range and middle value*		*Everyday Mathematics* , Lesson 6.12, 10.1
B. Probability		
1. Use chance devices like spinners and dice to explore concepts of probability. *** certain, impossible** *** more likely, less likely, equally likely**	Project 7: Weather and Probability	*Everyday Mathematics*, Lesson 1.8 *Teaching Student-Centered Mathematics, K-3*, Lovin and Van de Walle, Chapter 12
2. Provide probability of specific outcomes.		*Teaching Student-Centered Mathematics, K-3*, Lovin and Van de Walle, page 338
C. Discrete Mathematics - Systematic Listing and Counting		*Teaching Student-Centered Mathematics, K-3,* Lovin and Van de Walle Best of Math I and II, Exemplars CD
1. Sort and classify objects according to attributes.		*Everyday Mathematics*, Lesson 4.2, 7.1, 7.2
2. Generate all possibilities in simple counting situations (e.g., all outfits involving two shirts and three pants)		Teacher supplement *Best of Math I and II, Exemplars CD*

D. Discrete Mathematics - Vertex-Edge Graphs and Algorithms

1. Follow simple sets of directions.	Teacher supplement
2. Color simple maps with a small number of colors.	See map skills Social Studies Curriculum Website resources
3. Play simple two-person games and informally explore the idea of what the outcome should be.	Teacher supplement

Grade: 1 **Standard 4.5 Mathematical Processes**

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and, as such, all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference?
How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving **1. Learn mathematics through problem solving, inquiry, and discovery.**	Oral / Slate Assessment Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	EDM games EDM Activities Explore ways to solve problems using manipulatives, models, drawing a picture, acting it out, working backwards, guessing and checking	*Everyday Mathematics*, Activities throughout the year *Groundworks Series,* selected problems *Best of Math I and II, Exemplars CD* Website resources for appropriate leveled problems *Read It, Draw It, Solve It* - Dale Seymour Publications *8- Step Model Drawing* Crystal Springs Books *The Problem-Solver* - Creative Publications *Roads To Reasoning* - Creative Publications
2. Solve problems that arise in mathematics and in other contexts.			*Best of Math I and II, Exemplars CD* *Teaching Student-Centered Mathematics in grades K-3*, Lovin and Van de Walle
***Open-Ended problems**			Teacher supplement Sample open-ended problems, various resources *Everyday Mathematics,* Unit Assessment Open Response
***Non-Routine problems**			*NJ Mathematics Curriculum Frameworks*, selected activities
***Problems with multiple solutions**			Website resources
***Problems that can be solved in several ways**			*Best of Math I and II, Exemplars CD*

3. Select and apply a variety of problem solving strategies to solve problems.	*Everyday Mathematics*, Activities, ongoing throughout the year Teacher supplement *Elementary School Mathematics with Pizzazz,* Creative Publications *The Problem-Solver* - Creative Publications *Roads To Reasoning* - Creative Publications *Read It, Draw It, Solve It* - Dale Seymour Publications
4. Pose problems of various types and levels of difficulty.	*Everyday Mathematics*, Lesson 8.2 Teacher supplement
5. Monitor their progress and reflect on the process of their problem solving activity.	Teacher created rubrics *Best of Math I and II, Exemplars rubric*
B. Communication	
1. Use communication to organize and clarify their mathematical thinking.	Teacher supplement *Read It, Draw It, Solve It* - Dale Seymour Publications
2. Communicate their mathematical thinking coherently clearly to peers, teachers, and others, both orally and in writing.	Best of Math I and II, Exemplars CD
3. Analyze and evaluate the mathematical thinking and strategies of others.	*Everyday Mathematics*, Lesson 7.2

C. Connections		
1. Recognize recurring themes across mathematical domains.		*Everyday Mathematics*, Lesson 1.2, 1.9 Teacher supplement
2. Use connections among mathematical ideas to explain concepts.	Project: 5 Apple Math Project 2 Amaryllis Plant	
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Project 1 Geometric Gift Wrap and Greeting Cards	*Everyday Mathematics*, Lesson 1.9, 2.2 Link to Social Studies: discuss museum, community helpers
4. Apply mathematics in practical situations in other disciplines.	Seed Unit, Climate Zones	Science Curriculum, Social Studies Curriculum
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).		*Everyday Mathematics*, Lesson 4.9 See Science, Social Studies curriculum for resources and connections
D. Reasoning		
1. Recognize that mathematical facts, procedures, and claims must be justified.		*Everyday Mathematics*, Lesson 7.4
2. Use reasoning to support their mathematical conclusions and problem solutions.		*Everyday Mathematics*, Lesson 1.10, 7.4
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.		Teacher supplement

6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Teacher supplement Create student friendly rubric Website resources
E. Representations	
1. Create and use representations to organize, record, and communicate mathematical ideas. ***Concrete representations** ***Pictorial representations** ***Symbolic representations**	*Everyday Mathematics*, Lesson 1.1, 1.10 NJ Mathematics Curriculum Framework, selected activities *Groundworks Series,* selected problems *Best of Math I and II, Exemplars CD* Website resources for appropriate leveled problems *Read It, Draw It, Solve It* - Dale Seymour Publications *8- Step Model Drawing* Crystal Springs Books *The Problem-Solver* - Creative Publications *Roads To Reasoning* - Creative Publications
F. Technology	
4. Use calculators as problem solving tools.	*Everyday Mathematics*, Lesson 2.4, 3.10, 8.1 8.2 Texas Instruments resources

Second Grade Math
Pacing Guide

Unit	Number of Days (Approximate)	Unit	Number of Days (Approximate)
1 - Number and Routines	14	**7 -** Patterns and Rules	13
2 - Addition & Subtraction	18	**8 -** Fractions	12
3 - Place Value, Money, & Time	13	**9 -** Measurement	15
4 - Addition & Subtraction	14	**10 -** Decimals and Place Value	16
5 - 3-D and 2-D Shapes	13	**11 -** Whole-Number Operations Revisited	14
6 - Whole Number Operations & Number Stories	15	**12 -** Year-End Review & Extensions	10
Mid-Year Benchmark Assessment	1	End-of-the-Year Benchmark Assessment	1

Grade: 2 **Standard 4.1 Number and Numerical Operations**
Essential Question: How can problems in the real world be solved with mathematics?
How can estimation be useful to us?
How do numbers help us reason out solutions to problems?
How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 2 pertain to these sets of numbers as well)	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games Digi-blocks Base Ten Blocks Calendar skills	NJ Mathematics Curriculum Framework grades K-2, selected activities
Ordinals (First grade secure)			*Everyday Mathematics,* Lesson 1.3 Teacher supplement
***Whole numbers through hundreds**		Number Lines & Open Number Lines	*Everyday Mathematics*, Lesson 1.1
***Proper fractions (denominators of 2, 3,4, 8, 10)**		Fraction Tiles Cuisenaire Rods	*Everyday Mathematics,* Lessons Unit 8 & 11 Teacher supplement Website resources *Elementary School Mathematics with Pizzazz,* Creative Publications
**Count by 2's, 5's and 10's through hundreds*			*Everyday Mathematics,* Lessons 1.10, 1.11
**Make tallies and give the total*			*Everyday Mathematics,* Lessons 1.7, 1.9, 1.11, 1.12

* *Find equivalent names for numbers* * *Name collection boxes*	Fact Families Funny Numbers Roman Numerals Ten-Frames	*Everyday Mathematics* Lessons 1.9 1.13, 2.9,
**Understand that the amount represented by a fraction depends on the size of the whole*		Eating Fractions, Bruce McMillian Gator Pie, Louise Matthews Ed Emberley's Picture Pie: A Circle Drawing Book, Ed Emberley *Everyday Mathematics*, Lessons 8.1, 8.2 Teacher Supplement: *Teaching Student-Centered Mathematics*, K-3, Lovin and Van de Walle
**Shade a specified fractional part of a region or collection*		*Everyday Mathematics*, Lessons 8.3, 8.5 Fraction Factory Game *Elementary School Mathematics with Pizzazz*, Creative Publications
* *Give the fraction name for the shaded part of a region or collection (Denominators 2, 3, 4, 8, 10)*	Auntie Pasta's Fraction Game	*Everyday Mathematics*, Lessons 8.1 - 8.6 Teacher supplement Website games and resources
**Understand fractions as names for equal parts of a region or set*		*Everyday Mathematics*, Lessons 8.4, 8.5 EM resource for fraction circles, Math Masters, page 144

**Compare fractions*		*Everyday Mathematics* , Lesson 8.5 Fraction Kit, Marilyn Burns
**Solve number stories involving fractions*		*Everyday Mathematics,* Lesson 8.7
2. Demonstrate an understanding of whole number place value concepts.		Place Value Mini Flip Charts *A Collection of Math Lessons*, Marilyn Burns "Digit Place" Game pg 73-75 *Groundworks-Reasoning with Numbers, Grade 2*, Creative Publications
** Identify place value in 1, 2, 3 and 4 digit numbers.*		*Everyday Mathematics* Lessons 1.9, 3.1, 10.8, 10.9, 10.10 Place Value Mini Flip Charts *A Collection of Math Lessons*, (1-3) Marilyn Burns, "Digit Place" Game pg 73-75
** Identify place value for ones, tens and hundreds.*		*Everyday Mathematics,* Lessons 1.9, 1.12, 1.13.
** Know and express automatically the values of digits in 5 digit numbers.*	Quizmo Bingo	Teacher supplement Website resources
** Solve number grid puzzles*		*Everyday Mathematics,* Lessons 1.8, 7.2, 10.6, 11.2

3. Understand that numbers have a variety of uses.		Teacher supplement: bring in number related math ideas from everyday life as often as possible
4. Count and perform simple computations with coins. ***Amounts up to $1.00 using cent notation.**		*Everyday Mathematics*, Lessons 3.2, 3.7, 3.8, 10.2 EM Fruit Stand Poster, page 54 EM Milk and Juice Vending Machine, EM Math Masters, page 58 EM Good Buys Poster, Journal, page 240 The Purse, by Kathy Caple
** Find values of bill combinations, including $1, $5, $10, and $100.*	Money Bags Game Allowance Game	*Everyday Mathematics,* Lessons 1.2, 1.5, 3.2, 3.8, 4.3, 4.6, Overhead Money, play/real money
**Show "P" "N" "D" and "Q" for a given amount.* **Make change up to $1.00.* **Making change from $10.00*		*Everyday Mathematics,* Lesson 1.2, 1.6, 3.2, 4.3 *Everyday Mathematics,* Lessons 1.2, 1.6, 3.2, 3.7, 3.8, 4.3, 4.6, 10.6 EM resource, Good Buys Poster, Alexander, Who Used to be Rich Last Sunday, Judith Viorst
** Know exchange values of US coins.*		*Everyday Mathematics* , Lesson 3.8 Teacher supplement Website resources

**Use equivalent coins to show money amounts in different ways.*	*Everyday Mathematics* , Lessons 3.2, 10.1, 10.4 Teacher supplement
**Use a calculator to compute money amounts.*	*Everyday Mathematics* , Lessons 10.3, 10.4 EM resource, Then and Now Poster
**Solve money stories involving change.*	*Everyday Mathematics* , Lessons 4.5, 10.2, 10.5, 11.1 Create a math center class store to practice shopping EM resources, Art Supply Poster The Great Party Supply Store Pigs Will Be Pigs: Fun with Math and Money, Amy Axelrod

5. Compare and order whole numbers.

**Compare and order numbers using less than, greater than, and equal to.*	Big Book, More or Less *Everyday Mathematics* Lessons 1.11

B. Numerical Operations

By the end of second grade, 80% of Flemington-Raritan second grade students will have basic fact mastery for addition facts 0-9, and 70% of Flemington-Raritan second grade students will have basic fact mastery for subtraction facts 0-9.

District Timed Tests: 20 facts in one minute

Marking period packets: MP 1, 2, 3, 4 Addition and Subtraction separate

1. Develop the meanings of addition and subtraction by concretely modeling and discussing a large variety of problems.

Teaching Student-Centered Mathematics, Grades K-3, Lovin and Van de Walle

***Joining, separating and comparing**

Everyday Mathematics, Lessons 2.7, 4.1, 4.2
Teacher supplement
Website resource
Putting Together & Taking Apart, student sheets 13-16, Dale Seymour Publications by K. Economopoulus & S.J. Russell

**Solve simple addition number stories.*

Everyday Mathematics Lessons 2.1, 4.1, 4.2, 6.4
Some students may begin to recognize parts and total or change to more ideas in their stories
Make a class addition story book
Fish Poster
Coins, Coupons, & Combinations, story problems pgs. 157-162, Dale S. Seymour
Start-Change-End diagram

**Write addition and subtraction number stories.*		*Everyday Mathematics* , Lesson 6.2 NJPASS State rubric
**Solve addition and subtraction stories*	Close To 20	*Everyday Mathematics* Lessons 2.1, 4.1, 4.2, 4.6, 6.2-6.4, 11.1, 11.2 Twelve Ways to Get Eleven, Eve Merriam EM Diagram resource EM resource for jumping height data
2. Explore the meanings of multiplication and division by modeling and discussing problems.		
**Model multiplication and division with arrays.*		*Everyday Mathematics* , Lesson 6.7 - 6.9 EM resource: Multiplication array, One Hundred Hungry Ants, Elinor J. Pinczes *Teaching Student-Centered Mathematics K-3*, Lovin and Van de Walle Website resources
**Construct multiplication/division fact families.*		*Everyday Mathematics,* Lessons 11.7 - 1.9, 12.4, 12.5
**Multiply numbers with 2, 5, or 10 as a factor.*		*Everyday Mathematics,* Lesson 7.1, 11.6
**Introduce a products table and find patterns for O and 1 facts*		*Everyday Mathematics,* Lesson 11.7

**Solve stories about multiplication of equal groups*		*Everyday Mathematics,* Lesson 6.8, 6.9, 6.10, 11.4 Teacher supplement Each Orange Had Eight Slices: A Counting Book, Paul Giganti, Jr. Sea Squares, Joy N. Hulme EM resource: multiplication diagram
**Solve equal grouping and equal sharing division problems*		*Everyday Mathematics,* Lesson 6.10, 11.5, 12.5 A Remainder of One, Elinor J. Pinczes EM resource: division diagram Teacher supplement
**Solve simple multiplication and division number stories.*		*Everyday Mathematics* , Lesson 11.4, 11.5
3. Develop proficiency with basic addition and subtraction number facts using a variety of fact strategies (such as counting on and near doubles) and then commit them to memory.	Oh No 20! Pyramid of 10 Rio Addition	*Teacher Supplement* *Everyday Mathematics*, ongoing activities throughout the year (Double facts) *Everyday Mathematics*, Lesson 2.3, EM Two of Everything: A Chinese Folktale, Lily Toy Hong (+ /- Facts table) (Domino-Dot Patterns) (+(shortcut) *Facts in a Flash* *Fast Facts* Website resources

**Review +0 and +1 addition facts*	*Everyday Mathematics,* Lesson 2.2 Fish Eyes: A Book You can Count On, Lois Ehlert
**Know addition facts, sums to 18.*	*Everyday Mathematics* Lesson 2.1-2.6, 2.10, EM Skills Link Website resources Illuminations website- Five and Ten Frame activities
**Explore and practice double-plus 1 and doubles-plus 2 facts*	*Everyday Mathematics,* Lesson 2.5
**Know subtraction facts.*	*Everyday Mathematics,* Lesson 2.6, 2.7, 2.10, 2.11, 2.12, 2.13, 3.6, 4.4, 6.2, 6.4, 6.5 Teacher supplement: website, games, extra practice
**Construct fact families for addition and subtraction*	*Everyday Mathematics,* Lesson 2.6, 2.7, 2.10
**Practice doubling and halving*	*Everyday Mathematics* , Lesson 2.3 & 7.5 Anno's Magic Seeds, Two of Everything: A Chinese Folktale, Lilly Toy Hong
** Find distances on a number grid, number line*	*Everyday Mathematics* , Lesson 2.2, 2.10, 3.6, 4.1
**Complete simple Frames-and-Arrows diagrams.*	*Everyday Mathematics,* Lesson 2.10
**Solve Frames and Arrow problems having two rules*	*Everyday Mathematics,* Lesson 2.10, 3.6

4. Construct, use and explain procedures for performing addition and subtraction calculations with: ***pencil and paper** ***mental math** ***calculator**	*Everyday Mathematics*, Lesson 4.8, 4.9 EM Skills Book Website Resources for practice
**Add and subtract multiples of 10*	*Everyday Mathematics* , Lesson 1.5, 1.8, 1.10, 3.1, 3.4, 4.5, 4.6-4.9, 6.5, 7.1, 10.9
** Know compliments of 10. (using two digit numbers)*	*Everyday Mathematics*, Lesson 7.2 Illumination web-site (Ten Frames) Website resources
**Find missing addends for the next multiple of 10.*	*Everyday Mathematics* , Lesson 7.2, selected activities *Elementary School Mathematics with Pizzazz*, Creative Publications
5. Use efficient and accurate pencil and paper procedures for computation with whole numbers. ***Addition of 2-digit numbers** ***Subtraction of 2-digit numbers**	*Everyday Mathematics*, activities, ongoing throughout the year Website resources *Elementary School with Pizzazz*, Creative Publications
** Devise and use strategies for finding sums and differences of 2-digit numbers.*	*Everyday Mathematics,* Lesson 4.6, 4.8 Teacher Supplement Website resources for practice EM Skills Book

**Use partial-sums, traditional and other algorithms to develop a successful strategy for addition*	*Everyday Mathematics,* Lesson 4.9 Teacher supplement
**Use the trade-first and other methods to solve 2-digit subtraction problems.*	Teacher supplement *Everyday Mathematics*, Lesson 6.4, 6.5 Website resources
**Add three 2-digit numbers mentally*	*Everyday Mathematics, L* esson 7.3 EM Skills Link Website resources EM teacher resource
6. Select pencil and paper, mental math or calculator as the appropriate computational method in a given situation depending on the context and numbers.	Teacher Supplement with problem solving situations Website resources
** Devise and use strategies for finding sums and differences of 2-digit numbers.*	*Everyday Mathematics*, Lesson 11.3 Activities ongoing throughout the year Teacher supplement
7. Check the reasonableness of results of computations.	*Everyday Mathematics* activities, ongoing throughout the year Teacher supplement

Select and use various types of reasoning and methods of proof. Use reasoning to support their mathematical conclusions and problem solutions.	Best of Math I and II, Exemplars CD *Roads to Reasoning Series*, Creative Publications NJPASS State rubric Website resources *Read It Draw It Solve It*
*Make ballpark estimates	*Everyday Mathematics* , Lessons 4.5, 4.8, 4.9, 10.5, 10.6, 11.1 Teacher supplement
8. Understand and use the inverse relationship between addition and subtraction.	
*Frames and Arrows	*Everyday Mathematics* , Lesson 2.10 and ongoing throughout the year *Teaching Student Centered Mathematics, Grades K-3*, Lovin and Van de Walle pgs 58-59
*What's My Rule? Everyday Mathematics, Lesson 2.11 and ongoing throughout the year	See also Function machines
*Diagramming Number Stories	*Everyday Mathematics,* Lesson 2.4 Teacher Supplement *8- Step Model Drawing*, Bob Hogan & Char Forsten, Crystal Springs Books 2007
*Understand parts to whole relationships using addition and subtraction.	Teacher Supplement *Teaching Student Centered Mathematics, Grades K-3*, Lovin and Van de Walle
*Develop and find missing addends.	Teacher Supplement

C. Estimation

1. Judge without counting whether a set of objects has less than, more than or the same number of objects as a reference set.	Teacher supplement
2. Determine the reasonableness of an answer by estimating the result of computations (e.g., 15 + 16 is not 211).	*Everyday Mathematics,* Lesson 4.5 and ongoing throughout the year
3. Explore a variety of strategies for estimating both quantities (e.g., the number of marbles in a jar) and results of computation.	
**Example - Estimating the number of marbles in a jar.*	Teacher supplement

Flemington-Raritan School District
Mathematics Curriculum

Grade: 2 Standard 4.2 Geometry and Measurement

Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
	A. Geometric Properties		
1. Identify and describe spatial relationships between objects in space and their relative shapes and sizes.	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games Geoboards Attribute Blocks Miras 3-D Nets Polygon Tiles Wooden 3-D shapes Attribute Bingo Tangram Packet Anglegs	*Everyday Mathematics*, Unit 5 NJ Mathematics Curriculum Frameworks K-2, selected activities *Teaching Student Centered Mathematics, K-3,* Lovin and Van de Walle
*** Inside/outside, left/right, above/below, between**			*Everyday Mathematics* activities, ongoing throughout the year Teacher supplement
***Smaller/larger/same size, wider/ narrower, longer/shorter**			*Everyday Mathematics*, Lesson 5.4 Teacher supplement
***Congruence (same size and shape)**			*Everyday Mathematics*, Lesson 5.6 Teacher supplement Website resources

***Sort and classify objects according to attributes.**	*Everyday Mathematics* , Lesson 5.4 Teacher supplement
**Define, name and draw point and line segments,*	*Everyday Mathematics,* Lesson 5.2
**Introduce concept of parallel*	*Everyday Mathematics,* Lesson 5.3 Create a symmetry booklet or bulletin board
2. Use concrete objects, drawings and computer graphics to identify, classify and describe standard three-dimensional and two-dimensional shapes.	
*** Vertex, edge, face, side**	Grandfather Tang's Story, *Ann Tompert* *Teaching Student-Centered Mathematics, K-3,* Lovin and Van de Walle *Everyday Mathematics*, Lesson 5.6, 5.7 Create class chart Website resources
*** 2D Figures- square, rectangle, circle, triangle**	*Everyday Mathematics*, Lesson 4.7, 5.1 The Greedy Triangle, Marilyn Burns A Cloak for the Dreamer, Aileen Friedman Website resources
*** 3D Figures-cube, rectangular prism, sphere, cone, cylinder, and pyramid**	*Everyday Mathematics*, Lesson 5.6, 5.7 Laminate Pyramid Base cards, Website resources Shapes, Shapes, Shapes, Tana Hoban

**Identify names and characteristics of quadrangles, beyond square and rectangle*		*Everyday Mathematics,* Lesson 5.3 & 5.4 Teacher supplement
***Relationships between three-and two dimensional shapes**		*Groundworks Reasoning with Measurement*, Creative Publications *Everyday Mathematics*, Lesson 5.6 & 5.7
3. Describe, identify, and create instances of line symmetry	*Shapes, Halves, and Symmetry* pg. 196 & 197	*Everyday Mathematics, Lesson 5.8* Lao Lao of Dragon Mountain, Margaret Bateson-Hill Website resources EM Project 5: Making Snowflakes *Investigations in Number, Data, and Space: Shapes, Halves & Symmetry,* Joan Akers
4. Recognize, describe, extend, and create designs and patterns with geometric objects of different shapes and sizes	Shapes, Halves, & Symmetry Pg 172 - 175 (Predict & Cover)	*Everyday Mathematics*, Lesson 5.5
B. Transforming Shapes		
1. Use simple shapes to make designs, patterns, and pictures		*Everyday Mathematics*, Lesson 5.1, 5.5, 10.7 Shapes, Shapes, Shapes, Tana Hoban The Art of Shapes for Children and Adults, Margaret Steele and Cindy Estes Website resources
2. Combine and subdivide simple shapes to make other shapes		*Everyday Mathematics*, Lesson 5.1, 5.5, 8.2 Teacher supplement

C. Coordinate Geometry

1. Give and follow directions for getting from one point to another on a map or grid		Teacher Supplement See Social Studies Unit on Map Skills
D. Units of Measurement		
1. Directly compare and order objects according to measurable attributes ***Attributes- length, weight, capacity, time, temperature.**	Mapping Flat Stanley	*Everyday Mathematics*, Lesson 4.3, 4.7, 5.1
2. Recognize the need for a uniform unit of measure		*Everyday Mathematics*, Lessons 4.4, 4.7, 7.5 - 7.7, Unit 9, *Navigations in Measurement, grades K-2,* NCTM, selected activities
3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real life problems.		*Everyday Mathematics*, activities, ongoing in Unit 9 Teacher supplement Website resources *Groundworks -Reasoning with Measurement,* Creative Publications *Elementary School Mathematics with Pizzazz,* Creative Publications

*** Length- inch, foot, yard, centimeter, meter**		*Everyday Mathematics*, Lesson 4.7, 7.5, 7.6, 9.1, 9.2 How Big is a Foot? Rolf Myller Counting on Frank, Rod Clement Twelve Snails to One Lizard: A Tale of Mischief and Measurement, Susan Hightower EM resource, A Foot and A decimete Create a class table of equivalent measures in US customary and metric
**Investigate accuracy in measurement using tools, 1/2 inch, 1/2 centimeter*		*Everyday Mathematics,* Lesson 9.3 Teacher supplement Website resources Inch by Inch, Leo Lionni
**Introduce the mile and kilometer*		*Everyday Mathematics, Lesson 9.5*
***Weight- pound, gram, kilogram** **ounce*		*Everyday Mathematics,* Lesson 2.8, 7.5, 9.9
***Capacity- pint, quart, liter**		*Everyday Mathematics*, Lesson 9.8 Create class table of equivalencies *Elementary School Mathematics with Pizzazz*, Creative Publications
***Time- second, minute, hour, day, week, month, year**		*Everyday Mathematics*, Lesson 1.3, 5.1, 12.1 - 12.3
**Tell time to five minute intervals*	Project 8: How Far Can I Run in 10 Seconds?	*Everyday Mathematics* Lesson 3.3, 3.4, 5.1, 12.2 Website resources

***Temperature- degrees Celsius, degrees Fahrenheit**	Project 2: Weather Station A Week of Weather Observations	Thermometer *Everyday Mathematics*, Lesson 1.12, 4.3, 4.4 Link to science units on temperature around the country and world
5. Solve problems involving elapsed time.		*Everyday Mathematics*, Lesson 4.9, 12.3 Teacher supplement *Elementary School Mathematics with Pizzazz*, Creative Publications
4. Estimate measures		Teacher supplement Website resources
E. Measuring Geometric Objects		
1. Directly measure the perimeter of simple two-dimensional shapes		*Everyday Mathematics*, Lesson 9.4 *Navigation with Measurement*, K-2, NCTM
2. Directly measure the area of simple two-dimensional shapes by covering them with squares.		*Everyday Mathematics*, Lesson 4.7, 9.7, 10.7 NJ Mathematics Curriculum Framework, grades K-2, selected activities
** Develop the concept of area as square units*		*Everyday Mathematics* , Lesson 9.7, 10.7 *Teaching Student-Centered Mathematics, in Grades K-3*, Lovin and Van de Walle
**Investigate perimeter and area relationship*		*Everyday Mathematics,* Lesson 9.7 Teacher supplement Website resources
**Explore concept of volume*		*Everyday Mathematics* , Lesson 8.2 *Teaching Student-Centered Mathematics, Grades K-3*, Lovin and Van de Walle, pg 239-240.

Grade: 2 Standard 4.3 Patterns and Algebra			
Essential Questions: How can patterns help in problem solving?			
How can symbols be used to help us in problem solving?			
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?			
Knowledge/Skills/Understandings	**Assessments**	**Learning Experiences**	**Resources**
A. Patterns			
1. Recognize, describe, extend and create patterns	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games Geoboards Attribute Blocks Miras, reflection mirrors 3-D Nets Polygon Tiles Wooden 3-D shapes Attribute Bingo Tangram Packet Anglegs	*Everyday Mathematics,* Lesson 1.10, 1.8, 2.10, 7.1, 7.5 Teacher supplement
***Using concrete materials (manipulatives), pictures, rhythms, & whole numbers**		Project 1: Boxes, Boxes, Beautiful Boxes	Teacher supplement
***Descriptions using words and symbols (e.g., "add two" or "+2")**			Teacher supplement
***Repeating patterns.**			
***Whole number patterns that grow or shrink as a result of repeatedly adding or subtracting a fixed number**			*Everyday Mathematics*, Lesson 1.10 Teacher Supplement
**Complete number sequences; identify and use number patterns to solve problems.*			*Everyday Mathematics* Lesson 1.1, 1.8, 1.10
**Solve Number Grid Puzzles*			*Everyday Mathematics*, Lesson 1.8

B. Functions and Relationships			
1. Use concrete and pictorial models of function machines to explore the basic concept of a function.			Teacher supplement *Teaching Student-Centered Mathematics, K-3,* Lovin and Van de Walle
**Complete "What's My Rule," Input/Output Tables, and T- Charts.*			*Everyday Mathematics*, Lesson 2.11 Ongoing throughout the year
**Complete simple Frames-and-Arrows diagrams.* **Complete two rule "Frames-and-Arrows" diagrams*			*Everyday Mathematics*, Lesson 2.10, 3.6 Activities ongoing throughout the year
C. Modeling			
1. Recognize and describe changes over time (e.g., temperature, height).			Teacher supplement
** Interpreting pictures, tally charts, pictographs, bar graphs, and Venn diagrams*			Teacher Supplement Website resources
**Collecting daily weather data*			Teacher Supplement Website resources
2. Construct and solve simple open sentences involving addition or subtraction.			*Everyday Mathematics*, activities, ongoing throughout the year Teacher supplement with website resources and other published worksheets
***Result unknown (e.g., 6 - 2 = ___ or n = 3 + 5)**			Ongoing activities throughout the year *Elementary School Mathematics with Pizzazz*, Creative Publications

***Part unknown (e.g., 3 + __ = 8)**			Ongoing activities throughout the year EM Skills Link
D. Procedures			
***Commutative (e.g., 5 +3 = 3 + 5)** ***Turn-Around Facts.**			Teacher Supplement Everyday Mathematics, Lesson 2.4
***Zero as the identity element (e.g., 7 + 0 = 7)**			Everyday Mathematics, Lesson 2.2 Teacher supplement
***Associative (e.g., 7 + 3 + 2 can be found by first adding either 7 + 3 or 3 + 2)**			Everyday Mathematics, Lesson 10.11 Teacher supplement
***Introduce the use of parentheses in number models**			Everyday Mathematics, Lesson 10.11

Grade: 2 **Standard 4.4 Data Analysis, Probability, and Discrete Mathematics**
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1. Collect, generate, record, and organize data in response to questions, claims or curiosity.	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games Calendars Graphs/Charts Attribute Blocks Miras, reflection mirrors Dominoes	*Navigations in Data Analysis and Probability in K-2, NCTM,* selected activities NJ Mathematics Framework, grades K-2, selected activities
*** Data collected from students' everyday experiences.**			*Everyday Mathematics*, Lesson 3.5, 6.3, 7.6 Website resources
**Collecting daily weather data*			Daily morning activities, ongoing throughout the year
*** Data generated from chance devices, such as spinners and dice**			*Everyday Mathematics*, Lesson 3.2. Frog Math, *Math by All Means: Probability 1-2,* Marilyn Burns *Groundworks Reasoning with Probability,* Creative Publications

2. Read, interpret, construct and analyze displays of data	*Everyday Mathematics*, Lesson 7.6 - 7.8, 12.6, 12.7 Teacher supplement
***Pictures, tally charts, pictograph, bar graph, Venn diagram**	*Everyday Mathematics*, Lesson 3.5, 7.9 Link data examples from Language Arts, Science, Social Studies Curriculum Teacher supplement
***Smallest to largest, most frequent, mode**	*Everyday Mathematics,* Lesson 10.10, 12.7 Teacher supplement
** Finding the middle number (median) in a set of data*	*Everyday Mathematics,* Lesson 3.5, 7.6, 12.7 Website resources
**Review range of data*	*Teacher supplement*
B. Probability	
1. Use chance devices like spinners and dice to explore concepts of probability	*Math By All Means, Probability 1-2,* Marilyn Burns *Elementary School Mathematics with Pizzazz,* Creative Publications
***Certain, impossible**	Teacher Supplement
***More likely, less likely, equally likely**	Teacher Supplement

2. Provide probability of specific outcomes.	District teacher made packets *Best of Math I and II, Exemplars*, CD *Navigations in Data Analysis and Probability, K-2,* NCTM, selected problems Website resources
D. Discrete Mathematics-Vertex, edge graphs and Algorithms	
*** Probability of getting specific outcome when coin is tossed, when die is rolled, when spinner is spun (e.g., if spinner has five equal sectors, then probability of getting a particular sector is one out of five.)**	*Groundworks-Reasoning with Probability,* Creative Publications NJ Mathematics Curriculum Framework, grades K-2, 3-4, selected activities
*** When picking a marble from a bag with three red marbles, the probability of getting a red marble is three out of seven.**	*Teaching Student-Centered Mathematics in grades K -3,* Lovin and Van de Walle
C. Discrete Mathematics - Systematic Listing and Counting	
1. Sort and classify objects according to attributes.	*Everyday Mathematics*, selected activities, Unit 5 Teacher supplement
***Venn Diagrams**	Teacher supplement
2. Generate all possibilities in simple counting situations	*Read It! Draw It! Solve It!* Teacher Supplement *Best of Math I & II, Exemplar* CD

1. Follow simple sets of directions	*Navigations Through Geometry Pre K-2,* NCTM See Map skills, Social Studies Curriculum
2. Color simple maps with a small number of colors.	District-teacher made worksheets Website resources for maps
3. Play simple games and informally explore the idea of what the outcome should be.	*Math by All Means: Probability 1-2,* Marilyn Burns NJ Mathematics Curriculum Framework, K-2, selected activities
4. Explore concrete models of vertex-edge graphs **Paths from one vertex to another*	*Navigations Through Geometry PreK- 2,* NCTM Teacher supplement

Grade: 2 **Standard 4.5 Mathematical Processes**

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference?
How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving inquiry and discovery.	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games Exemplars Anglegs Pattern Blocks Attribute Blocks 3-D Shapes MIRA reflection mirrors	*Teaching Student-Centered Mathematics, Grades K-3*, Lovin and Van de Walle *Best of Math I and II, Exemplars* CD Website resources for open-ended problems
2. Solve problems that arise in mathematics and in other contexts.			*Best of Math I and II, Exemplars* CD Use examples of math that occur daily in life Teacher supplement NJ Mathematics Curriculum Framework, page 46 - 47

*** Open ended problems**	*Best of Math I and II, Exemplars* CD *Groundworks* books, Creative Publications, selected activities Website resources NJ state rubric *Roads to Reasoning, Developing Thinking Skills,* Suzanne Levin
*** Non-routine problems**	*Best of Math I and II, Exemplars* CD Website resources *Everyday Mathematics* activities, ongoing throughout the year
*** Problems with multiple solutions**	*Best of Math I and II, Exemplars* CD *Navigation series*, NCTM, selected activities *Read It Solve It Draw It*
*** Problems that can be solved in several ways**	*Best of Math I and II, Exemplars* CD Sample problems form published workbooks or internet sources
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.	*Best of Math I and II, Exemplars* CD *Groundworks* series, selected activities, Creative Publications Teacher supplement
4. Pose problems of various types and levels of difficulty.	Website resources Teacher Supplement
5. Monitor their progress and reflect on the process of their problem solving activity.	*Read It! Draw It! Solve It!* *Best of Math I and II, Exemplars* CD *Roads to Reasoning,* Suzanne Levin
B. Communication	

1. Use communication to organize and clarify their mathematical thinking.	*Read It! Draw It! Solve It!* *Best of Math I and II, Exemplars CD* *Roads to Reasoning,* Suzanne Levin
*** Reading and writing**	Website resources NJ Mathematics Curriculum Framework, K-2 selected activities
***Discussion, listening and questioning**	Teacher supplement
***2.* Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.**	*Read It! Draw It! Solve It!* *Teaching Student-Centered Mathematics, in Grades K-3,* Lovin and Van de Walle, page 4 - 6
***3.* Analyze and evaluate the mathematical thinking and strategies of others.**	*Read It! Draw It! Solve It!* *Best of Math I and II, Exemplars CD* *Roads to Reasonin,* Suzanne Levin *g* Website resources
4. Use the language of mathematics to express mathematical ideas precisely.	NJ Mathematics Curriculum Framework, grades K-2, selected activities
C. Connections	
1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	Teacher supplement with website and other resources
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	*Read It! Draw It! Solve It!* *Roads to Reasoning,* Suzanne Levin Teacher supplement

3. Recognize that mathematics is used in a variety of contexts outside of mathematics.		*Everyday Mathematics*, Lesson 1.1 *Best of Math I & II Exemplars CD* *Roads to Reasoning,* Suzanne Levin Incorporates appropriate math ideas with Science, Language Arts and Social Studies Curriculum
4. Apply mathematics in practical situations and in other disciplines.		*Read It! Draw It! Solve It!* Teacher supplement Website Resources
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Project 6: Time Capsule	*Everyday Mathematics*, Lesson 1.1, 12.3 See Social Studies curriculum activities
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.		Teacher supplement
D. Reasoning		
1. Recognize that mathematical facts, procedures, and claims must be justified.		*Read It! Draw It! Solve It!* *Best of Math I and II, Exemplars CD* *Roads to Reasoning,* Suzanne Levin
2.Use reasoning to support their mathematical conclusions and problem solutions.		Teacher Supplement NJ Mathematics Curriculum Framework K-2, selected activities NJ State Rubric *Best of Math I and II, Exemplars* CD

3. Select and use various types of reasoning and methods of proof.	*Read It! Draw It! Solve It!* *Groundworks,* selected activities Creative Publlications Website resources
4. Rely on reasoning, rather than answer keys, teachers, or peers, the check the correctness of their problem solutions.	Website resources
5. Make and investigate mathematical conjectures.	*Read It! Draw It! Solve It!* Teacher supplement Website resources
*** Counterexamples as a means of displaying conjectures.**	Teacher supplement
*** Verifying conjectures using informal reasoning or proofs.**	Teacher supplement
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Teacher Supplement
E. Representations	
1. Create and use representations to organize, record, and communicate mathematical ideas.	*Read It! Draw It! Solve It!* *Best of Math I and II, Exemplars CD* *Roads to Reasoning,* Suzanne Levin *Groundworks* series, selected activities, Creative Publications *Elementary School Mathematics with Pizzazz,* Creative Publications Teacher supplement
*** Concrete representations (e.g., base-ten blocks)**	*Everyday Mathematics*, Lesson 1.2

*** Pictorial representations (e.g., diagrams, charts, or tables)**	*Everyday Mathematics*, Lesson 1.2, 1.3
*** Symbolic representations (e.g., a formula)**	Teacher supplement
*** Graphical representations (e.g., a bar graph)**	Teacher supplement
***2.* Select, apply, and translate among mathematical representations to solve problems.**	*Roads to Reasoning,* Suzanne Levin *Best of Math I and II, Exemplars* CD
3. Use representations to model and interpret physical, social, and mathematical phenomena.	Teacher supplement Website resources
F. Technology	
1. Use technology to gather, analyze, and communicate mathematical information.	Teacher supplement
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).	Teacher supplement Activities in conjunction with technology teacher

3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	Teacher supplement Website resources Texas Instruments resources
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	TI-1 08
5. Use computer software to make and verify conjectures about geometric objects.	Activities in conjunction with technology teacher Website resources National Virtual Manipulatives Library website
6. Use computer-bases laboratory technology for mathematical applications in the sciences (cf. science standards).	Activities in conjunction with technology teacher and or science lessons

Third Grade Math
Pacing Guide

Unit	Number of Days (approximate)	Unit	Number of Days (approximate)
1 . Routines/Review & Assessment	16	**7** . Multiplication & Division	15
2 . Adding & Subtracting Whole Numbers	15	**8** . Fractions	11
3 . Linear Measures & Area	14	**9** . Multiplication & Division	17
4 . Multiplication & Division	14	**10** . Measurement & Data	13
5 . Place Value, Whole Numbers & Decimals	16	**11** . Probability	8
6 . Geometry	15	End-of-the-Year Benchmark Assessment	1

Mid-Year Benchmark Assessment	1		

Grade: 3 **Standard 4.1 Number and Numerical Operations**
Essential Question: How can problems in the real world be solved with mathematics?
How can estimation be useful to us?
How do numbers help us reason out solutions to problems?
How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers.	Unit Assessments Do Now/Ticket In/Exit Ticket Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games & Activities Digi-blocks Base Ten Blocks Calendar skills Pattern Blocks Place value mat or chart Fraction strips Fraction Circles Cuisenaire Rods Tangrams Geoboards Otter Creek- Fact Mastery Greg Tang Strategies	*Groundworks- Reasoning with Numbers, Creative Publications* NJ Mathematics Curriculum Framework in Grade 3-4, selected problems EM Home Link Book

***Read and write whole numbers through hundred thousands**		*Everyday Mathematics*, Lesson 5.1, 5.2, 5.3, 5.5 How Much is a Million?, David Schwartz
** Read, write and compare large numbers*		*Everyday Mathematics* Lesson, 5.4,
***Read and write commonly used fractions (denominators of 2, 3, 4, 5, 6, 8, 10) as part of a whole, as a subset of a set, and as a location on a number line**		A Collection of Math Lessons 3-5, Marilyn Burns About Teaching Mathematics, Marilyn Burns Everyday Mathematics, Unit 8
**Identify fractional parts of a region* **Identify fractional parts of a set.*		*Everyday Mathematics* Lesson 1.6, 3.2, Unit 8, 9.3, Ed Emberley's Picture Pie, A Book of Circle Art, Ed Emberley Eating Fractions, Bruce McMillan
**Solve fraction number stories*		*Everyday Mathematics* Lesson 8.7, 8.8, 9.7, 9.13 Math Curse, Jon and Lane Smith, Scieszka
**Introduce the number line for fractions*		*Everyday Mathematics,* Lesson 8.4
2. Demonstrate an understanding of whole number place value concepts.	EM Project 6: How Far Can You go in a Million Steps?	*Elementary School Mathematics with Pizzazz,* Creative Publications
**Identify place value in whole numbers up to 6 digits*		*Everyday Mathematics*, Lesson 5.1 - 5.5
**Introduce concept of rounding to a specific place value*		Teacher supplement

3. Identify whether any whole number is odd or even.	*Everyday Mathematics*, activities ongoing throughout the year Teacher supplement
4. Explore the extension of the place value in decimals through hundredths	Teacher supplement *Everyday Mathematics*, Unit 5 activities
**Identify place value in decimals*	*Everyday Mathematics,* Lesson 5.7 - 5.10
**Read and write 1-, 2-, 3-digit decimals (D/S)*	*Everyday Mathematics* Lesson 1.9, 1.10, 5.8 - 5.11, 6.10, 9.1, 9.5
5. Understand the various uses of numbers ***counting, measuring, labeling** ***counting money**	*Everyday Mathematics*, Lesson 1.1, 9.5, 10.1 - 10.5
**Find factors of a number*	*Everyday Mathematics* , Lesson 9.6
**Find equivalent fractions*	*Everyday Mathematics,* Lesson 8.4, 8.5, 9.3
**Investigate positive and negative numbers*	*Everyday Mathematics,* Lesson 9.13
***6.* Compare and order numbers**	*Everyday Mathematics*, Unit 5 *Elementary School Mathematics with Pizzazz,* Creative Publications

**Read, write, and compare up to 6- and 7-digit whole numbers*	*Everyday Mathematics* , Lesson 5.1 - 5.5, 9.1 How Much is a Million?, David Schwartz If You Made a Million, David Schwartz A Million Fish... More or Less, Patricia McKissack
**Compare and order commonly used fractions* **Compare and order other fractions*	Teacher supplement *Everyday Mathematics* , Lesson 3.2, 8.4 - 8.6, 9.3
**Compare and order decimals*	*Everyday Mathematics,* Lesson 5.7 - 5.9, 5.11
**Identify and use number patterns to solve problems*	*Everyday Mathematics*, Lesson 1.2, 1.11, 7.1, 9.10, ongoing
**Find equivalent names for numbers (D/S)*	*Everyday Mathematics, Lesson 1.6* Twelve Ways to Get to Eleven, *Eve Merriam*
**Convert between mixed numbers and fractions*	*A Collection of Math Lessons, 3-5,* Marilyn Burns *Everyday Mathematics* Lesson 1.6, 8.7

B. Numerical Operations

By the end of third grade, 90% of Flemington-Raritan third grade students will have basic fact mastery for addition facts 0-20, and 80% of Flemington-Raritan third grade students will have basic fact mastery for subtraction facts 0-20 (10+10).

By the end of third grade, 85% of Flemington-Raritan third graders shall have basic fact mastery of multiplication and division facts for 1, 2, 5, and 10.

Flemington-Raritan School District
Mathematics Curriculum

District Timed tests: 50 facts in 3 minutes

Marking Period Packets: MP 1, 2, 3, 4 Addition separate, subtraction separate;; Multiplication and division facts separate

1. Develop the meaning of the four basic arithmetic operations by modeling and discussing a large variety of problems. ***Addition and subtraction: joining, separating, comparing** ***Multiplication: repeated addition, area/array** ***Division: repeated subtraction, sharing**	Amanda Bean's Amazing Dream, Cindy Neuschwander *Everyday Mathematics*, Lessons 2.1, 2.2, 4.1 - 4.8, *Groundworks-Reasoning with Numbers,* Creative Publications *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van de Walle
**Know basic addition and subtraction facts up to 20*	Teacher Supplement *Everyday Mathematics* , Unit 2 Website resources
**Complete fact and number families*	*Everyday Mathematics* , Lesson 2.1, 4.6, 4. 7, 4.8, 7.1, 7.3
**Solve addition and subtraction multi-digit number stories*	*Everyday Mathematics* , Lesson 2.4 - 2.6, 2.9
2. Develop proficiency with basic multiplication and division number facts using a variety of fact strategies (such as "skip counting" and "repeated subtraction")	Teacher Supplement *Everyday Mathematics*, Unit 4; Lessons 7.1, 9.1 *Elementary School Mathematics with Pizzazz,* Creative Publications
**Know multiplication facts having 2, 5, or 10 as a factor*	Teacher supplements *Everyday Mathematics*, Lesson 4.4 - 4.6 The Best of Times, Greg Tang

**Use basic facts to solve fact extensions*		*Everyday Mathematics* , Unit 2, 7
**Complete multiplication/division fact families*		*Everyday Mathematics*, Unit 4, and activities ongoing throughout the year *Math by All Means- Multiplication,* "Circles and Stars", Marilyn Burns
**Know multiplication facts up to 12 x 12*	Games: Rio; Salute,	*Everyday Mathematics*, Lesson 4.5, 7.2, 7.3, ongoing activities through Unit 10 Teacher Supplement Website resources Illuminations, National Library of Virtual Manipulatives websites
**Know assorted multiplication facts from first and second set of Fact Triangles*		*Everyday Mathematics*, Lesson 4.5 - 4.8, 7.1 - 7.3, 7.6, 7.8, 9.1 - 9.6 Cupid and Pschye, M. Charlotte Craft Pegasus, Marianna Mayer Persephone and the Pomegranate: A Myth from Greece, Kris Waldherr
**Know multiplication facts having 3 or 4 as one factor and 2 through 7 as the other factor*		*Everyday Mathematics*, Unit 4
**Solve extended multiplication facts to tens x tens*		*Everyday Mathematics* Lessons 7.6, 7.8, 9.1, 9.2
**Solve extended multiplication facts to hundreds x hundreds*		*Everyday Mathematics*, Lessons 7.6, 7.8, 9.1, 9.2
**Multiply by multiples of 10, 100, 1000 and divide such multiples by 1-digit numbers*		*Everyday Mathematics,* Lesson 7.6, 7.8, 9.1, 9.2 Website resources

**Interpret remainders in division problems*	*Everyday Mathematics* , Lesson 9.8 Teacher supplement Remainder of One, Elinor Pinczes
**Recognize and know square products*	*Everyday Mathematics* , Lessons 4.6 -4.8, 7.1, 9.3 Sea Squares, Joy Hulme
3.Construct, use and explain procedures for performing whole number calculations with: ***Pencil and Paper** ***Mental Math** ***Calculator**	Teacher supplements
4. Use efficient and accurate pencil-and-paper procedures for whole number computation.	Teacher supplement as needed
***Addition of 3-digit numbers**	*Everyday Mathematics, Unit 2* EM Skills Book Website resources
***Subtraction of 3-digit numbers**	*Everyday Mathematics*, Unit 2 EM Skills Book Website resources
***Multiplication of 2-digit numbers by 1-digit numbers**	*Everyday Mathematics*, Lessons 4.8, 7.1, 7.3, 7.6, 7.8, 9.2, 9.4, 9.5, 9.9, 9.11, 9.12, 10.6 EM Skills Book Website Resources

5. Count and perform simple computations with money *use cents notation (¢)	*Everyday Mathematics*, assorted Math Boxes in Units 1, 2, 4, 5, 7, 9 Teacher supplement Website resources
***Count combinations of bills and coins and write the total using dollars and cents notation*	*Everyday Mathematics Lesson 1.9, 1.10, 7.7, 9.5, 9.7* 26 Letters and 99 Cents, Tana Hoban
6. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers	*Everyday Mathematics*, Unit 2, 7, 9 *Elementary School Mathematics with Pizzazz,* Creative Publications Best of Math I and II, Exemplars CD
**Solve number stories involving equal groups by using multiplication*	*Everyday Mathematics, Lessons 4.1, 4.2, 7.1, 7.2, 7.3, 7.8, 9.1 - 9.6, 11.1* Each Orange Had Eight Slices: A Counting Book, Paul Giganti Sea Squares, Joy Hulme One Hundred Hungry Ants, Elinor J. Pinczes
**Solve number stories involving equal sharing and equal grouping*	*Everyday Mathematics*, Unit 4
**Solve number stories involving positive and negative numbers*	*Everyday Mathematics*, Lesson 9.13 Teacher supplements
7. Check the reasonableness of results of computations	*Everyday Mathematics*, Units 2, 7, 9 Website resources *Exemplars, Best of Math I and II CD* *Elementary School Mathematics with Pizzazz*, Creative Publications

C. Estimation

1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.	*Everyday Mathematics*, Unit 1 and ongoing activities throughout the year *Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and Van DeWalle
2. Construct and use a variety of estimation strategies (e.g., rounding and mental math) for estimating both quantities and the result of computations.	*Everyday Mathematics* Units 2, 7, 9
***Estimating Costs**	*Everyday Mathematics* , Lesson 7.7
3. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.	*Everyday Mathematics*, Unit 7 *Exemplars, Best of Math I and II* CD
4. Use estimation to determine whether the result of a computation (either by calculator or by hand) is reasonable.	*Everyday Mathematics, Unit 2, 7, 9 Teacher supplement* *Exemplars, Best of Math I and II* CD
**Estimate answers to multi-digit addition and subtraction problems*	*Everyday Mathematics*, Unit 2

Grade: 3 **Standard 4.2 Geometry and Measurement**

Essential Question: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
Building upon knowledge and skills gained in preceding grades, by the end of grade 3, students will:			
A. Geometric Properties			
1. Identify and describe spatial relationships of two or more objects in space.	Unit Assessments Do Now/Ticket In/Exit Ticket Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games & Activities Calendar skills Pattern Blocks Cuisenaire Rods Tangrams Geoboards Geosolids Polygon Tiles Balance/Scale/Weights Master Rulers Mira (mirrors)	*Teaching Student-Centered Mathematics, Grades K-3, Grades 3-5*, Lovin and Van DeWalle, page 42-43, 245
***Direction, orientation, and perspectives (e.g., which object is on your left when you are standing here?)** ***Relative shapes and sizes**		EM Project 2: Using a Magnetic Compass centimeter cubes	Teacher supplement

2. Use properties of standard three-dimensional and two-dimensional shapes to identify, classify, and describe them. *** Vertex, edge, face, side, angle** *** 3D figures - cube, rectangular prism, sphere, cone** ***2D figures - square, rectangle, circle triangle, pentagon, hexagon, octagon**	*Everyday Math*ematics Lesson 3.5, - 3.9, 5.6, 6.4 -6.6, 6.11, 6.12, 7.9, 9.10, 10.2 - 10.5 *Groundworks for Geometry,* Creative Publication Shapes, Shapes, Shapes, Tana Hoban Anno's Magic Seeds, Mitsumasa Anno
**Explore various types of triangles*	*Everyday Mathematics,* Lesson 6.4, 9.10 Website resources
*Explore various types of quadrangles	*Everyday Mathematics,* Lesson 6.5
*Recognize the characteristics of polygons, with regular polygon emphasis	*Everyday Mathematics,* Lesson 6.6
*Recognize 3-D shapes and identify bases of pyramids and prisms * Explore the characteristics of prisms	*Everyday Mathematics,* Lesson 6.11, 6.12, 10.2
3. Identify and describe relationships among two-dimensional shapes.	*Elementary School Mathematics with Pizzazz,* Creative Publications The Greedy Triangle, Marilyn Burns
***Same size, same shape**	*Everyday Mathematics,* Lesson 7.9
**Identify congruent shapes.*	*Everyday Mathematics,* Lesson 6.10 Teacher created materials
***Lines of symmetry**	Teacher supplements *Everyday Mathematics*, Lesson 6.9 Teacher supplement *Exemplars, Best of Math I and II* CD
**Identify symmetric figures and draw lines of symmetry*	Teacher made-materials *Everyday Mathematics* Lesson 6.9

4. Understand and apply concepts involving lines, angles and circles.		*Everyday Mathematics,* Lesson 3.8
***Identify, draw, and name line segments, lines, and endpoints.**		*Everyday Mathematics* Lesson 3.2 - 3.4, 5.6, 6.1, 6.2, 9.10, 10.1 Opt: An Illusionary Tale, Arline and Joseph Baum Teacher supplement
***Draw parallel and intersecting line segments, lines and rays**		*Everyday Mathematics* Lesson 1.4, 3.2 - 3.4, 5.6, 6.2, 7.9, 9.10, 10.1
**Identify right angles*		*Everyday Mathematics* Lesson 6.3, 6.7, 6.8, 7.9
**Draw angles as records of rotations*		*Everyday Mathematics* Lesson 6.3, 6.7, 11.4
5. Recognize, describe, extend, and create space-filling patterns		*Everyday Math* Lesson 6.6 Teacher supplement
B. Transforming Shapes		
1. Describe and use geometric transformations (slide, flip, turn).		District-made teacher packet NJ Mathematics Curriculum Frameworks, selected geometry activities for grades 3 - 4 Navigations in Geometry, grades 3-5, NCTM,
2. Investigate the occurrence of geometry in nature and art.	EM Project 3: Illusions	Everyday Math Unit 6 Website resources

C. Coordinate Geometry

1. Locate and name points in the first quadrant on a coordinate grid.		Teacher supplement *Everyday Mathematics,* Lesson 10.10 The Fly on the Ceiling, Julie Glass

D. Units of Measurement

1. Understand that everyday objects have a variety of attributes, each of which can be measured in many ways.	EM Project 5: Attributes	Counting On Frank, Rod Clement *Groundworks for Geometry*, Creative Publications *About Teaching Mathematics,* Marilyn Burns, page 71
2. Select and use appropriate standard units of measure and measurement tools to solve real-life problems.		*Everyday Mathematics,* Units 3 and 10, Lesson 1.4 NJ Mathematics Framework Curriculum, selected activities for grades 3 -4 *Navigations in Measurement, grades 3-5,* NCTM
***Length- fractions of an inch (1/4, 1/2), mile, decimeter, kilometer, *Length- centimeter, meter (grade 3 secure)**		Teacher supplement Everyday Mathematics, Lesson 3.1-3.4, 10.1
**Recognize equivalents in US customary and metric systems for length, weight*		*Everyday Mathematics*, Lesson 10.1, 10.3, 10.4 Teacher supplement
***Area-square inch, square centimeter**		Teacher supplement *Groundworks- Reasoning for Measurement,* Creative Publications
***Weight-ounce**		*Everyday Mathematics,* Lesson 10.3, 10.4 *Elementary School Mathematics with Pizzazz,* Creative Publications

*Consider relationships between weight and volume	*Everyday Mathematics,* Lesson, 10.4
*** Capacity- fluid ounce, cup, gallon, milliliter**	*Everyday Mathematics,* Lesson 10.5 NJ Mathematics Curriculum Frameworks, grades 3-4, selected activities
**Measure angles*	*Everyday Mathematics,* Lesson, 6.7 & 6.8, 11.4
3. Incorporate estimation in measurement activities (e.g., estimate before measuring).	*Everyday Math* Unit 3 How Big is a Foot?, Rolf Myllar *Everyday Mathematics*, Lesson, 4.9, 6.8
5. Solve problems involving elapsed time	District teacher made supplements
E. Measuring Geometric Objects	
1. Determine the area of simple two-dimensional shapes on a square grid	Teacher supplements *Everyday Mathematics,* Lesson 3.6, 3.7, 3.8 *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van DeWalle
***2.* Determine the perimeter of simple shapes by measuring all of the sides.**	Teacher supplements *Everyday Math* Lesson 3.4, 3.6 A Cloak for the Dreamer, Aileen Friedman
3. Measure and compare the volume of three-dimensional objects using materials such as rice or cubes	*Everyday Mathematics, L*esson 10.2, 10.4 The Librarian Who Measured the Earth, Kathryn Lasky
*Explore the volume of rectangular prisms	*Everyday Mathematics*, Lesson 10.2, 10.4

Grade: 3 **Standard 4.3 Patterns and Algebra**

Essential Question: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature and the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns.	Unit Assessments Do Now/Ticket In/Exit Ticket Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games & Activities Calendar skills Pattern Blocks Cuisenaire Rods Tangrams Geoboards Geosolids Polygon Tiles Balance/Scale/Weights Master Rulers Mira (mirrors)	*Everyday Mathematics,* Lesson 1.12, 2.3, 7.1, 9.4 *Navigations in Algebra, grades 3-5*, NCTM
***Descriptions using words and number sentences/expressions**			*Everyday Mathematics,* Lesson 7.1
***Whole number patterns that grow or shrink as a result of repeatedly adding, subtracting, multiplying by, or dividing by a fixed number (e.g., 5, 8, 11, . . . or 800, 400, 200)**			*Everyday Mathematics,* Lesson 2.3 Groundworks, Creative Publications
**Identify and use number patterns to solve problems*			*Everyday Mathematics*, 7.1, 7.6, 9.1
**Use of a calculator to explore patterns*			Calculator TI 108

**Understand function and placement of parentheses in number sentences*

Everyday Mathematics, Lesson 7.4, 7.5

B. Functions & Relationships

1. Use concrete and pictorial models to explore the basic concept of a function.

Groundworks- Algebraic Thinking, Creative Publications

***Input/ output tables; T charts**

**Complete "What's My Rule?" tables*

Everyday Mathematics, Lesson 2.3

** Complete "Frames and Arrows" problems*

Everyday Mathematics, Lesson 2.5

C. Modeling

1. Recognize and describe change in quantities.
***Graphs representing change over time (e.g., temperature, height)**

Teacher supplement
Everyday Mathematics, Lesson 5.12

2. Construct and solve simple open sentences involving addition or subtraction (e.g., 3 + 6 = __, n = 15 - 3, 3 + __ = 3, 16 - c = 7).

Everyday Mathematics Units 1 & 2
Teacher created materials
Elementary School Mathematics with Pizzazz, Creative Publications

D. Procedures

1. Understand and apply the properties of operations and numbers.
***Commutative (e.g., 3 x 7 = 7 x 3)**
*Turn-around facts

Teacher-made supplements
NJ Mathematics Framework Curriculum, grades 3-4, selected activities

***Identity element for multiplication is 1 (e.g., 1 x 8 = 8)**	Teacher-made supplements
***Any number multiplied by zero is zero**	*Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van de Walle
***Associative (Grade 2 Secure)**	Teacher supplement
2. Understand and use the concepts of equal, less than and greater than to describe the relationship between numbers. ***Symbols (=, <, >)**	*Everyday Mathematics,* Lesson 2.6, 5.2, 5.3, 5.4, 5. 10

Grade: 3 **Standard 4.4 Data Analysis, Probability, and Discrete Mathematics**
Essential Question: How can classifying help me to organize data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us to understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1. Collect, generate, organize, and display data in response to questions, claims, or curiosity.	Unit Assessments Do Now/Ticket In/Exit Ticket Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games & Activities Calendar skills Pattern Blocks Cuisenaire Rods Tangrams Geoboards Geosolids Polygon Tiles Balance/Scale/Weights Master Rulers Mira (mirrors)	*Everyday Mathematics*, activities ongoing throughout the year Teacher supplement
*** Data collected from the classroom environment**			*Everyday Mathematics,* Lesson 5.12, 10.6
**Find the median of a data set*			*Everyday Mathematics* , Lesson 1.5, 10.6 Website resources
**Make a frequency table*			*Everyday Mathematics* , Lesson 1.5, 10.9
**Find the mean of a data set*			*Everyday Mathematics* , Lesson 1.5, 1.10, 10.6, 10.8 *Exemplars, Best of Math I and II* CD *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van de Walle, page 326 Teacher supplement

**Find the mode of the set of data*	*Everyday Mathememematics,* Lesson 1.5
**Find the range of data*	Teacher supplement
2. Read, interpret, construct, analyze, generate questions about, and draw inferences from displays of data.	*Everyday Mathematics Lessons,* 1.5, 5.10, 10.9, 10.10, 11.1, 11.2, 11.5
***Pictograph, bar graph, table**	*Exemplars, Best of Math I and II* CD *Everyday Mathematics*, Lesson 11.9
B. Probability	
1. Use everyday events and chance devices, such as dice, coins, and unevenly divided spinners, to explore concepts of probability.	*Math By All Means, Probability 3-4,* Marilyn Burns *Everyday Mathematics Lesson 1.5, 11.1* *The I Hate Mathematics Book,* Marilyn Burns *About Teaching Mathematics,* Marilyn Burns, page 71
***likely, unlikely, certain, impossible**	District Teacher-Made Probability worksheets *Everyday Mathematics*, Lesson 11.3, 114, 11.5 *Navigation with Data and Probability in Grades 3-5*, NCTM
***more likely, less likely, equally likely**	Everyday Mathematics, Lesson 11.3, 11. 4, 11.5 District Teacher-Made Probability worksheets

2. Predict probabilities in a variety of situations (e.g., given the number of items of each color in a bag, what is the probability that an item picked will have a particular color). *What students think will happen (intuitive) *Collect data and use that data to predict the probability (experimental).	*Everyday Mathematics*, Lesson 8.2, Unit 11 District Teacher-Made Probability worksheets *Groundworks- Reasoning with Data and Probability,* Creative Publications
**Uses fractions to record probability of events*	*Everyday Mathematics* , Lesson 10.9, 11.3, 11.4, 11.5 *Exemplars, Best of Math II CD* Samples NJASK 3 Open-Ended problems
C. Discrete Mathematics-Systematic Listing and Counting	
1. Represent and classify data according to attributes, such as shape or color, and relationships. ***Venn diagrams** ***Numerical and alphabetical order**	Teacher supplement *Groundworks- Reasoning with Geometry,* Creative Publications
2. Represent all possibilities for a simple counting situation in an organized way and draw conclusions from this representation. ***Organized lists, charts**	*Exemplars, Best of Math I and II* CD *Groundworks- Reasoning with Data and Probability,* Creative Publications *Everyday Mathematics*, Lesson 8.2 *Navigation with Data and Probability in Grades 3-5*, NCTM, selected activities Website resources
D. Discrete Mathematics- Vertex-Edge Graphs and Algorithms	
1. Follow, devise, and describe practical sets of directions (e.g., to add two 2-digit numbers).	*Everyday Mathematics*, all units

2. Explore vertex-edge graphs ***vertex, edge** ***path**	District Teacher-Made Worksheets Website resources
3. Find the smallest number of colors needed to color a map.	District Teacher-Made Map Coloring worksheets Website resources

Flemington-Raritan School District

Mathematics Curriculum

Grade: 3 **Standard 4.5 Mathematical Processes**

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference?
How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving inquiry and discovery	Unit Assessments Do Now/Ticket In/Exit Ticket Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games & Activities Calendar skills Pattern Blocks Cuisenaire Rods Tangrams Geoboards Geosolids Polygon Tiles Balance/Scale/Weights Master Rulers Mira (mirrors)	*Everyday Mathematics*, Open Response questions & activities ongoing throughout the year *Best of Math I and II, Exemplars* CD *About Teaching Mathematics*, Marilyn Burns *Elementary School Mathematics with Pizzazz*, Creative Publications *Groundworks,* Creative Publications
2. Solve problems that arise in mathematics and in other contexts			*Best of Math I and II, Exemplars* CD *NJ Mathematics Curriculum Framewo*rks, page 51 - 53

*** Open ended problems**	*Best of Math I and II, Exemplars CD* *Navigation Series,* NCTM selected problems Sample NJASK Open-ended problems NJASK State Rubric Website resources Teacher supplement
*** Non-routine problems**	*Best of Math I and II, Exemplars* CD Sample NJASK Open-ended problems Website resources Teacher Supplement
*** Problems with multiple solutions**	*Best of Math I and II, Exemplars* CD Sample Open-ended problems from other states Website resources Teacher supplement *Groundworks,* Creative Publications
*** Problems that can be solved in several ways**	*Best of Math I and II, Exemplars* CD *Naviagation Series*, NCTM selected problems Sample NJASK Open-ended problems Website resources Teacher Supplement
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.	*Best of Math I and II, Exemplars* CD *Groundworks*, Creative Publications *Everyday Mathematics*, All units -Open Response question
4. Pose problems of various types and levels of difficulty	*Everyday Mathematics*, Problem solving: verbal, pictorial, concrete and symbolic, teacher's guide ongoing *Best of Math I and II, Exemplars* CD *Navigation Series*, NCTM selected problems Website resources for Open-ended problems *Elementary School Mathematics with Pizzazz,* Creative Publications

5. Monitor their progress and reflect on the process of their problem solving activity	Teacher supplement
B. Communication	
1. Use communication to organize and clarify their mathematical thinking *** Reading and writing** ***Discussion, listening and questioning**	Teacher supplement *Best of Math I and II, Exemplars* CD *Navigation Series,* NCTM selected problems Website resources Open-ended problems *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van De Walle, page 5
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	*Best of Math I and II, Exemplars* CD *NJ Mathematics Curriculum Framework*, selected activities for grades 3-4 Sample NJASK Open-ended problems
3. Analyze and evaluate the mathematical thinking and strategies of others.	*Best of Math I and II, Exemplars* CD *Navigation Series,* NCTM selected problems Website resources for Open-ended problems
4. Use the language of mathematics to express mathematical ideas precisely.	*Best of Math I and II, Exemplars* CD NJ Mathematics Core Curriculum Content Standards for appropriate grade level vocabulary and mathematical concepts and skills (2002) NJASK State mathematics rubric *NJ Mathematics Curriculum Framework* selected activities for grades 3 - 4

C. Connections

1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	*Best of Math I and II, Exemplars* CD *Everyday Mathematics* Activities, ongoing throughout the year Open-ended problems from website resources
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	*Everyday Mathematics* Activities, ongoing throughout the year *Best of Math II, Exemplars* CD *Navigation Series*, NCTM selected problems Sample NJASK Open-ended problems *Groundworks,* Creative Publications
3. Recognize that mathematics is used in a variety of contexts outside of mathematics	*Everyday Mathematics* Activities, ongoing throughout the year *Best of Math I and II, Exemplars* CD Website resources for "real world" applications of mathematics
4. Apply mathematics in practical situations and in other disciplines	*Everyday Mathematics*- Activities,on-going throughout the year *Best of Math I and II, Exemplars* CD *Navigation Series,* NCTM selected problems Teacher supplement with assorted problems from Website resources, newspapers, children's literature and professional magazines
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Social Studies unit on timelines Teacher supplement with Website and media center resources Science: Space timeline

6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole	*Everyday Mathematics* Activities, ongoing throughout the year *NJ Mathematics Curriculum Framework*, selected activities, grade 3-4
D. Reasoning	
1. Recognize that mathematical facts, procedures, and claims must be justified.	*Best of Math I and II, Exemplars* CD *Navigation Series*, NCTM selected problems Sample NJASK Open-ended problems Website resources *NJ Mathematics Curriculum Framework,* grades 3-4, selected activities
2.Use reasoning to support their mathematical conclusions and problem solutions.	*Elementary School Mathematics with Pizzazz*, Creative Publications *Navigation Series,* NCTM selected problems Teacher supplement with Open-ended problems from website resources *Everyday Mathematics*, Lesson 11.3, 11.5
3. Select and use various types of reasoning and methods of proof.	*Best of Math I and II, Exe*mplars CD Sample open-ended problems from various Website resources NJASK State rubric
4. Rely on reasoning, rather than answer keys, teachers, or peers, the check the correctness of their problem solutions	*Elementary School Mathematics with Pizzazz*, Creative Publications *Best of Math I and II, Exemplars* CD

5. Make and investigate mathematical conjectures	*Best of Math I and II, Exemplars* CD *Navigation Series,* NCTM selected problems Sample NJASK Open-ended problems
*** Counterexamples as a means of displaying conjectures**	Teacher supplement with website resources *Best of Math I and II, Exemplars* CD
*** Verifying conjectures using informal reasoning or proofs.**	Teacher supplement Sample open-ended problems from website resources *NJ Mathematics Curriculum Frameworks,* selected activities for grades 3 - 4
6. Evaluate examples of mathematical reasoning and determine whether they are valid	*Best of Math I and II, Exemplars* CD Teacher supplement with website resources
E. Representations	
1. Create and use representations to organize, record, and communicate mathematical ideas.	*Everyday Mathematics* activities ongoing throughout the year *Best of Math I and II, Exemplars* CD Teacher supplement with problems from various resources
*** Concrete representations (e.g., base-ten blocks or algebra tiles)**	*Everyday Mathematics* activities ongoing throughout the year *Best of Math I and II, Exemplars* CD *Navigation Series*, NCTM selected problems
*** Pictorial representations (e.g., diagrams, charts, or tables)**	*Everyday Mathematics* activities ongoing throughout the year *Best of Math I and II, Exemplars* CD *NJ Mathematics Curriculum Framework,* selected activities grades 3-4 Everyday Mathematics, Lesson 7.9

*** Symbolic representations (e.g., a formula)**	*Everyday Mathematics* activities ongoing throughout the year Sample open-ended problems from NJASK and other states
*** Graphical representations (e.g., a line graph)**	*Everyday Mathematics* activities ongoing throughout the year Teacher supplement with website resources *Everyday Mathematics,* Lesson 5.12, 11.5
2. Select, apply, and translate among mathematical representations to solve problems	Teacher supplement *Best of Math I and II, Exemplars* CD *NavigationSeries*, NCTM selected problems Website resources for Open-ended problems *NJ Mathematics Curriculum Frameworks*, selected activities for grades 3-4
3. Use representations to model and interpret physical, social, and mathematical phenomena	*Everyday Mathematics* activities, ongoing throughout the year Website resources: e.g., National Library of Virtual Manipulatives *Elementary School Mathematics with Pizzazz* , Creative Publications *Navigation Series,* NCTM selected problems
F. Technology	
1. Use technology to gather, analyze, and communicate mathematical information.	*Everyday Mathematics*, calculator activities ongoing throughout the year Teacher made materials in conjunction with Technology teacher Website resources

2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).	Microsoft Office tools such as Word, Excel, PowerPoint United Streaming, videos Website resources Consult with technology teacher to supplement
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	Teacher supplement Website resources Texas Instruments resources
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	*Best of Math I and II, Exemplars* CD *Everyday Mathematics*, activities ongoing throughout the year Sample open-ended problems using website resources
***Introduce memory keys on a calculator**	*Everyday Mathematics* , Lesson 10.8
5. Use computer software to make and verify conjectures about geometric objects.	NCTM's Illuminations website National Library of Virtual Manipulatives website
6. Use computer-based laboratory technology for mathematical applications in the sciences (cf.science standards).	Teacher supplement with websites in conjunction with Technology teacher Texas Instrument website lessons

Flemington-Raritan School District

Mathematics Curriculum

Fourth Grade Math
Pacing Guide

Unit	Number of Days (approximate)	Unit	Number of Days (approximate)
1- Geometric Figures	12	**7 -** Fractions & Probability	16
2 - Numbers and Data	13	**8 -** Perimeter & Area	12
3 - Multiplication & Division	15	**9 -** Fractions, Decimals, & Percents	13
4 - Decimals	14	**10 -** Reflections & Symmetry	10
5 - Big Numbers	15	**11 -** Weight, Volume, & Capacity	11
6 - Division and Angles	14	**12 -** Rates	12
Mid-Year Benchmark Assessment	1	End-of-the-Year Benchmark Assessment	1

Grade: 4 Standard 4.1 Number and Numerical Operations

Essential Question: How can problems in the real world be solved with mathematics?
How can estimation be useful to us?
How do numbers help us reason out solutions to problems?
How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 4 pertain to these sets of numbers as well)	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks Games Base Ten Blocks Digi-blocks Pattern Blocks Place value mat or chart Fraction pieces Fraction Circles Cuisenaire Rods Tangrams Geoboards	*Groundworks- Reasoning with Numbers,* Creative Publications Frame FunFraction Factory
** Give equivalent names for numbers.*			Twelve Ways to Get Eleven, *Eve Merriam* *Everyday Mathematics,* Lesson 1.6, 2.2, 7.6, 7.9, 9.1, 9.3
***Read and write whole numbers through millions**			*Everyday Mathematics*, Lesson 5.8
** Read and write numbers through billions*			*Everyday Mathematics,* Lesson 2.3, 2.4 How Much is a Million?,(book & video) David Schwartz If You Made a Million, David Schwartz

***Commonly used fractions (denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 16) as part of a whole, as a subset of a set, and as a location on a number line**	*Everyday Mathematics*, Lesson 7.1 - 7.3, 7.6, 7.7, 7.9, 7.10 Fraction Factory
***Decimals through hundredths**	*Everyday Mathematics*, Lesson 4.1, 4.3 Decimal Factory Digi-decimals
**Identify fractional parts of a collection of objects and regions*	Eating Fractions, Bruce McMillian Only One, Jean Harshman *Everyday Mathematics*, Lesson 7.1, 7.2, Yellow/red counters Exemplar: "Deluxe Birthday Cake"
**Rename fractions with denominators of 10 and 100 as decimals.*	*Everyday Mathematics*, Lesson 9.1 – 9.5 Fraction kit games
** Find equivalent fractions for given fractions*	*Everyday Mathematics,* Unit 7, 9.1 – 9.5
* Use percents to describe real-life situations	*Everyday Mathematics, Lessons 7.7, 9.1- 9.5*
**Find a percent or a fraction of a number*	*Everyday Mathematics* , Lesson 9.1-9.5 Illuminations website
**Give equivalencies between "easy" fractions (fourths, fifths, and tenths), decimals, and percents.*	*Everyday Mathematics, Lesson 9.1-9.5*
**Give equivalencies between hundredths fractions, decimals, and percents*	*Everyday Mathematics*, Lesson 9.1
**Use a calculator to rename any fractions as decimal or percent.*	*Everyday Mathematics*, Lesson 9.3, 9.4, 9.5 *Writing in Math Class*, M. Burns

2. Demonstrate an understanding of place value concepts.		Everyday Mathematics Lessons 2.2-2.4, 4.1- 4.6 (decimal), 4.10, 5.8-5.11 (big numbers)
** Practice place-value skills through a calculator routine*		*Everyday Mathematics*, Lesson 2.3
**Develop the concept of rounding*		Teacher supplement
3. Demonstrate a sense of the relative magnitudes of numbers.		*Everyday Mathematics*, Lesson 4.3, 5.4,
***4.* Understand the various uses of numbers.**		*Everyday Mathematics*, Lesson 2.1, 3.5, and ongoing throughout the year
***Counting, measuring, labeling (e.g., numbers on baseball uniforms), locating (e.g., Room 235 is on the second floor)**		*Best of Math I and II, Exemplars CD* (Skating Party & Farmer Brown)
5. Use concrete and pictorial models to relate whole numbers, commonly used fractions, and decimals to each other, and to represent equivalent forms of the same number.		*Everyday Mathematics*, Lesson 9.1 - 9.5
**Identify the whole for fractions*	Games: Fraction Fish (TERC Different Shapes, Equal Pieces)	*Everyday Mathematics,* Lesson 7.1 - 7.3, 7.6, 7.7, 7.9, 7.10
6. Compare and order numbers.		Twelve Ways to Get to 11, Eve Merriam Everyday Mathematics, Lesson 4.2, 7.9
** Compare large numbers*		*Everyday Mathematics* Unit 2, Unit 3, Lessons 5.8, 5.10, 5.11

**Compare and order fractions*		*Everyday Mathematics* , Lesson 7.9 - 7.11
** Compare and order decimals*		*Everyday Mathematics* , Lesson 4.2
7. Explore settings that give rise to negative numbers.		*Everyday Mathematics*, Lessons 2.3, 11.6 Teacher supplement Number line (negative to positive)
***Temperatures below zero degrees, debts**	Thermometer	Teacher-made supplement Weather/Science Unit
***Extension of the number line**		*Everyday Mathematics*, Lesson 7.1 Teacher supplement
** Add positive and negative numbers; integers*		*Everyday Mathematics,* Lesson 10.6, 11.6 Visit the Statue of Liberty, Nathan Zimelman (Social Studies link)
** Use exponential notation to represent powers of ten*	almanacs, atlas, reference books sound, speed, distance	*Everyday Mathematics*, Lesson 5.9, 5.10 Teacher supplement Website resources for real life uses of exponential notation

B. Numerical Operations

By the end of fourth grade,90% of Flemington Raritan fourth graders will have basic fact mastery of addition facts 0-20.
By the end of fourth grade, 85 % of Flemington-Raritan fourth graders will have basic fact mastery of subrtraction facts 0-20.

By the end of fourth grade, 80% of Flemington Raritan fourth graders will have basic fact mastery of multiplication and division facts up to 12. (12 x 12)

District Timed Tests: 50 facts in 3 minutes

Addition and subtraction fact tests should be given every six weeks.
MP 1 addition and subtraction separate; multiplication separate
MP 2,3 addition and subtraction separate: multiplication and division separate
MP 4 addition and subtraction separate; multiplication and division separate

1. Develop the meanings of the four basic arithmetic operations by modeling and discussing a large variety of problems.		*Everyday Mathematics,* Lessons 2.7, 2.9, 3.1, 3.2, 3.3, 3.4, 5.1, 6.1 *Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and Van de Walle Fact Mastery District Assessment
***Addition and subtraction: joining, separating, comparing**	Games: Rio, Four in a Row, The Winning Touch	*Everyday Mathematics,* Lesson 1.7, 2.7, 2.9 Website Links: Exemplar: Lost Count (Farmer Brown)
*Use and explain strategies for solving addition and subtraction number stories	Rio	Anno's Hat Tricks, Akihiro Nozaki *Everyday Mathematics* Lesson 3.7, 3.11

***Multiplication: repeated addition, area/array**		*Everyday Mathematics,* Lesson, 3.1, 3.2, 3.3, 3.4, 5.1 *Elementary and Middle School Mathematics Teaching Developmentally,* Fifth edition, John A. Van De Walle page 149 Grapes of Math, The Best of Times, Greg Tang
***Division: repeated subtraction, sharing**		What Comes in 2's, 3's, 4's?, Suzanne Aker Exemplar: Farming Math by All Means Multiplication, Grade 3, Marilyn Burns *Everyday Mathematics*, Lesson 6.1, 6.2, 6.3, 6.4
*Solve equal-grouping division stories using a multiples of 10 strategy		*Everyday Mathematics*, Lesson 6.1
*Solve multiplication and division number stories		*Everyday Mathematics,* Lesson 6.3, 6.11 A Remainder of One, E.J. Pinczes Sea Squares, Joy N. Hulme
2. Develop proficiency with basic multiplication and division number facts using a variety of fact strategies (such as "skip counting" and "repeated subtraction") and then commit them to memory.	I Have... Who Has Cards Multiplication Tic Tac Toe How Long How Many (About Teaching Mathematics, Marilyn Burns) Circles and Stars (Marilyn Burns	*Everyday Mathematics,* Lesson 3.1, 3.2, 3.3, 3.4, 6.1 Each Orange Had 8 Slices, Paul Giganti Amanda Bean's Amazing Dream
** Solve basic multiplication/ division facts to 10*		Each Orange Had Eight Slices: A Counting Book, Paul Giganti *Everyday Mathematics* Lesson 3.1 - 3.6, 3.9
**Solve basic multiplication/division facts to 12*		*Everyday Mathematics,* Lesson 3.1
* Review square numbers		*Everyday Mathematics,* Lesson 3.1

**Express the remainder of a whole number division problem as a fraction and the answer as a mixed number.* • *Interpret the remainder in division problems* • *How to express remainder, round up, fraction, or ignore*	*Everyday Mathematics* , Lesson 6.1, 6.4 A Remainder of One, Elinor J. Pinczes *Everyday Mathematics* Lesson 6.2, 6.3, 6.4
3. Construct, use, and explain procedures for performing whole number calculations and with:	*Teaching Student Centered Mathematics, Grades 3-5*, Lovin and VanDeWalle, Chapter 4
***Pencil-and-paper**	*Everyday Mathematics*, Lesson 2.7, 2.9
***Mental math**	*Grapes of Math and Math For All Seasons Greg Tang*
***Calculator**	*Student Reference Book*
4. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.	*Elementary Mathematics with Pizzazz,* Creative Publications
***** *Solve addition and subtraction facts up to 20*	Chart progress of students. Most fourth graders should have mastered these facts already. Ongoing throughout the year
***Addition of 3-digit numbers**	*Everyday Mathematics.* Lesson 2.7 Teacher supplements

***Subtraction of 3-digit numbers**	*Everyday Mathematics*, Lesson 2.9 Funny Numbers – Greg Tang
***Multiplication of 2-digit numbers**	*Everyday Mathematics*, Lesson 5.5, 5.6, 5.7
***Division of 3-digit numbers by 1-digit numbers**	*Everyday Mathematics*, Lesson 6.1, 6.2, 6.3, 6.4
5. Construct and use procedures for performing decimal addition and subtraction.	*Everyday Mathematics*, Lesson 4.6 Money
*Construct and use procedures for performing decimal multiplication and division	*Everyday Mathematics*, Lesson 9.8, 9.9
6. Count and perform simple computations with money.	*Everyday Mathematics*, Lesson 4.6 Exemplar: Skating Party
***Standard dollars and cents notation**	*Everyday Mathematics*, Lesson 4.6 The Lunch Line (Hello Math Reader level 3)
7. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.	*Everyday Mathematics*, Lesson 3.7, Exemplars, Best of Math I and II CD "Shopping for Shoes"
8. Check the reasonableness of results of computations.	*Everyday Mathematics*, Activities ongoing throughout the year Lesson 3.8
*******Calculate unit prices to determine which product is the "better buy."*	*Everyday Mathematics* , Lesson 12.4, 12.5

9. Use concrete models to explore addition and subtraction with fractions.		*Everyday Mathematics*, Lesson 7.1 - 7.6
** Add and subtract fractions*		*Everyday Mathematics* , Lesson 7.5
10. Understand and use the inverse relationships between addition and subtraction and between multiplication and division.		*Everyday Mathematics,* Lesson 3.5 Teacher Supplement
C. Estimation		
1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.	Ten Frames	*Everyday Mathematics*: Units 2, 3, 4, 5, 6 Teacher supplement
2. Construct and use a variety of estimation strategies (e.g., rounding and mental math) for estimating both quantities and the results of computations.	Beans and Scoops Investigation Activity: Estimation Scavenger Hunt- find an object who length is 3.5 m etc. (Marilyn Burns)	*Everyday Mathematics*, Lesson 4.4, 5.3, 5.4, and throughout the year *About Teaching Mathematics*, Marilyn Bums *Teaching Student-Centered Mathematics Grades 3-5,* Lovin and VanDeWalle, page 280
3. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.		How Big is a Foot?, Rolf Myller *ED Unit 5*
4. Use estimation to determine whether the result of a computation (either by calculator or by hand) is reasonable. ** Estimate sums*		*Everyday Mathematics* , Lesson 5.3

* *Estimate products*	*Everyday Mathematics,* Lesson 5.4
* *Round whole numbers to a given place*	*Everyday Mathematics* , Lesson 5.4, 5.10

Grade: 4 Standard 4.2 Geometry and Measurement

Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Identify and describe spatial relationships of two or more objects in space.	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games Polygon Tiles Centimeter cubes Geometric solids Geometry Riddles, "I have, who has" Match up game Polygon tiles, tangrams, pattern blocks Mira/ Transparent Mirror Angelegs Protractor Master Rulers MIRA –transparent mirrors	*Everyday Mathematics,* activities ongoing throughout the year *Groundworks: Reasoning with Geometry*
***Direction, orientation, and perspectives (e.g., which object is on your left when you are standing here?)**		Project 6: Building & Viewing Structures	Teacher-made supplements *Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and VanDeWalle, page 246 Directions using a map
*** Relative shapes and sizes**			Teacher-made supplements NJ Mathematics Curriculum Framework for grades 3-4, selected activities
***Shadows (projections) of everyday objects**			Teacher-made supplements

2. Use properties of standard three-dimensional and two-dimensional shapes to identify, classify, and describe them.	*Everyday Mathematics,* Unit 1, Unit 11, and ongoing throughout the year
***2D figures -- square, rectangle, circle, triangle, quadrilateral, pentagon, hexagon, octagon**	*Everyday Mathematics,* Unit 1
**Name, draw, and label line segments, lines, rays, angles, triangles, and quadrangles (include square, rectangle, rhombus, parallelogram, trapezoid).*	*Everyday Mathematics* , Lesson 1.2 - 1.5 Teacher supplement
** Use a compass and a straightedge to construct geometric figures*	*Everyday Mathematics* Lesson 1.6, 1.7, 1.8
**Classify quadrangles based on their properties*	*Everyday Mathematics, Lesson 1.4, 1.5 Teaching Student-Centered Mathematics, Grades 3-5, Lovin and VanDeWalle, Chapter 8 selected activities*
**Identify properties of polygons and distinguish between convex and concave (nonconvex) polygons*	*Everyday Mathematics, Lesson 1.5* The Greedy Triangle, *Marilyn Burns*
***3D figures -- cube, rectangular prism, sphere, cone, cylinder, and pyramid**	*Everyday Mathematics*, Unit 11
***Vertex, edge, face, side, angle**	*Everyday Mathematics* Lesson 11.2, 11.3 National Library of Virtual Manipulatives Library Website Shapes, Shapes, Shapes, Tana Hoban NJ Mathematics Curriculum Framework, Grades 3-4, selected activities

***Inclusive relationships -- squares are rectangles, cubes are rectangular prisms**	*Navigations through Geometry in Grades 3-5*, NCTM, selected activities *Everyday Mathematics, Lesson 1.4, Unit 11* *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van DeWalle, Chapter 8, page 231 Teacher supplement
3. Identify and describe relationships among 2-D shapes.	*Everyday Mathematics*, Lesson 1.3, 1.5, 11.3 Ed Emberley's Big Green (Orange, Purple and Red) Drawing Book, Ed Em berley
***Congruence**	*Everyday Mathematics*, Lesson 10.1 *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, page 216
***Lines of symmetry**	*Everyday Mathematics*, Lesson 10.2 - 10.4 Website resources
* Lines of reflection	*Everyday Mathematics*, Lesson 10.1, 10.2, 10.3, Shadows and Reflections, Tana Hoban Round Trip, Ann Jonas Reflections, Ann Jonas
4. Understand and apply concepts involving lines, angles, and circles. ***Point, line, line segment, endpoint** *Ray	*Everyday Mathematics,* Lesson 1.2, 1.7
***Parallel, perpendicular (symbols: ll and ⊥)**	Teacher supplement with perpendicular practice

		Introduce symbols for parallel and perpendicular *Everyday Mathematics,* Lesson 1.4
***Angles -- acute, right, obtuse**		*Everyday Mathematics* Lesson 1.3, 6.7 Grandfather Tang's Story, Ann Tompert
**Angle - Reflex*		*Everyday Mathematics,* Lesson, 6.7
**Use circle protractor and half circle protractor to measure and draw angles.*		*Everyday Mathematics* , Lesson 6.6, 6.7
** Identify and describe right angles and parallel lines and line segments*		*Everyday Mathematics,* Lesson 1.3, 6.5, 6.7
***Circles -- diameter, radius, center**		*Navigations through Geometry in grades 3-5,* NCTM
**Drawing circles with a compass* **Define a circle, explore designs with circles (concentric circles, nonconcentric circles)*	Pi Day	*Everyday Mathematics* Lesson 1.6. 1.7 Ed Emberley's Picture Pie: A Circle Drawing Book, Ed Emberley
5. Recognize, describe, extend, and create space-filling patterns.		*Everyday Mathematics,* Lesson 10.5
**Use a map scale to estimate distances*		*Everyday Mathematics* Lesson 2.1, 3.6, Unit 6, Unit 8
B. Transforming Shapes		
1. Use simple shapes to cover an area (tessellations).		*Everyday Mathematics*, Lesson 10.5 Grandfather's Tang Story, Ann Tompert

2. Describe and use geometric transformations (slide, flip, turn). • **Slide (translation)** • **Flip (reflection)** • **Turn (rotation)** ** Use a transparent mirror to draw reflection of a figure.)*		*Everyday Mathematics* Lessons Unit 10 *Elementary School Mathematics with Pizzazz,* Creative Publications Grandfather's Tang Story, Ann Tompert *Everyday Mathematics* Lessons Unit 10
*Relate turns and angles		*Everyday Mathematics*, Lesson 6.5
3. Investigate the occurrence of geometry in nature and art.	Project 4: Making a Quilt	NJ Mathematics Curriculum Framework, selected activities for grades 3-4 Shapes, Shapes, Shapes, Jon Scieszka EM Teacher's Guide, page 895 *Everyday Mathematics,* Unit: 1,10,11 Greedy Triangle, Marilyn Burns
C. Coordinate Geometry		
1. Locate and name points in the first quadrant on a coordinate grid.	Hurkle	*Everyday Mathematics*, Lesson 6.8, 6.9 Teacher supplement
2. Use coordinates to give or follow directions from one point to another on a map or grid.		Fly on the Ceiling, Julie Glass *Everyday Mathematics*, Lesson 6.9 Teacher supplement

D. Units of Measurement **1. Understand that everyday objects have a variety of attributes, each of which can be measured in many ways.**		*Everyday Mathematics*, Unit 4 activities *Groundworks for Measurement,* Creative Publications Illuminations Website
2. Select and use appropriate standard units of measure and measurement tools to solve real-life problems.		Teacher supplement *Everyday Mathematics*, Lesson 4.8, 4.9, 4.10 *Groundworks-Reasoning with Measurement,* Creative Publications
Length -- fractions of an inch (1/8, 1/4, 1/2), mile, centimeter (grade 2 Secure), decimeter, kilometer		*About Teaching Mathematics*, M. Burns*Everyday Mathematics*, Unit 4, 8.1, Teacher supplement *Elementary School Mathematics with Pizzazz,* Creative Publications
***** Length -- millimeter *** Area -- square inch, square centimeter**		*Everyday Mathematics,* Lesson 8.3, 8.4, 8.5, 8.6, 8.7, 8.8 *Exemplar: Stain Glass Window*
*Draw and measure line segments to the nearest centimeter		Inchworm and a Half, E. Pinczes EDM Unit 8
* Draw and measure line segments to the nearest millimeter		*Everyday Mathematics*, Lesson 4.10 Teacher supplement
***Volume -- cubic inch, cubic centimeter**		*Everyday Mathematics*, Lesson 11.4, 11.5 Science: Matter Unit D
***Weight -- ounces / grams**	balance, scale	*Everyday Mathematics*, Lesson 11.7
** Estimate the weight of objects in ounces or grams and weigh objects in ounces or grams*		*Everyday Mathematics* , Lesson 11.7

***Capacity -- fluid ounce, cup, gallon, milliliter**	Gallon Man Gallon Game	*Everyday Mathematics,* Lesson 11.7 Best of Math Exemplars II CD Rom The King's Chessboard, David Birch One Grain of Rice: A Mathematical Folktale, Demi *Teaching Student Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, page 265-266
3. Develop and use personal references to approximate standard units of measure (e.g., a common paper clip is about an inch long).		*Everyday Mathematics*, Lesson 4.9
4. Incorporate estimation in measurement activities (e.g., estimate before measuring).		*Teaching Student Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, page 278-280
*Use a map scale to estimate distances.		*Everyday Mathematics,* Lesson 2.1, 3.6, 6.8, 6.9 See Social Studies / NJ Unit on map scales
*Convert between metric measures		*Everyday Mathematics*, Unit 4
* Express metric measures with decimals.	Using a ruler, meter stick, tape measure	*Everyday Mathematics*, Lesson 4.9
*Identify locations on Earth for which latitude and longitude are given: find latitude and longitude for given locations.	Project 1: making a Cutaway Globe Project 2: Using a Magnetic compass	*Everyday Mathematics*, Lesson 6.9 See Social Studies NJ Unit/ longitude/latitude
5. Solve problems involving elapsed time		*Everyday Mathematics,* Lesson 3.8, 6.6 *Teaching Student Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, page 270 District Teacher-Made Elasped Time Worksheets *Groundworks: Reasoning about Measurement*

E. Measuring Geometric Objects

1. Determine the area of simple two-dimensional shapes on a square grid.	*Everyday Mathematics*, Lessons 8.1-8.8 Teacher supplement
2. Distinguish between perimeter and area and use each appropriately in problem-solving situations.	*Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and Van De Walle, page 265 *Everyday Mathematics*, Unit 8 Teacher Supplement Spaghetti and Meatballs for All *Math by All Means: Perimeter and Area Grades 5-6,* Marilyn Burns www.mathsolutions.com
3. Measure and compare the volume of three-dimensional objects using materials such as rice or cubes.	*Everyday Mathematics,* Lessons 11.4, 11.5 Science: Matter Unit - Compare volumes of containers
**Solve cube stacking volume problems.*	*Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and Van De Walle, page 267 *Everyday Mathematics* , Lesson 11.4, 11.5

Grade: 4 Standard 4.3 Patterns and Algebra
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns.	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Hundreds Grid Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks Tinkerplots Software Geometer's Sketchpad Software Games	*Everyday Mathematics*, Lesson 10.5
***Descriptions using words, number sentences/expressions, graphs, tables, variables (e.g., shape, blank, or letter)**			*Navigations through Algebra 3-5, NCTM* *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van DeWalle
***Sequences that stop or that continue infinitely**			*Navigations through Algebra 3-5, NCTM* Teacher Supplement
***Whole number patterns that grow or shrink as a result of repeatedly adding, subtracting, multiplying by, or dividing by a fixed number (e.g., 5, 8, 11,...or 800, 400, 200,...)**			Illuminations website *Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and Van DeWalle, page 293 Teacher Supplement
***Sequences can often be extended in more than one way (e.g., the next term after 1, 2, 4, ... could be 8, or 7, or...)**			*Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, page 294

B. Functions and Relationships

1. Use concrete and pictorial models to explore the basic concept of a function.	*Everyday Mathematics*, Lesson 12.1, 12.2, 12.3 Teacher Supplement Model Drawing books
***Input/output table, T-charts**	*Everyday Mathematics*, Activities ongoing throughout the year *Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and VanDeWalle, page 295-298
** Complete a "What's My Rule"? Chart*	*Everyday Mathematics* , activities ongoing throughout the year
***Combining two function machines**	Teacher Supplement
***Reversing a function machine**	*Navigations through Algebra in grades 3-5,* NCTM

C. Modeling

1. Recognize and describe change in quantities. ***Graphs representing change over time (e.g., temperature, height)**	*Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and VanDeWalle, page 333 Teacher supplements
**Solve problems involving elapsed time*	District Teacher-Made Elapsed Time worksheets

***How change in one physical quantity can produce a corresponding change in another (e.g., pitch of a sound depends on the rate of vibration)**	Teacher Supplement Teaching Student Centered Mathematics, Grades 5-8, Lovin and VanDeWalle, Chapter 10
** Find unit rates*	*Everyday Mathematics,* Unit 12
** Solve rate problems using rates tables as necessary*	*Everyday Mathematics,* Unit 12
2. Construct and solve simple open sentences involving any one operation (e.g., 3 x 6 = _____, n = 15 ÷ 3, 3 x ____ = 0, 16 - c = 7).	*Everyday Mathematics*, Lesson 3.11 Teaching Student Centered Mathematics, Grades 3-5, Lovin and Van De Walle, page 307
*Determine whether number sentences are true or false	*Everyday Mathematics*, Lesson 3.9
D. Procedures	
1. Understand, name, and apply the properties of operations and numbers. ***Commutative (e.g., 3 x 7 = 7 x 3)** **"Turn around property" order does not change an answer**	Teaching Student-Centered Mathematics, Grades 3-5, Lovin and VanDeWalle, page 66 Teacher-made supplements
***Identity element for multiplication is 1 (e.g., 1 x 8 = 8)**	Teaching Student-Centered Mathematics, Grades 3-5, Lovin and VanDeWalle, page 66 Teacher-made supplements
***Associative (e.g., 2 x 4 x 25 can be found by first multiplying either 2 x 4 or 4 x 25)**	*Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle Teacher-made supplements

***Division by zero is undefined**	*Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, page 66 Teacher-made supplements
***Any number multiplied by zero is zero**	*Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and VanDeWalle, page 66 Teacher-made supplements
** Determine whether number sentences are true or false*	*Everyday Mathematics* , Lesson 3.9
** Insert parentheses to make true number sentences. Solve problems with parentheses*	*Everyday Mathematics* , Lesson 3.10
2. Understand and use the concepts of equals, less than, and greater than in simple number sentences. ***Symbols (=, <, >)**	*Everyday Mathematics*, Lesson 3.8 *Elementary School Mathematics with Pizzazz,* Creative Publications

Grade: 4 Standard 4.4 Data Analysis, Probability, and Discrete Mathematics
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1. Collect, generate, organize, and display data in response to questions, claims, or curiosity.	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games Attribute blocks Polygon Tiles Venn Diagrams Graphs/Charts	*Everyday Mathematics, Lessons* 2.5, 2.6, & 2.8, 12.1 - 12.5
***Data generated from the school environment**		Project 5: Which Soft Drink is the Best Buy?	*Navigations through Data Analysis and Probability, 3-5,* NCTM *Teaching Student Centered Mathematics 3-5,* Lovin and VanDeWalle, page 321
			* Display data in a line plot
2. Read, interpret, select, construct, analyze, generate questions about and draw inferences from displays of data.			Everyday Mathematics Unit 2, 5.11 *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van De Walle, page 329
***Pictograph, bar graph, line plot, line graph, table**			*Everyday Mathematics*, Lesson 2.8, 9.6 Illuminations website
***Average (mean), most frequent (mode), middle term (median)**			*Teaching Student Centered Math 3-5,* page 326-328, LouAnn Lovin and John Van DeW alle

** Use the statistical landmarks of maximum and minimum number and range in a set of data*		*Everyday Mathematics,* Lesson 2.5
B. Probability		
1. Use everyday events and chance devices, such as dice, coins, and unevenly divided spinners, to explore concepts of probability	PIG, The Two-Dice Sum Game	*Everyday Mathematics*, Lesson 7.11 *District Teacher-Made Packet of Probability worksheets* *About Teaching Mathematics*, Marilyn Burns, page 70, 71, 73, 74 *Groundworks-Reasoning with Data and Probability,* Creative Publications
***Likely, unlikely, certain, impossible, improbable, fair, unfair**		*Everyday Mathematics*, Lesson 7.11, 7.12 District Teacher-Made Probability worksheets
***More likely, less likely, equally likely**		*Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and Van De Walle, Chapter 12 Teacher-made supplements teacher supplement
***Probability of tossing "heads" does not depend on outcomes of previous tosses**		
2. Determine probabilities of simple events based on equally likely outcomes and express them as fractions.		District Teacher-Made Probability worksheets *Everyday Mathematics*, Lesson 7.11, 7.12
3. Predict probabilities in a variety of situations (e.g., given the number of items of each color in a bag, what is the probability that an item picked will have a particular color).		*Everyday Mathematics, Lesson 7.11, 7.12* District Teacher-Made Probability worksheets *Math by All Means, Probability 3-4,* Marilyn Burns
***What students think will happen (intuitive)**		*Everyday Mathematics*, Lesson 7.11, 7.12

***Collect data and use that data to predict the probability (experimental)**	*Everyday Mathematics,* Lesson 7.12 *Navigating through Data Analysis and Probability 3-5, NCTM*
***Analyze all possible outcomes to find the probability (theoretical)**	*Navigating through Data Analysis and Probability 3-5, NCTM* *Exemplar: "A Lucky Draw"*
C. Discrete Mathematics-Systematic Listing and Counting **1. Represent and classify data according to attributes, such as shape or color, and relationships.**	*Everyday Mathematics,* activities ongoing throughout the year Matter and Solid Earth Units in Science- rock characteristics Website resources
***Venn diagrams**	EM Adjusting the Activity, page 28 Teacher supplement NJ Mathematics Curriculum Framework, selected activities for grades 3-4
***Numerical and alphabetical order**	*Everyday Mathematics*, Units 2, 4, 5, 7, 8, 11
2. Represent all possibilities for a simple counting situation in an organized way and draw conclusions from this representation.	*Groundworks: Reasoning with Data and Probability* Illuminations website Count Your Way Through...(Series) , Jim Haskins and Kathleen Benson Exemplars: Super Bowl Sunday"

***Organized lists, charts, tree diagrams**		Teacher-made supplements *Best of Math I and II, Exemplars CD*
***Dividing into categories (e.g., to find the total number of rectangles in a grid, find the number of rectangles of each size and add the results)**		Teacher-made supplements
D. Discrete Mathematics - Vertex - Edge - Graphs and Algorithms		
1. Follow, devise, and describe practical sets of directions (e.g., to add two 2-digit numbers).		*Everyday Mathematics*, Units 2, 5, 7, 9 Teacher supplement
2. Play two-person games and devise strategies for winning the games (e.g., "make 5" where players alternately add 1 or 2 and the person who reaches 5, or another designated number, is the winner.)	Game of Nim Game of Pig Odd Number Wins	*Math By All Means Probability 3-4*, Marilyn Burns
3. Explore vertex-edge graphs and tree diagrams.		*Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, page 348
***Vertex, edge, neighboring/adjacent, number of neighbors**		District teacher-made worksheets NJ Mathematics Curriculum Framework, selected activities for grades 3-4
***Path, circuit (i.e., path that ends at its starting point)**		District teacher-made worksheets
4. Find the least number of colors needed to color a map or a graph.	Use US state maps, NJ county maps and abstract drawings	*Everyday Mathematics*, Lesson 9.7 Map Coloring District Teacher Made worksheets

Grade: 4 Standard 4.5 Mathematical Processes

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference?
How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving inquiry and discovery	Unit Assessments Do Now Teacher Observation Discussion Open Ended Writing Tasks Recognizing Student Achievement sections in Everyday Math 3	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks EM Games	Illuminations website Inside the Amazon, Don Lessem and Michael Rothman *Elementary School Mathematics with Pizzazz,* Creative Publications *Everyday Mathematics*, activities ongoing throughout the year
2. Solve problems that arise in mathematics and in other contexts			Incredible Comparisons, Russell Ash *Everyday Mathematics,* Unit 9 *Everyday Math,* World Tour Lessons
***Open ended problems**			Best of Math I and II, Exemplars CD Website resources Sample open-ended assessment problems from various states *Groundworks*, Creative Publications *Read It, Draw It Solve It,* Dale Seymour *Explain It,* Creative Publications

***Non-routine problems**	NJ Mathematics Curriculum Framework Grades 3-4, Standard 1: Problem Solving Exemplars, Best of Math I and II, CD Website resources
***Problems with multiple solutions**	*Exemplars, Best of Math I and II* CD Website Resources *Groundworks,* Creative Publications
Problems that can be solved in several ways	Rain Forest, BarbaraTaylor *Best of Math I and II, Exemplars* CD :Shopping for Shoes", "Skating Trip"
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.	*Everyday Mathematics*, Lesson 3.7, 3.11, 6.1, 6.3 National Geographic Atlas for Young Explorers, National Geographic Society Exemplars, Best of Math I and II CD NJ Mathematics Curriculum Frameworks, selected activities Website resources Guiness Book of World Records
4. Pose problems of various types and levels of difficulty	*Everyday Mathematics* Problem solving: verbal, pictorial, concrete and symbolic, *Everyday Math* – all unit "Readiness" and "Enrichment" activities Scholastic Kid's Almanac for 21st Century, E. Pascoe and D. Kops Website resources Teacher supplement – tiered worksheets

5. Monitor their progress and reflect on the process of their problem solving activity	Use NJ state rubric for mathematics Website resources *Everyday Math* Open Response rubrics
B. Communication	
1. Use communication to organize and clarify their mathematical thinking	Illuminations website Teacher supplement Math Curse, Jon Scieszka
***Reading and writing**	*Best of Math I and II, Exemplars* CD Sample NJASK Open-Ended Problems Getting the Facts: Counting on Frank, Rod Clement *Read It, Draw It, Solve It,* Dale Seymour Online Powerpoints
***Discussion, listening and questioning**	*Teaching Student Centered Mathematics, Grades 3-5,* Lovin and Van DeWalle *Math Talk*, Suzanne Chapin, Math Solutions *Classroom Discussions,* Chapin O'Connor, and Anderson, Math Solutions
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	*Everyday Mathematics,* Lesson 3.7 Teacher supplement with various math writing prompts: what was easy, most difficult, how do "I know that...", "Is there more than one way?" *Everyday Math* Open-Ended Responses
3. Analyze and evaluate the mathematical thinking and strategies of others.	*Best of Math I and II Exemplars*, CD NJ state rubric Website resources

4. Use the language of mathematics to express mathematical ideas precisely.		*Best of Math I and II Exemplars*, CD NJ Mathematics Core Curriculum Content Standards for appropriate grade level vocabulary and mathematics concepts and skills (2002)
C. Connections		
1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).		*Everyday Math* –Unit 4, 5, and 12 Website resources Teacher supplement *Elementary School Mathematics with Pizzazz*, Creative Publications
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).		*Everyday Mathematics-,* Unit Assessments
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	EM Project 6: Building and Viewing Structures	*Everyday Mathematic -s* Throughout all Units Teacher supplement
4. Apply mathematics in practical situations and in other disciplines.		*Best of Math I and II, Exemplars* CD Teacher supplement with Open Ended Problems from website resources, newspapers, children's literature and professional magazines

5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	EM Project 7: Numbers, Mayan Style EM Project 4: Making a Quilt	Website / Media Center resources
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.		Math Curse, Jon Scieska Teacher supplement NJ Mathematics Curriculum Framework activities *Teaching Student-Centered Mathematics, Grades 3-5,* Lovin and VanDeWalle, Chapter 1 Website resources
D. Reasoning		
1. Recognize that mathematical facts, procedures, and claims must be justified.		Illuminations website Website Resources NJ Sate Rubric *Best of Math I and II, Exemplars* CD
2. Use reasoning to support their mathematical conclusions and problem solutions. * Develop reasoning skills	Project 3: A Carnival Game	Illuminations website Website Resources NJ Mathematics Curriculum Frameworks, pages 48-50 *Everyday Mathematics,* Lesson 3.11 Anno's Hat Tricks, Akihiro Nozaki
3. Select and use various types of reasoning and methods of proof.		*Best of Math I and II, Exemplars CD* Sample Open-Ended Problems from website resourcesTeacher supplement

4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	*Everyday Mathematics* Lesson 12.3 Teacher supplement Website resources *Elementary School Mathematics with Pizzazz,* Creative Publications
5. Make and investigate mathematical conjectures. ***Counterexamples as a means of displaying conjectures**	Teacher supplement *Best of Math I and II, Exemplars* CD Sample Open-Ended Problems from Website resources NJ Mathematics Curriculum Frameworks
***Verifying conjectures using informal reasoning or proofs.**	Teacher supplement *Best of Math I and II, Exemplars* CD Sample Open-Ended Problems from Website resources NJ Mathematics Curriculum Frameworks
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Teacher supplement with website resources
E. Representations	
1. Create and use representations to organize, record, and communicate mathematical ideas.	*Everyday Mathematics* activities ongoing throughout the year Teacher supplement *Groundworks,* Creative Publications
***Concrete representations (e.g., base-ten blocks or algebra tiles)**	*Everyday Mathematics* activities ongoing throughout the year

***Pictorial representations (e.g., diagrams, charts, or tables)**	*Everyday Mathematics* activities ongoing throughout the year
***Symbolic representations (e.g., a formula)**	*Everyday Mathematics* activities ongoing throughout the year
***Graphical representations (e.g., a line graph)**	*Everyday Mathematics* activities ongoing throughout the year
2. Select, apply, and translate among mathematical representations to solve problems	*Everyday Mathematics*, Lesson 3.7 *Best of Math I and II, Exemplars* CD
3. Use representations to model and interpret physical, social, and mathematical phenomena.	*Everyday Mathematics* activities ongoing throughout the year
F. Technology	
1. Use technology to gather, analyze, and communicate mathematical information.	Illumination website Website resources: math forum
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).	Illuminations websiteWebsite resourcesMS office programs: Word, Excel and PowerPointUnited Streaming, Consult with technology teacher to supplement

3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	Teacher supplement Texas Instruments Resources Website resources
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	*Everyday Mathematics,* activities ongoing throughout the year *Best of Math I and II, Exemplars* CD
5. Use computer software to make and verify conjectures about geometric objects.	National Library of Virtual Manipulatives Website Illuminations website Website resources MS Office programs: Word
6. Use computer-based laboratory technology for mathematical applications in the sciences (cf. science standards).	Teacher supplement See also science standards

Fifth Grade Math
Pacing Guide

Unit	Number of Days (approximate)	Unit	Number of Days (approximate)
1- Number Theory	12	**7** - Exponents and Negative Numbers	14
2 - Estimation and Computation	13	**8** - Fractions and Ratios	15
3 - Geometry Explorations & The American Tour	13	**9** - Coordinates, Area, Volume & Capacity	13
4 - Division	10	**10** - Using Data; Algebra Concepts and Skills	12
5 - Fractions, Decimals, and Percents	15	**11 -** Volume	10
6 - Using Data; Addition & Subtraction of Fractions	13	**12** - Probability, Ratios, and Rates	10
Mid-Year Benchmark Assessment	1	End-of-the-Year Benchmark Assessment	1

Grade: 5 Standard 4.1 Number and Numerical Operations
Essential Question: How can problems in the real world be solved with mathematics?
How can estimation be useful to us?
How do numbers help us reason out solutions to problems?
How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 5 pertain to these sets of numbers as well).	Teacher Observation/RSA (Recognizing student achievement); Test/Quiz; Exit tickets		
• Whole numbers through millions (Grade 4 secure)		Place Value Puzzle Literature Link Journal pages and math boxes	
** Demonstrate an understanding of place value concepts.*	EM Unit 2 checking progress,	EM Activity: Place Value Puzzles	*Place Value Poster* *Everyday Mathematics*, Lesson 2.10, 3.2.
**Know place value to billions*		Use real numbers: house prices, stock market daily volume, bank account, profit / loss statements for companies, tax obligations	*Everyday Mathematics*, Lesson 2.10
**Know place value to hundredths*		Math Game: Number Top It	
**Understand the relative size of 1 million, 1 billion, 1 trillion*			*Everyday Mathematics,* Lesson 2.10

**Round numbers to designated places*		Engage in discussion when and why rounding is beneficial Discuss rounding in context: finding mean to nearest tenth, finding number of people for a party, finding exact interest for a bank account	*Everyday Mathematics*, Lesson 2.7 and ongoing activities throughout the year; Sketch pad Lesson: Place Value Counter Target
*** All fractions as part of a whole, as subset of a set, as a location on a number line, and as divisions of whole numbers**		Important to allow students to manipulate with models to master the part-whole relationships Provide opportunities given an identified whole, find part values Review basic fraction ideas with class.	*Everyday Mathematics,* Lesson 5.1, 5.2, *Fraction Tiles, fraction circles, rulers* Sketchpad Lesson: Fraction Tiles, Comparing fractions. Balloon Dart game on website.
*Convert between mixed numbers and improper fractions		Pattern blocks, tan grams Fraction Tiles, fraction circles	*Everyday Mathematics,* Lesson 5.2
***All decimals**	EM, Unit 5 checking progress	EM Game: 2-4-5-10 Frac-Tac-Toe (Decimal Version)	*Everyday Mathematics*, Unit 5
*Rounding decimals		Discuss purposes for rounding decimals. Offer always down, always up, to nearest selected place. Ask when is each appropriate?	*Everyday Mathematics,* Lesson 5.5 Sketchpad lesson: Zooming decimals, Balloon Flight, How Close Can You Get.
2. Recognize the decimal nature of United States currency and compute with money.	EM Unit 4 checking progress		*Everyday Mathematics*, Lesson 2.4, 5.8

3. Demonstrate a sense of the relative magnitudes of numbers		EM Game: First to 100, Estimation Squeeze, Multiplication Bullseye. Discuss data used for circle graphs	*Everyday Mathematics, - 5 Lesson 2.10, 4.3* How Much is a Million*?,* by David Schwartz
**Make magnitude estimates.*			*Everyday Mathematics* , Unit 2
**Make magnitude estimates for quotients of whole and decimal numbers divided by whole numbers*		EM Activity: Magnitude Estimates Explore division with base ten blocks	*Everyday Mathematics*, Unit 4
4. Use whole numbers, fractions, and decimals to represent equivalent forms of the same number.	EM Unit 5 checking progress	Everyday Mathematics, Unit 5.4	*Everyday Mathematics, Unit 5* *Middle School Mathematics with Pizzazz, selected activities* *Sketchpad: Fraction tiles, Comparing Fractions, Feed the Mouse.*
**Rename fractions as decimals*		Use 10 x 10 grids, fraction stick chart, decimal number line * writing equivalent fractions using 10 or 100 as denominators before writing decimals * find decimal equivalents before being allowed to use the calculator for converting fractions to decimals. * Discuss terminating versus repeating decimal numbers * Encourage students to find numerical patterns for decimal equivalents EM Game: 2-4-5-10 Frac-Tac-Toe (Decimal Version)	*Everyday Mathematics, Lesson 8.1, 8.7, 8.9* *EM Probability Meter Poster*

**Find decimals between pairs of numbers*	Evaluation of written response with reasoning Do Now, Exit Ticket	EM Game: Estimation Squeeze Provide opportunities for multiple step problems in open-ended format	*Everyday Mathematics, Lesson 8.4, 8.5* *Balloon target website.* *Sketchpad: Zooming Decimals*
**Convert among fractions, decimals and percents.*	EM Unit 5 checking progress	EM Game: Fraction / Percent Concentration, 2-4-5-10 Frac-Tac-Toe (Percent Version, Bingo Version)	*Everyday Mathematics, Unit 5, 8.7, 8.9, 8.10* *Sketchpad: Stretchy Percent Ruler.*
**Convert between fractions and mixed or whole numbers.*		Use games, allow students to explore with manipulatives or models	*Everyday Mathematics, Lesson 5.2, 8.12*
**Convert between decimals, fractions and mixed numbers*		Use games, allow students to explore with manipulatives or models EM Game: Spoon Scramble	*Everyday Mathematics, Lesson 5.6, 5.8, 5.10, 5.11, 8.8* *Middle School Mathematics with Pizzazz, Creative Publications, selected activities*
**Find common denominators*		Provide opportunities for students to find strategies for finding common denominators	*Everyday Mathematics, Lesson 6.9, 6.10* *Website resources* *Sketchpad: Open the Safe*
**Find equivalent fractions*		Provide opportunities for students to explore equivalencies using paper folding and diagram modeling as well as use of other manipulatives or models EM activity: Using Fraction Sticks	*Everyday Mathematics, Lesson 5.4, 6.9, 6.10* Teacher supplement
**Finding a fraction of a number*		Provide opportunities for students to model sets, paper fold and use other manipulatives including number line	*Everyday Mathematics, Lesson 5.1, 5.2, 8.4, 8.5* *EM Bulletin Board of Fraction of a Fraction examples*

**Explore meaning of and purpose of percent*		Explore meaning of percent that makes sense to students, comparison of different units e.g., grades, percent as a number representation of a whole e.g., 25% of $10 not the	*Everyday Mathematics, Unit 5* *Teaching Student-Centered Mathematics, Grades 3-5, Lovin and Van de Walle.*
**Find percent of a number*		Discuss various ways to find percent of a number Provide multiple opportunities to find most efficient method. EM Activity: American Tour Populations: rural and urban	*Everyday Mathematics, Unit 5, Lesson 8.9, 8.11*
**Practice finding the whole, given a fraction or percent of the whole*		same as 25% of $1 000 Provide opportunities to model using manipulatives	*Everyday Mathematics, Lesson 5.1, 5.2, 6.5, 8.10*
**Review concept of rates; represent rates with formulas, tables, and graphs*		Graphically explore rates: discuss continuous and discrete quantities, Demonstrate Distance, speed and time using CBR and graphing calculator	*Everyday Mathematics, Lesson 10.4, 10.6* *Website resources* *CBR / graphing calculator*
5. Develop and apply number theory concepts in problem solving situations.		EM Game: Advanced Factor Captor EM Project 2: "Deficient, Abundant, & Perfect	*Everyday Mathematics, Unit 1 and activities ongoing throughout the year* *NJ Mathematics Curriculum Framework for grades 5-6, selected activities* *NJ State rubric* *Teacher supplement with Logic Number Problems* *Sketchpad: Mystery Number*
**Identify even and odd numbers*	EM Unit 1 checking progress	Have students tell why number is even or odd Numbers"	*Teacher-made supplement (review skill from earlier grade)*

• *Primes, factors, multiples*		Project 1: The Sieve of Eratosthenes	*Everyday Mathematics, Unit 1* *Middle School Mathematics with Pizzazz, selected activities, Creative Publications* *Teacher supplement* *Sketchpad: Combination Locks, Factor Puzzles.*
ind and identify the factors of a number.	EM Unit 1 checking progress	EM Activity: Factor pairs EM Game: Factor Captor, Factor Bingo EM Activity: Factor Rainbows, Square and Square Roots.	*Everyday Mathematics, Unit 1, 12.1*
ind the prime factorizations of numbers		Practice factor tree, write product of primes using exponents (EM uses factor strings)	*Everyday Mathematics, Lesson 1.9, 12.1* *Middle School Mathematics with Pizzazz, selected activities* *Teacher supplement*
entify prime and composite numbers	EM Unit 1 checking progress	Explore array strategy for finding primes EM Project 1: The Sieve of Eratosthenes	*Everyday Mathematics, Lesson 1.6*
**Find the greatest common factor of two numbers*		Provide examples using prime factorization	*Everyday Mathematics, Lessons 12.1* *Teacher supplement using other resource* *Sketchpad: Combination Locks.*
**Find the least common multiple of two numbers*		Provide examples using prime factorization	*Everyday Mathematics, Lessons 12.1* *Teacher supplement* *Sketchpad: Combination Locks.*
**Represent square numbers as arrays and as numbers written as exponents*		EM Activity: Exploring Square numbers	*Everyday Mathematics, Lesson 1.7*
ind the square root of a square number		Refer to square root as un squaring a number: use squeeze method	*Everyday Mathematics, Lesson 1.8*

** Explore rates*		Provide opportunities to solve number stories using rates	*Everyday Mathematics, Lesson 12.1* *Teacher supplement* *Website resources* *Teaching Student-Centered Mathematics in grades 3-5, 5-8, Lovin and Van de Walle*
** Explore uses of ratios and way of expressing ratios*		Provide opportunities to explore ratios in everyday life; model and solve problems involving ratios of part to whole relationship and number stories EM American Tour data EM Activity: Musical Ratios.	*Everyday Mathematics, Lesson 12.3, 12.4, 12.5* *Teacher supplement* *Middle School Mathematics with Pizzazz, Creative Publications* *NJ Mathematics Curriculum Framework in grades 5-6, selected activities*
**Solve rate story problems*	EM, Unit 12 checking progress	EM Activity: Find your Heart Rate. Provide multiple opportunities to model using manipulatives, discuss rate tables, and explore relationships between numbers using rate stories	*Everyday Mathematics, Lesson 12.6, 12.7, 12.8* *Teacher supplement* *Best of Math I and II, Exemplars CD* *Website resources*
**Introduce cross multiplication for solving ratio problems (proportions)*		Practice setting up equivalent ratios that yield the same solutions.	*Everyday Mathematics, Lesson 12.5* *Teacher supplement* *Middle School Mathematics with Pizzazz, Creative Publications* *Website resources*
6. Compare and order numbers.		EM Activity: Ranking States by Their Native-American Populations	*Everyday Mathematics, Lesson 3.2, 4.6*
**Order and compare positive and negative numbers*		Explore practical uses for negative numbers: golf scores, football gains and losses, having and owing money, above and below sea level, stock market * Use number line	*Everyday Mathematics, Lesson 2.10, 5.3, 7.7* *Sketchpad: Jump Along.*

	* Explore -x as the "opposite of x" since x may be a positive or negative number	
*Order and compare fractions	Use 0, 1/2 and 1 as benchmarks, Provide students with Fraction pieces, stick chart or number line to support their ordering	*Everyday Mathematics, Lesson 5.3, 8.1* *Super Source with Cuisenaire series, Marilyn Burns*
*Understand and apply exponential notation	EM Game: Build It Explore as repeated multiplication Introduce calculator keys A and y to the x EM Game: Exponent Ball	*Everyday Mathematics, Lesson 7.1, 7.2, 7.3*
*Introduce number and word notation for large numbers	Create place value chartsDiscuss and show examples of standard form and number and word notationGive students practice writing numbers such as 4.2 million, 35 billion, 29.3 thousand, What is 8K?	*Everyday Mathematics, Lesson 7.1, 7.2, 7.3*
*Introduce exponential notation for powers of 10	Explore relative size of numbers when distinguishing between positive and negative exponents for powers of ten	*Everyday Mathematics, Lesson 7.1, 7.2, 7.3*
*Understand and apply scientific notation	Explore uses of scientific notation, find examples on the Internet Literature Link While calculators may differ- introduce using scientific notation on a calculator for discussion purposes EM Game: Scientific Notation Toss	*Everyday Mathematics, Lesson 7.3* *Teacher supplement; Website resources* The King's Chessboard, *David Birch*

B. Numerical Operations

By the end of fifth grade, 90% of Flemington-Raritan students will have mastery of basic facts for addition and subtraction up to 20, and multiplication and division up to 12 x 12.

District Timed tests: 50 facts in two minutes

MP 1, 2, 3, 4 addition and subtraction separate; multiplication and division separate

** Demonstrates proficiency in basic facts for addition and subtraction and multiplication and division*	EM Unit 1 Checking Progress	EM Game: Advanced version of Factor Captor Game	*Everyday Mathematics*, Unit 1 and ongoing throughout the year Website resources
** Draw arrays to model multiplication*	EM Unit 1 Checking Progress	EM activity: Finding Rectangular Arrays in Perpetual Calendar Use array dot paper Geoboard Activity	*Everyday Mathematics*, Lesson 1.2
**Find the quotient and remainder of a whole number divided by a 1-digit whole number*	EM Unit 4 Checking Progress	Discuss what form the remainder should be written in: decimal, fraction Provide opportunities to divide in context so remainder is valid	*Middle School Mathematics with Pizzazz*, selected activities
**Find the quotient and remainder of a whole number divided by a 2 -digit whole number*	EM Unit 4 Checking Progress, Part B.	EM Game: Division Dash Explore remainder uses and formats at length Student should use appropriate estimation	*Everyday Mathematics*, Lesson 4.1, 4.2 *Middle School Mathematics with Pizzazz*, selected activities Give extra practice: teacher made or published worksheets

**Add and subtract positive and negative numbers*	EM Unit 7 checking progress	Use two color counters activities Student should be able to demonstrate add / subtraction with counters or using the number line. EM Game: Top It, Credit/Debits Game Calculators should not be used for computation	*Everyday Mathematics*, Lesson 7.8, 7.9, 7.10 (NO calculator)
1. Recognize the appropriate use of each arithmetic operation in problem situations.	EM Unit 2, checking progress	EM Project 3: Ancient Multiplication Algorithm	*Everyday Mathematics,* Units 2.2, 2.3, 2.4, 2.8, 2.9, 4.2, 4.6
2. Construct, use, and explain procedures for performing addition and subtraction with fractions and decimals	EM Unit 2, 5, 8 checking progress	Students should have a successful strategy for computation. Students should be able to show understanding of computation method they are using. Encourage students to use appropriate and efficient procedures as time and problem warrants.	*Everyday Mathematics,* Lesson 2.2, 2.3, 2.4, 5.3, 6.8, 6.9, 6.10, 8.1, 8.2, 8.3, 8.4
• **Pencil-and-paper**		Provide practice appropriate to student need	
• **Mental math**		Provide class competitions	Teacher supplement
• **Calculator**		Use appropriate numbers and monitor student use Discuss answer interpretations EM Game: Beat the Calculator	Website resources

* *Find the sum and difference of multi-digit whole numbers and decimals*		Assess place value using EM whole class discussion. Review various algorithms for adding and subtracting numbers, include traditional EM Games: Addition Top IT, Subtraction Target Practice	*Everyday Mathematics,* Lessons 2.2, 2.3, 2.4
* *Find the product of multi-digit whole numbers, fractions, and decimals*	EM Unit 2, Checking progress	Review various algorithms for multiplying numbers, include traditional. EM Games: Multiplication Wrestling	*Everyday Mathematics,* Lesson 2.8, 2. 9, 8.5, 8.6, 8.7
* *Use an algorithm to add and subtract mixed numbers*	EM Unit 8 checking progress	EM Game: Fraction Capture, Mixed Number Spin, Fraction Action, Fraction Friction	*Everyday Mathematics,* Lesson 8.2, 8.3.
* *Add and subtract fractions with common denominators*	EM Unit 5, 6 checking progress	Provide opportunities for students to use manipulatives and other models to support their thinking Fraction pieces Explore the use of equivalent fractions to find common denominators EM Game: Fraction Capture,	*Everyday Mathematics,* Lesson 6.8, 6.9, 6.10, 5.3 *Middle School Mathematics with Pizzazz* , Creative Publications, selected activities
**Add and subtract fractions with unlike denominators*	EM Unit 5, 6 checking progress	Provide opportunities for visual and concrete experiences to help students to understand concept EM Activity: Clock Fraction	*Everyday Mathematics,* Lesson 5.3, 6.8, 6.9, 6.10

** Use area model for fraction multiplication*		Paper folding	*Everyday Mathematics,* Lesson 8.5
**Use an algorithm to multiply fraction, whole number and mixed numbers by a fraction of same*	EM Unit 8 checking progress, Part B.	Student should understand reasons behind multiplication algorithm: provide ample opportunities for modeling using manipulatives EM Game: Fraction/Whole Number Multiplication Top It	*Everyday Mathematics,* Lesson 8.5, 8.6, 8.7, 8.8, 8.10
**Find the quotient for dividing a whole number by a whole number*	EM Unit 4 checking progress	Review partial-quotients algorithm and traditional method. Encourage good estimating	*Everyday Mathematics,* Lesson 4.1, 4.2, 4.4
**Introduce strategy for dividing fractions*		Provide opportunities for discussion and understanding, use manipulatives and models	*Everyday Mathematics,* Lesson 8.12
3. Use an efficient and accurate pencil-and-paper procedure for division of a 3-digit number by a 2-digit number.	EM Unit 4 checking progress, Part B.	Provide opportunities for students to show mastery of efficient methods: emphasis is on efficiency, students who use one method should be encouraged to have alternate methods based on problem set	*Everyday Mathematics,* Lessons 4.2, 4.4, 4.5. 4.6 *Middle School Mathematics with Pizzazz*, selected activities
**Use a divisibility test to determine if a number is divisible by another number.*		Enrichment: Exploring a Divisibility test EM Activity: Divisibility Tests	*Everyday Mathematics*, Lesson 1.5 *Middle School Mathematics with Pizzazz,* Creative Publications, selected activities
**Interpret the remainder in division number stories*	EM Unit 4 checking progress	Provide visual representation of division using diagrams or models EM Activity: Solving division stories with remainders	*Everyday Mathematics,* Lesson 4.6 Website resources

**Divide decimal numbers by whole numbers with no remainders (B/D)*	EM Unit 4 checking progress	Provide opportunities for students to estimate answer before calculating solution	*Everyday Mathematics,* Lesson 4.5 *Middle School Mathematics with Pizzazz*, Creative Publications
4. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.		Supplemental enrichment activities	*Everyday Mathematics,* Units 1, 2, 3, 8, 10 *Best of Math I and II, Exemplars CD*
** Solve number stories (addition and subtraction) (S)*		Provide models of number stories including open sentences	*Everyday Mathematics,* Lesson 2.4, 2.8
5. Check the reasonableness of results of computations.		Always remind student to ask "Does this answer make sense?"	*Everyday Mathematics,* Units 2.1, 2.5, 2.7, 2.8, 9.7
6. Understand and use the various relationships among operations and properties of operations.	EM Unit 4, 7, 9 checking progress	EM Activity: The Four 4's	*Everyday Mathematics,* Lesson 1.4, 1.5, 1.9, 4.1, 9.7
• *Understand how square numbers and their square roots are related*		Create and explore patterns for squares and square roots Use visual representations: geoboard Introduce square root as the undo of squaring	*Everyday Mathematics*, Lesson 1.7, 1.8

• *Solve ratio and rate number stories*		Provide multiple opportunities for students to explore relationships and use as problem solving strategy Encourage: Does this make sense? How can I use this information to help solve other problems?	*Everyday Mathematics*, Lesson 12.4, 12.5
C. Estimation			
1. Use a variety of estimation strategies for both number and computation.	EM Unit 2 checking progress	Provide ongoing opportunities for student guesses in estimation jars filled with a variety of objects.	*Everyday Mathematics*, Lesson 2.1, 2.5, 2.7
*Make magnitude estimates for product of multi-digit numbers, including decimals	EM Unit 2 checking progress	Encourage students always to make estimates whenever doing computation whether on a calculator or by hand EM Game: Multiplication Bull's Eye	*Everyday Mathematics,* Lesson 2.7
2. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.		EM Activity*:* Estimation EM Activity: Estimate Reaction Time EM Activity: American Tour: Population estimates Literature Link	*Everyday Mathematics,* Lesson 2.1, 2.5. Counting on Frank, Rusty Bresser

* Use sampling to make an estimate		Explore the enormity of such large numbers through class discussions EM Activity: Making Time Estimates for 1 Billion and 1 Trillion Literature Link EM Activity: Earth's Water Surface and School's Land area.	*Everyday Mathematics,* Lesson 2.10, 9.7 Website resources for real data numbers How Much is a Million*?,* David Schwartz
3. Determine the reasonableness of an answer by estimating the result of operations.	EM Unit 2 checking progress	Provide opportunities to practice estimation prior to computation Encourage good estimates and define key numbers to use	*Everyday Mathematics*, Lesson 2.1, 2.5, 2.7
4. Determine whether a given estimate is an overestimate or an underestimate.		Multiplication Bulls Eye.	*Everyday Mathematics,* Lesson 2.1, 2.7

Grade: 5 Standard 4.2 Geometry and Measurement
Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Understand, apply, and identify concepts involving lines and angles.	Teacher Observation/RSA (Recognizing Student Achievement) Test/Quiz Exit Ticket	Provide hands-on models Discuss and model appropriate examples	*Everyday Mathematics* Unit 3 Website resources
• Notation for line, ray, angle, line segment		Provide practice for students to name, write, draw, notations.	*Everyday Mathematics,* Lesson 3.4, 3.5
• Properties of parallel, perpendicular, and intersecting lines		including those found within 2-D and 3-D figures	*Everyday Mathematics,* Lesson 3.5, 9.6
• Sum of the measures of the interior angles of a triangle is 180°		Demonstrate using paper to show angle measures total 180 degrees Explore different kinds of triangles and sizes	*Everyday Mathematics*, Lesson 3.9 Website resources
**Find the sum of the measures of the angles in any polygon*		Provide opportunities for students to explore the sums of angles; Use appropriate software such as Geometer's Sketchpad or other internet resource	*Everyday Mathematics*, Lesson 3.9 *Middle School Mathematics with Pizzazz*, selected activities Website resources

**Determine angle measures based on relationships between angles*	EM Activity: Finding pattern-block angle measures. EM Activity: Solving a Baseball Challenge. Provide examples using a half protractor with angles drawn; Provide right triangle and one angle measure, find the third, give one base angle of isosceles and find other two measures	*Everyday Mathematics,* Lesson 3.3, 3.4, 3.5, 3.9
** Identify types of angles* ** Explore relationships for adjacent and vertical angles with intersecting lines*	EM Games: Angle Tangle Provide ample opportunities to explore relationships using models or software	*Everyday Mathematics,* Lesson 3.4, 3.5 Teacher supplement
** Use a compass to draw a circle and copy a line segment*	compass Geometer's Sketchpad	*Everyday Mathematics*, Lesson 3.5 Teacher supplement
2. Identify, describe, compare, & classify polygons. • Triangles by angles & sides• Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi	"Geodeo's Sorting Scheme"	*Everyday Mathematics,* Lesson 3.6
• Polygons by number of sides **• Equilateral, equiangular, regular** **• All points equidistant from a given point form a circle**	Geometry solids, Polygon tiles EM Game: Polygon Capture	*Everyday Mathematics,* Lesson 3.7, 3.9 Illuminations website
*******Identify types of triangles*		*Everyday Mathematics,* Lesson 3.6 Website resources
**Identify the base and height of triangles and parallelograms*	Use graph paper and geoboard activities to model heights and bases	*Everyday Mathematics*, Lesson 9.5, 9.6

3. Identify similar figures.	Use Problems for the Geometry Template; Explore angle measures and side lengths, discuss relationships; Show examples and non examples for definition "same shape different size"	*Everyday Mathematics,* Lesson 3.10 Teacher supplement Sketchpad: Sliding Shapes
** Know the properties of geometric solids*	Use or create geosolid models EM Game: 3-D Shape Sort, EM Activity: polyhedral Dice, EM Activity: Cube pattern, EM Activity: rectangular Prism Pattern,	*Everyday Mathematics*, Lesson 11.1, 11.2 Website resources
***Identify faces, vertices and edges (Grade 4 secure)**	Use geosolids models Literature Link	*Everyday Mathematics*, Lesson 11.2 *The Boy Who Reversed Himself, Flatland*
3. Understand and apply the concepts of congruence and symmetry (line and rotational).	EM Study Link 9.3 (reflection) Look for congruent and similar shapes in wallpaper, fabric, art	*Everyday Mathematics,* Lesson 3.6, 9.3 Teacher supplement
B. Transforming Shapes		
1. Use a translation, a reflection, or a rotation to map one figure onto another congruent figure.	EM Game: Robot Activity:" Shape Cutter" This is new vocabulary for students: slide, flip and turn are previous vocabulary used Provide projects in which student must use one shape and show all three transformations	*Everyday Mathematics*, Lesson 3.6, 3.8, 9.3 Illuminations website *Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and Van de Walle Teacher supplement *Middle School Mathematics with Pizzazz*, selected activities

**Define and create tessellations*	EM Activity: Tessellation Museum.	*Everyday Mathematics,* Lesson 3.8 *Teaching Student-Centered Mathematics, Grades 3-5*, Lovin and Van de Walle. *The Art of MC Escher,* "Tessellmania" *Sketchpad: Making Kaleidoscopes, Sliding Shapes, Mosaic Tile Designs*.
2. Recognize, identify, and describe geometric relationships and properties, as they exist in nature, art, and other real-world settings.	Use real applications	*Everyday Mathematics,* Unit 3 Teacher supplement Illuminations website *Geometry in the World of Art - Grades 3-5*
**Know properties of polygons*	Provide models for student to explore	*Everyday Mathematics,* Lesson 3.7 Teacher supplement
**Know names of geometric solids and compare properties of prisms, pyramids, cylinders and cones.*	Provide students with models to explore and compare Literature Link	*Everyday Mathematics,* Lesson1 1.1, 11.2 The Boy Who Reversed Himself, William Sleator
C. Coordinate Geometry		
1. Create geometric shapes with specified properties in the first quadrant on a coordinate grid.	Activity:" Lost in the Crowd" Literature Link	The Fly on the Ceiling, Julie Glass
**Plot ordered pairs on a four-quadrant coordinate grid*	Battleship game EM Activity: Hidden Treasure EM Activity: coordinates in a classroom	*Everyday Mathematics*, Lesson 9.1, 9.2, 9.3
**Explore transformations of figures in a plane*	Use graph paper, geoboard, pattern blocks, block letters Have students write directions on how to move an object to a new location on the graph or describe changes from its original position; Provide practice in reflections, translations, and rotations.	*Everyday Mathematics,* Lesson 9.2, 9.3 Teacher supplement Website resources

EM Activity: Sailboat graph

D. Units of Measurement

1. Select and use appropriate units to measure angles and area.	Have whole class discussions about measures and the appropriate measuring units: both metric and US customary	*Everyday Mathematics Lesson 3.3, 3.4, 3.9, 9.4, 9.5, and 9.6* *Teacher supplement*
**Understand the concept of area of a figure*	Provide multiple opportunities for student to explore area using manipulatives, models and graph paper in different unit sizes. Emphasize square units as the measuring unit	*Everyday Mathematics, Lesson 9.4, 9.5, 9.6*
**Use the formula for area of a rectangle*	Explore ideas of variables used in formulas; Explore patterns to help develop the formula; Explore areas of irregular shapes that could be partitioned into smaller rectangles.	*Everyday Mathematics, Lesson 9.4* *Middle School Mathematics with Pizzazz, Creative Publications, selected activities*

**Explore strategies, including the rectangle method, for finding areas of polygons*		Explore using geoboard, centimeter graph paper; Elicit strategies to find the areas, e.g., add parts, build up and subtract Literature Link	*Everyday Mathematics, Lesson 9.5 and 9.6* Spaghetti and Meatballs for All, Cheryl Rectanus
**Use formulas for area of triangle and parallelogram*	EM Unit 9 Checking Progress	Explore using manipulatives and models heights (altitude) and bases of triangles and parallelograms, use geoboard activities and graph paper	*Everyday Mathematics, Lesson 9.6* *Middle School Mathematics with Pizzazz, Creative Publications, selected activities*
**Estimate distances using a map scale*		Have class discussions about measuring on a map; Work in cooperative groups	*Everyday Mathematics, Lesson 4.3* *Teacher supplement* Sketchpad: U.S. Cities
** Reading a ruler (previous grade secure)*		Provide multiple opportunities for students to measure and draw lengths using both centimeter and inch ruler.	Teacher supplement Website resources Transparency Rulers - Master Rulers
**Select reasonable measurement units , US and metric*		EM Activity: Finding Personal Measures for One's Body Allow students to create own multiple choice problems using both US customary and metric units for length, weight and capacity	*Everyday Mathematics, Lesson 6.2* *Math Masters* Sample multiple choice assessment like items from NJ state and other state assessments
2. Convert measurement units within a system (e.g., 3 feet = ___ inches).		Activity: "Measuring Up" EM Activity: Finding Measurement Equivalencies	*Illuminations website* Teacher supplement *Middle School Mathematics with Pizzazz, selected activities* *Everyday Mathematics, Lesson 9.10*
3. Know approximate equivalents between the standard and metric systems (e.g., one kilometer is approximately 6/10 of a mile).		Reference Page of Journal 2 (back cover)	*Everyday Mathematics, Lesson 6.2, 11.6*

**Examine the relationship among liter, milliliter, and cubic centimeter*	Use models to demonstrate equivalencies	*Everyday Mathematics, Lesson 9.10*
4. Use measurements and estimates to describe and compare phenomena.	Project 8- Pendulums Provide some informal indirect measurement examples	*Everyday Mathematics, Lesson 2.5, 10.5*
** Understand the concept of capacity and how to calculate it*	Solve problems involving units of weight, see Teacher's guide for examples	*Everyday Mathematics Lesson 11.6* Teacher supplement with Open-ended problems from various sources
5. Solve problems with elapsed time (Grade 4 secure)	Provide students with opportunities to write and solve number stories involving elapsed time: include fractions, decimals and whole numbers, e.g., daily schedule, cooking, appointments, getting ready for school	*EM teacher's guide* Teacher supplement Website resources
E. Measuring Geometric Objects		
1. Use a protractor to measure angles.	Geometry template, Have students explore using both half and circle protractors EM Activity: Pattern Block Angles	*Everyday Mathematics, Lesson 3.3 3.4* *Middle School Mathematics with Pizzazz, selected activities*
**Estimate the measure of an angle*	Cooperative group exploration activities	*Everyday Mathematics, Lesson 3.6, 3.8* *Sketchpad: Angle Estimation.* ** Measure an angle within 2 degrees* *Math Masters* *Sketchpad: Introducing Protractors.*

2. Develop and apply strategies and formulas for finding perimeter and area.	EM Project 6: Sports Areas EM Math Masters EM Project 7: Polygon Areas and Pick's Theorem Use geoboard activities	*Everyday Mathematics, Lessons 9.3, 9.4, 9.5, 10.8, and 10.9* *Sketchpad: Rectangles with Same Area*, Rectangles with Same Perimeter.
**Square* *V P t a Q J i V I I 1*	Use models to explore formulas Graph paper, geoboard Explore to find formula	*Teacher supplement* *Everyday Mathematics, Lesson 9.4*
**Polygons*	Use models, polygon tiles or other to explore area Student not expected to generate formulas for all polygons, such as hexagon, pentagon etc.	*Everyday Mathematics Unit 9*
**Triangles*		*Everyday Mathematics, Lesson 9.6* *Math Masters* *Sketchpad: Rectangles and Triangles*.
** Parallelograms*		*Everyday Mathematics, Lesson 9.6*
**Identify the base and height of triangles and parallelograms*	Explore using manipulatives and models Geoboards, graph paper	*Everyday Mathematics, Lesson 9.4, 9.5, 9.6*
**Circles*		*Everyday Mathematics, Lesson 10.8 and 10.9* Teacher supplement
**Distinguish between circumference and area of circle problems*	Provide activities to explore the diameter and radius relationship between circumference and area using manipulatives and models Explore "pi" EM Activity: Circumference Investigation Literature Link	*Everyday Mathematics, Lesson 10.8, 10.9* The Librarian Who Measured the Earth, Kathryn Lasky *Website resources for "pi"*

**Use formulas to find the circumference and area of circles*		*Everyday Mathematics Lesson 10.8, 10.9*
**Understand the concept of volume of a figure*	Explore using manipulatives and models Creates 3-D models from net patterns EM Activity: explore volume using open boxes	*Everyday Mathematics Lesson 9.8, 9.9, 9.10* *Sketchpad: Cube Nets, Stack it Up*
**Understand the relationship between the volume of pyramids and prisms, and the volume of cones and cylinders*	Demonstrate using geosolids and water or other dry material to derive the relationship Use net patterns	*Everyday Mathematics, Lesson 11.7* *NJ Mathematics Curriculum Framework in grades 5-6, selected activities* Teacher supplement
** Use formulas to find the volume of prisms and cylinders*	Use centimeter cubes to build prisms and develop the formulas Use geosolids as reference models Provide opportunities to view the results of the volume of two cylinders with height of 5, 10 and radius of 10, 5 to see if same, or which is larger. Practice finding volumes with missing measures, e.g., Given V =36 cubic units, l = 4units, w =3units, what is h?	*Middle School Mathematics with Pizzazz, Creative Publications, selected activities* *Best of Math I and II, Exemplars, CD*
**Explore the volume of an irregular object by submerging it in water and measuring the volume of water it displaces*	Demonstration by teacher or students working in cooperative groups. Students may not be adept in experimentation accuracy for this to show accurate results. Have students make prediction and then find the difference between their prediction and the actual result.	*Everyday Mathematics, Lesson, 11.5* See science curriculum topics of displacement or calibration *Website resources*

**Understand the concept of surface area of a figure*	Geosolid with folding nets Gather 3-D objects and discuss the faces and their coverings	*Everyday Mathematics, Lesson 11.7* *Sketchpad: Perfect Package*
** Find the surface area of prisms*	Geosolid with folding nets Explore surface area using nets and writing recipes for finding surface areas	*Everyday Mathematics, Lesson 11.7* Teacher supplement
** Understand how to find the surface area of cylinders*	Use everyday examples of cylinders	*Everyday Mathematics Lesson 11.7*
3. Recognize that rectangles with the same perimeter do not necessarily have the same area and vice versa.	Explore rectangles using geoboard activities and other models	*Everyday Mathematics Lesson 9.4*
4. Develop informal ways of approximating the measures of familiar objects (e.g., use a grid to approximate the area of the bottom of one's foot).		*Everyday Mathematics Journal* Teacher supplement *Estimation Challenge*

Grade: 5 Standard 4.3 Patterns and Algebra
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns involving whole numbers.	Teacher Observation/RSA (Recognizing Student Achievement) Test/Quiz Exit Ticket EM Unit 10 checking progress	EM Activity: Number Patterns using dots, Math Masters. "Patterns that Grow" Provide multiple opportunities for exploring patterns involving manipulatives, numbers, models and other objects	*Everyday Mathematics* Units 1, 2, 7, 10 Teacher supplement Illuminations websites Sketchpad: The Envelope
• Descriptions using tables, verbal rules, simple equations, and graphs			*Everyday Mathematics,* Lesson 10.4, 10.5, 10.7 Website resources *Navigations in Algebra, grades 3-5*, NCTM, selected activities
**Explore Fibonacci Sequence*		Provide opportunities for students to explore pattern and find patterns in the Fibonacci sequence, especially those found in nature: sunflower seeds, nautilus shell, pine cones	Teacher supplement Website and Library resources
B. Functions & Relationships			
1. Describe arithmetic operations as functions, including combining operations and reversing them.		Allow student to explore ways to evaluate expressions	*Everyday Mathematics* Lesson 7.4, 7.5 *Groundworks for Algebra*, Creative Publications *Sketchpad: Function Machines.*
**Translate word descriptions into algebraic expression*		Discuss common symbols for words, e.g., twice, half	*Everyday Mathematics,* Lesson 10.3

**Complete "What's My Rule?"*	EM Unit 10 checking progress		*Everyday Mathematics,* Lesson 10.3, 10.4
2. Graph points satisfying a function from T-charts, from verbal rules, and from simple equations.	EM Unit 10 checking progress assessment	Explore linear relationships	*Everyday Mathematics* Lesson 10.4,10.5, 10.6
C. Modeling **1. Use number sentences to model situations.** **• Using variables to represent unknown quantities** **• Using concrete materials, tables, graphs, verbal rules, algebraic expressions/equations**		Use concrete models to represent variables At first, discuss what makes sense rather than procedural Geoboard EM Game: First to 100 EM Game: Algebra Election Game	*Everyday Mathematics* Lesson 2.4, 4.6, 10.3, 10.4, 10.6 Teacher supplement *NJ Mathematics Curriculum Frameworks in grades 5-6,* selected activities
• *Understand and apply the use of* • *Identify if equation is true or false*		Provide opportunities for types of open sentences that are true, false and neither	*Everyday Mathematics,* Lesson 7.4 Teacher supplement
parentheses in number sentences		Explore why parentheses have importance in expression simplifying (Words use commas to give meaning) EM Game: Name That Number EM Activity: Number Stories (Discuss nested parenthesis: most often used as brackets or braces) e.g., [(3+8) - (11 - 2)]	*Everyday Mathematics,* Lesson 7.4 NJ Mathematics Curriculum *Frameworks*, Grades 5-6, selected activities EM Activity: The Four 4's Problem.
• *Determine the value of a variable: use this value to complete a number sentence* • *Understand and apply order of operations to evaluate expressions and solve number sentences*		EM Activity: Converting Celsius to Fahrenheit Students should work in a vertical format and show each calculation. ONLY after students have mastery of steps for order of operations, provide exploration of simplifying using a calculator.	*Everyday Mathematics,* Lesson 4.6, 10.6 *Everyday Mathematics,* Lesson 7.5

• *Write algebraic expressions to describe situations*		Use story problems to generate variable expressions	*Everyday Mathematics,* Lesson 10.3 teacher supplement
• *Represent rate problems as formulas, graphs and tables*		Provide multiple opportunities to explore rate relationships in various problem situations	*Everyday Mathematics* Lesson 10.4 Teacher supplement
• *Write and solve open sentences for number stories*		Use manipulatives and models to explore solutions	*Everyday Mathematics,* Lesson 2.4, 10.2 Teacher supplement
• *Write and solve number sentences with variables for division number stories*		Allow students to use manipulatives and other models to assist in solving stories	*Everyday Mathematics,* Lesson 4.5, 4.6
2. Draw freehand sketches of graphs that model real phenomena and use such graphs to predict and interpret events.		EM Activity: Predicting Old Faithful's Next Eruption EM Project 8: Pendulum	*Everyday Mathematics*, Lesson 10.5, 10.7
***Changes over time**		Explore line graph data	Website resources
***Rates of change (e.g., when is plant growing slowly/rapidly, when is temperature dropping most rapidly/slowly)**		Explore: temperature over a month time, growth of plants, height of growth from child to adult	Teacher supplement Website resources
D. Procedures **1. Solve simple linear equations with manipulatives and informally** ***Whole-number coefficients only, answers also whole numbers** *** Variables on one side of equation**	EM Unit 9, 10 checking progress and assessment.	Use pan-balance, geoboard, manipulatives and other models to solve	*Everyday Mathematics,* Lesson 9.6, 10.3, 10.4, 10.5, 10.7. *Middle School Mathematics with Pizzazz,* selected activities *Teaching Student Centered Mathematics, Grade 3-5 & 5-8,* Lovin & Van de Walle, selected activities

**Solve one-step pan-balance problems*		Demonstrate using manipulatives and models, then use symbols before using variables Students should explore equation solving in cooperative groups	*Everyday Mathematics,* Lesson 10.1.
**Solve two-step pan-balance problems*		Begin with manipulatives and models	*Everyday Mathematics,* Lesson 10.2.
2. Understand and use the concepts of equals, less than, and greater than in simple number sentences. (Grade 4 secure) ***Symbols (<, >, =)**	EM Unit 7 checking progress	Incorporate use of these symbols when comparing all numbers including fractions and decimals	SRB, American Tour Section Website or library book resources
1. Understand, name and apply the properties of operations and numbers. (Grade 4 secure) ***Commutative** ***Identity element for multiplication** ***Associative** ***Division by zero** ***Any number multiplied by zero is zero**		Apply these properties when simplifying numerical expression including whole numbers, decimals, fractions and integers.	Teacher supplement *Middle School Mathematics with Pizzazz,* Creative Publications

Grade: 5 Standard 4.4 Data Analysis, Probability, and Discrete Mathematics
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1. Collect, use, generate, organize, and display data.	Teacher Observation/RSA (Recognizing Student Achievement) Unit 6 Checking Progress/Quiz Exit Ticket Evaluation of student completed projects using a rubric	EM Activity: Class Data for number of States students / adults have visited EM Activity: Collecting Exercise Data	*Everyday Mathematics*, Lesson 6.1, 12.7 *Best of Math I & II, Exemplars CD*
• Data generated from surveys		Have student generate surveys to collect data about themselves Introduce the American Tour Census Data EM Journal EM Activity: Interpret data in the news	*Everyday Mathematics,* Lesson 3.1, 3.2, 6.1, 6.6
2. Read, interpret, select, construct, analyze, generate questions about, and draw inferences from displays of data.		Activity: "Information Represented Graphically" EM Activity: Education and Earnings EM Activity: Estimating Colonial Populations EM: American Tour, School Days, EM Journal EM Activity: reading Graphs, Mystery Graphs.	Illuminations website *Everyday Mathematics*, Lesson 3.1, 3.2, 5.12, 10.7 Teacher supplement with various graphs from newspapers, periodicals, encyclopedias, and other related documents *Sketchpad: Target Mean Game.*

• **Bar graph, line graph, circle graph, table**	EM Unit 5 checking progress	Discuss differences of each type of graph and why one over another is appropriate for different types of data EM activity: Interpreting Data EM Activity: Create circle graphs with Class Snack Survey EM Activity: Acting out the Construction of a Circle graph	Teacher supplement Website resources *Everyday Mathematics,* Lesson 5.9, 5.10, 5.11, 6.1, 6.4, 6.6 Best of Math I and II, Exemplars
**Use a Percent Circle to find percents of circle graphs*			*Everyday Mathematics,* Lesson 5.10, 5.11 EM Math Masters
*******Measures pieces of a circle graph; interpret a circle graph*		Find and use circle graphs Use protractor to measure sectors	*Everyday Mathematics*, Lesson 6.5 Teacher supplement
**Construct circle graph*			*Everyday Mathematics* , Lesson 5.11 Math Masters
**Construct, read and interpret stem-and-leaf plots (B/D)*		Use various sample data sets to create stem and leaf plots EM Journal activity; Measuring the Great Span EM Math Masters EM Activity: Reaching and Jumping	Website sources for data *Everyday Mathematics,* Lesson 6.3, 6.4
• **range, median, and mean**		Provide multiple opportunities to explore these measures and their value in different contexts Discuss meaning for average and different uses of	Teacher supplement *Best of Math I & II, Exemplars CD* *Sketchpad: Target Mean Game*
**Identify the statistical landmarks for maximum, minimum, median, and mode*	EM Unit 2 checking progress	EM Activity: The Great Span EM Activity: Estimate Reaction Time EM Activity: States visited by Adults and Students	Illuminations website and others *Middle School Mathematics with Pizzazz,* Creative Publications *Everyday Mathematics,* Lessons 2. 5, 6.1, 6.4, 6.5, 6.6

** Collect, organize, use and display data landmarks*	Give students central tendency data and have them create data sets: e.g., Sample data set, mean is 10, median is 15, mode is 8, find the set of 5 numbers that satisfy these conditions Use open-ended problems EM Math Masters EM Activity: Constructing a Graph from Landmarks.	*Everyday Mathematics,* Lesson 2.5, 6.5 Website resources *Best of Math I and II, Exemplars CD*
**Interpret mystery line plots and graphs*	Explore examples of story telling graphically and then model	*Everyday Mathematics,* Lesson 6.4, 10.7, 12.7 Teacher supplement
**Understand how sample size affects results*	EM Activity: Sample Candy Color Provide multiple experiences changing sample size using models and manipulatives e.g., number of test questions	*Everyday Mathematics,* Lesson 6.5 Website resources
3. Respond to questions about data and generate their own questions and hypotheses.		*Everyday Mathematics* - Unit 6 Teacher supplement

B. Probability

1. Determine probabilities of events.	Teacher Observation/RSA (Recognizing Student Achievement) EM Unit 12 Checking Progress/Quiz Exit Ticket	EM Journal: Describing Chance Probability Meter Poster EM Activity: Thumbtack Experiment	*Everyday Mathematics,* Lesson 2.6, 12.2 *Jumanji,* Chris Van Allsburg Teacher supplement *Navigations in Data Analysis and Probability, grades 3-5, 5-8,* NCTM, selected activities *Best of Math I and II, Exemplars CD*
• Event, probability of an event		EM Activity: US Census results on the Probability Meter	*Everyday Mathematics*, Lesson 2.6 and 12.2 *Middle School Mathematics with Pizzazz,* Creative Publications
• Probability of certain event is 1 and of impossible event is 0		Whole class discussion about real events and their certainty or uncertainty e.g., day/ night, drive to Europe from NY	Everyday Mathematics, Lesson 2.6 Teacher supplement Probability Meter Poster
**Compute the probability of outcomes when choices are equally likely*		EM Activity: Probability Investigations	*Everyday Mathematics.* Lesson 12.2 Teacher supplement
2. Determine probability using intuitive, experimental, and theoretical methods (e.g., using model of picking items of different colors from a bag).		Provide multiple opportunities for students to find probability through simulations using coins, dice, cubes in a bag, etc. Have students explore experimental versus theoretical probabilities and discuss why they may be different	*Everyday Mathematics* Unit 2, 6, and 12, selected activities Teacher supplement Website resources Sketchpad: Red Light, Green Light

• Given numbers of various types of items in a bag, what is the probability that an item of one type will be picked	Provide multiple opportunities for students to find probability through simulations using coins, dice, cubes in a bag, etc. EM Activity: Taking a Small Sample of Candy Colors	*Everyday Mathematics*, Lesson 2.6, 6.5, and 12.5 *Navigation in Data and Analysis in Grades 3-5,* NCTM, selected activities
• Given data obtained experimentally, what is the likely distribution of items in the bag	Perform probability simulations and give results of experiment	*Everyday Mathematics*, Lesson 12.2 Teacher supplement
3. Model situations involving probability using simulations (with spinners, dice) and theoretical models.	Provide students with opportunities to model probability situations using manipulatives. EM Activity: Making Spinners	*Everyday Mathematics,* Lesson 2.6, 12.2 Jumanji, Chris Van Allsburg Teacher supplement
C. Discrete Mathematics-Systematic Listing and Counting		
1. Solve counting problems and justify that all possibilities have been enumerated without duplication.	EM Activity: Counting License Plates "The Handshake Problem"	Website resources *Best of Math I and II, Exemplars* CD Sketchpad: Hide the Spinner
• Organized lists, charts, tree diagrams, tables	EM Activity: Venn Diagrams	*Everyday Mathematics*, Lesson 11.2, 12.2 Sample Open-ended problems form various sources
**Use tree diagrams to find all possible ways a sequence of choices can be made (D/S)*	Use Multiplication Counting Principle and provide multiple opportunities to write out all possible outcomes	*Everyday Mathematics*, Lesson 12.2 Teacher supplement

2. Explore the multiplication principle of counting in simple situations by representing all possibilities in an organized way (e.g., you can make 3 x 4 = 12 outfits using 3 shirts and 4 skirts).	Fourth Grade Extension Activity: "Four-by-Four Block"	*Everyday Mathematics,* Lesson 12.2 *Explain It!* Selected problems Website resources Sketchpad: How Many Ways
**Use the Multiplication Counting Principle to find the total number of possible outcomes of a sequence of choices*	EM Activity: Probability Investigations	*Everyday Mathematics,* Lesson 12.2 *Middle School Mathematics with Pizzazz,* Creative Publications
D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms		
1. Devise strategies for winning simple games	EM Game: Finish First Design games to play and find strategies for winning: dice	*Everyday Mathematics*, Lesson 6.2 Teacher supplement
(e.g., start with two piles of objects, each of two players in turn removes any number of objects from a single pile, and the person to take the last group of objects wins) and express those strategies as sets of directions.	EM Activity: Making Spinners *Everyday Mathematics,* Lesson 12.2	
*** Explore vertex-edge graphs and tree diagrams (Grade 4)**	Use models and design communication chains: office manager can talk with every employee, each employee can talk to office manager and one other employee	*Everyday Mathematics,* Lesson 12.2 Teacher supplement Website resources
*** Vertex, edge, neighboring/adjacent number of neighbors (Grade 4)**	Use manipulatives and other models	Teacher supplement
***Path, circuit (Paths that end at its starting point) (Grade 4)**	Use museum, zoo, or school floor plans	Teacher supplement NCTM website Question Quest Level A

***Find the smallest number of colors needed to color a map or graph. (Graph 4)**	Use sample maps or drawings	Teacher supplement Website resources for maps

Grade: 5 Standard 4.5 Mathematical Processes

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference? How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving	***Note - Since Everyday Mathematics is a spiraling program, NJ standard 4.5 occurs throughout daily lessons. Additional resources that are used in conjunction with the program are listed below.***		
1. Learn mathematics through problem solving, inquiry, and discovery.	Teacher Observation/RSA (Recognizing Student Achievement) Test/Quiz Exit Ticket	Provide multiple opportunities with partner/small group/independent investigations of problem solving using manipulatives and other models. Problem Solving Diagram	*Best of Math I and II, Exemplars CD* *Everyday Mathematics* Projects *Everyday Mathematics*
2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3).		Provide examples of math in "real life" : shopping, discounts, counting and making change, scheduling for after school events, birthday and party planning	*Everyday Mathematics* Lessons 5.8, 5.9, and 5.10 *Best of Math I and II, Exemplars CD*
• Open-ended problems	Evaluation of student solution using a rubric	Provide students with opportunities to score other students solutions using a rubric	Sample open-ended questions from NJ and other states *Best of Math I and II Exemplars CD*

• **Non-routine problems**	Exemplars	EM teacher's Guide *Best of Math I and II, Exemplars CD* Open-ended responses
• **Problems with multiple solutions**	Provide opportunities for student to answer questions using the Geometer's Template. Explore open-ended questions	*Explain It* *Everyday Mathematics,* Lesson 3.10 Sample Open-ended questions from NJ and other states Website resources for open-ended problems
• **Problems that can be solved in several ways**	Discuss solution strategies for various open-ended problems EM Activity: Fraction Problems	Teacher supplement *Best of Math I and II, Exemplars CD* Open-ended responses
3. Select and apply a variety of appropriate problem-solving strategies (e.g., "try a simpler problem" or "make a diagram") to solve problems.	EM Math Journal: Number Stories EM activity: Finding the Area of Words	*Best of Math I and II, Exemplars CD*
4. Pose problems of various types and levels of difficulty.	Provide multiple opportunities for students to solve problems using models and manipulatives EM Activity: clock fractions EM Activity: Pattern Block Fractions	*Best of Math I and II, Exemplars CD* Sketchpad: Jeff's Garden

5. Monitor their progress and reflect on the process of their problem solving activity.		Provide student with opportunities to tell what they know and how they know and what they might not completely understand or are unclear on.	Teacher supplement
B. Communication			
1. Use communication to organize and clarify their mathematical thinking.		EM Project 5: How Would you Spend $1,000, 000? (rubric provided)	*Best of Math I and II, Exemplars CD* Teacher supplement
• **Reading and writing** •		**Discussion, listening, and questioning** Provide opportunities for students to discuss, listen and	Teacher supplement
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.		Use cooperative groups and partners to share mathematically thinking	*Best of Math I and II, Exemplars CD*
3. Analyze and evaluate the mathematical thinking and strategies of others.	Teacher Observation Group presentations of winning strategies for games	EM Game: First to 21	

4. Use the language of mathematics to express mathematical ideas precisely.	Ask student to create a poem about order of operations, area, perimeter and volume	*Best of Math I and II, Exemplars CD* Teacher supplement
C. Connections		
1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).		*Everyday Mathematics* Lesson 3.8
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Math Masters	*Best of Math I and II, Exemplars CD*
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	*Everyday Mathematics* American Tour Lessons	*Everyday Mathematics* : American Tour in Student Reference book

4. Apply mathematics in practical situations and in other disciplines.	*Everyday Mathematics* American Tour Example: Lesson 6.7 EM Activity: Locating Points on Land or Water EM Activity: Investigate Consumption of Rice for a Thai family of four	*Everyday Mathematics*: American Tour in Student Reference book Math Masters
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	EM American Tour EM Activity: An Ancient Multiplication Method EM Activity: Find out about American History EM Activity: Learn about Nonstandard Units of Measure EM Activity: History of the Earth EM Activity: Researching Rice	*Everyday Mathematics*: American Tour in SRB Math Masters *Everyday Mathematics*, Lesson 5.12, 6.2, 7.3, 11.6 Teacher supplement
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Frac-Tac-Toe Game American Tour EM Activity: Blast from the Past	*Everyday Mathematics,* Lesson 8.1 Teacher supplement with website and other resources

D. Reasoning		
1. Recognize that mathematical facts, procedures, and claims must be justified.	Class/group oral/ written discussions Whole class discussion questions on "average" agreement or disagreement in given situations,	
2. Use reasoning to support their mathematical conclusions and problem solutions.	EM Activity: Sorting attribute Blocks by Two Properties	NJ State rubric *Best of Math I and II, Exemplars CD*
3. Select and use various types of reasoning and methods of proof.	Explore different ways to support reasoning and proof for problems EM Activity: Attribute Puzzles EM Activity: Mystery Plots EM Game: Polygon Capture	*Best of Math I and II, Exemplars CD*
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	EM Journal	Website resources that include self check

5. Make and investigate mathematical conjectures.		EM Activity: Graphing race results -make prediction who will complete the course first	*Best of Math I and II, Exemplars CD* *Everyday Mathematics,* Lesson 10.6
• **Counterexamples as a means of disproving conjectures**		Provide opportunities for examples and non-examples, e.g., polygon / not polygon	Teacher supplement
• **Verifying conjectures using informal reasoning or proofs.**		Exemplars I and II	NJ State rubric
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Evaluation of student solution using a rubric	Provide opportunities to score solutions of their students and provide appropriate feedback Exemplars I and II	*Best of Math I and II, Exemplars CD* NJ State mathematics rubric
E. Representations			
1. Create and use representations to organize, record, and communicate mathematical ideas.		Explore strategies for solving open-ended problems	*Best of Math I and II, Exemplars CD*
• **Concrete representations (e.g., base-ten blocks or algebra tiles)**		Fraction Factory	Teacher supplement
• **Pictorial representations (e.g., diagrams, charts, or tables)**		*Everyday Mathematics,* Unit 10	graphs, charts

• Symbolic representations (e.g., a formula)		variables, equations	*Everyday Mathematics,* Unit 10
• Graphical representations (e.g., a line graph)		EM Journal	*Everyday Mathematics,* Unit 10 Teacher supplement
2. Select, apply, and translate among mathematical representations to solve problems.		EM Lesson 2.4, Mental Math and Reflexes	*Best of Math I and II, Exemplars CD*
3. Use representations to model and interpret physical, social, and mathematical phenomena.		Everyday Mathematics American Tour Lessons Example Lesson 12.3	*Everyday Mathematics*: American Tour in Student Reference book
F. Technology			
1. Use technology to gather, analyze, and communicate mathematical information.	Students display of findings; ex. posters, charts, PowerPoint	Place Value Puzzles Website resources Math Boxes	
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).		Use Microsoft Excel	*Everyday Mathematics:* Lesson Units 5 and 6 Teacher supplement

3. Use graphing calculators and computer software to investigate properties of functions and their graphs.		Explore Microsoft Excel activities using formulas and charts	Graphing calculators Texas Instruments resources Teacher supplement
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	Student created tessellation	Explore tessellations	*Everyday Mathematics* Lesson 3.8
5. Use computer software to make and verify conjectures about geometric objects.	Observation of students while interacting with software/	Provide appropriate opportunities for students to interact with software	*Geometer's Sketchpad* *Best of Math I and II Exemplars CD* Use additional website resources as needed
6. Use computer-based laboratory technology for mathematical applications in the sciences (cf. science standards).	Journal writing	Geometer's Sketchpad	*Geometer's Sketchpad*

Flemington-Raritan School District
Mathematics Curriculum

Sixth Grade Math
Pacing Guide

Unit	Number of Days (approximate)	Unit	Number of Days (approximate)
Unit 1. Data and Landmarks	15	**Unit 8**. Rates and Ratios	13
Unit 2. Operations with Whole Numbers and Decimals	20	**Unit 5**. 2 Dimensional Geometry	15
Metric and Customary Measurement	8	3 Dimensional Geometry	7
Unit 3. Variables, Formulas and Graphs	20	**Unit 6** - Number Systems and Algebra Concepts	14
Prime Time- Factors, Multiples, and Prime Numbers	10	**Unit 7** - Probability	5
Unit 4. Rational Number Uses and Operations	20	**Unit 9** - Variables, Formulas and Graphs	10
Mid-Year Assessment	1	End-of-the-Year Assessment	1

Flemington-Raritan School District
Mathematics Curriculum

Grade: 6th **Topic 4.1 Number and Numerical Operations**

Essential Question: How can problems in the real world be solved with mathematics?

How can estimation be useful to us?

How do numbers help us reason out solutions to problems?

How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers: All Integers; All fractions as part of a whole, as subset of a set, as a location on a number line, and as divisions of whole numbers; All Decimals; percents; whole numbers with exponents	Unit Assessments Do Now Teacher Observation Class Discussion Slate Assessments Open Ended Writing Tasks RSA Sections of EM3	Direct Instruction Cooperative – Collaborative Learning Experiences Written Explanations Open Ended Writing Tasks Games Geometer's Sketch Pad -Lesson Links	*Everyday Mathematics, Book 6*- Units 2, 4, 6 Selected Brain Pop applications www.brainpop.com Geometer's Sketch Pad New Jersey Math Frameworks 13 http://dimacs.rutgers.edu/njmathcoalition/framework.html *Van De Walle* Chapters 9-14
2. Recognize the decimal nature of United States currency and compute with money.			*Everyday Mathematics,* Book 6- Unit 2
3. Demonstrate a sense of the relative magnitudes of numbers.		*Power of Ten-video*	*Everyday Mathematics,* Book 6- Unit 2
4. Explore the use of ratios and proportions in a variety of situations.			*Everyday Mathematics,* Book 6- Unit 8 *Van De Walle* Chapter 18
5. Understand and use whole-number percents between 1 and 100 in a variety of situations.			*Everyday Mathematics,* Book 6- Unit 4 *Van De Walle* Chapter 7

6. Use whole numbers, fractions, and decimals to represent equivalent forms of the same number.	*Everyday Mathematics, Book 6*- Unit 4 *Van De Walle* Chapters 15, 16 New Jersey Math Frameworks http://dimacs.rutgers.edu/njmathcoalition/framework.html
7. Develop and apply number theory concepts in problem solving situations: Primes, Factors, Multiples; common multiples, common factors	*Connected Math- Prime Time*
8. Compare and order numbers of all types.	*Everyday Mathematics, Book 6* Units 2, 4
9. Understand that all fractions can be represented as repeating or terminating decimals.	*Everyday Mathematics, Book 6* Units 2, 4
10. Understand and use ratios, proportions, and percents in a variety of situations.	*Everyday Mathematics, Book 6*- Unit 8 *Van De Walle* Chapter 18
B. Numerical Operations	
1 .Recognize the appropriate use of each arithmetic operation in problem situations.	*Everyday Mathematics, Book 6*
2. Construct, use, and explain procedures for performing calculations with fractions and decimals with: paper and pencil, mental math, calculator	*Everyday Mathematics, Book 6* *Everyday Mathematics, 5 Minute Math* *Van De Walle* Chapters 15, 16

3. Use an efficient and accurate pencil-and-paper procedure for division of a 3-digit number by a 2-digit number.	*Everyday Mathematics, Book 6*- Unit 2
4. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.	*Everyday Mathematics,* Book 6
5. Find squares and cubes of numbers.	*Everyday Mathematics, Book 6* Units- 2, 3 *Van De Walle* Chapters 24 New Jersey Math Frameworks http://dimacs.rutgers.edu/njmathcoalition/framework.html
6. Check the reasonableness of results of computations.	New Jersey Math Frameworks 3 http://dimacs.rutgers.edu/njmathcoalition/framework.html
7. Understand and use the various relationships among operations and properties of operations.	*Everyday Mathematics, Book 6* Units- 3, 6
8. Understand and apply the standard algebraic order of operations for the four basic operations, including appropriate use of parenthesis.	*Everyday Mathematics, Book 6* Units- 3, 6
9. Use and explain procedures for performing calculations involving addition, subtraction, multiplication, division, and exponentiation with integers and all number types named above with: pencil and paper, mental math; calculator	*Everyday Mathematics, Book 6*

C. Estimation

1. Use a variety of strategies for estimating both quantities and the results of computations.	*Everyday Mathematics, Book 6*
2. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.	*Everyday Mathematics, Book 6*
3. Determine the reasonableness of an answer by estimating the result of operations.	*Everyday Mathematics,* Book 6
4. Determine whether a given estimate is an overestimate or an underestimate.	*Everyday Mathematics,* Book 6
5. Use equivalent representations of numbers such as fractions, decimals, and percents to facilitate estimation.	*Everyday Mathematics,* Book 6

Grade: 6 Topic 4.2 Geometry and Measurement

Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties	Unit Assessments Do Now Teacher Observation Class Discussion Slate Assessments Open Ended Writing Tasks RSA Sections of EM3	Direct Instruction Cooperative – Collaborative Learning Experiences Written Explanations Open Ended Writing Tasks Games Geometer's Sketch Pad -Lesson Links	*Everyday Mathematics,* Book 6- Units 5, 10 *Van De Walle* Chapter 20 *Groundworks Series – Geometry* *Groundworks Series – Measurement* New Jersey Math Frameworks, 7 http://dimacs.rutgers.edu/njmathcoalition/framework.html *NCTM Navigation Through Geometry 6-8* *Geometer's Sketch Pad*
2. Identify, describe, compare, and classify polygons and circles: Triangles, by angles and sides; Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi; Polygons by number of sides; Equilateral, equiangular, regular; All points equidistant from a given point from a circle.			*Everyday Mathematics,* Book 6- Unit 5, *Van De Walle* Chapter 20 *Groundworks Series – Geometry* *Groundworks Series – Measurement* New Jersey Math Frameworks, 7 http://dimacs.rutgers.edu/njmathcoalition/framework.html *NCTM Navigation Through Geometry 6-8* *Geometer's Sketch Pad*
3. Identify similar figures.			*Everyday Mathematics,* Book 6- Unit 5, *Van De Walle* Chapter 20 *Groundworks Series – Geometry* Geometer's Sketch Pad Sir Cumference and the Nights of the Round Table, Cindy Neuschwander

4. Understand and apply the concepts of congruence and symmetry (line and rotational)	*Everyday Mathematics,* Book 6- Unit 5, *Van De Walle* Chapter 20 *Groundworks Series – Geometry* *Groundworks Series – Measurement* New Jersey Math Frameworks, 7 http://dimacs.rutgers.edu/njmathcoalition/framework.html *NCTM Navigation Through Geometry 6-8* Geometer's Sketch Pad
5. Compare properties of cylinders, prisms, cones, pyramids, and spheres.	*Everyday Mathematics,* Book 6- Unit 9, *Van De Walle* Chapter 20 *NCTM Navigation Through Geometry 6-8* Geometer's Sketch Pad
6. Identify, describe, and draw the faces or shadow (projections) of three-dimensional geometric objects from different perspectives.	*Everyday Mathematics,* Book 6- Unit 9, *Van De Walle* Chapter 20 *NCTM Navigation Through Geometry 6-8* Geometer's Sketch Pad
7. Identify a three dimensional shape with given projections(top, front and side views)	*Van De Walle* Chapter 20 Geometer's Sketch Pad New Jersey Math Frameworks, 7 http://dimacs.rutgers.edu/njmathcoalition/framework.html
8. Identify a three dimensional shape with a given net (ie., a flat pattern that folds into a 3-d shape)	*Van De Walle* Chapter 20 *Geometer's Sketch Pad*
B. Transforming Shapes	
1. Understand a translation, a reflection, or a rotation to map one figure onto another congruent figure	*Groundworks Series – Geometry* *Van De Walle Chapter 20* *Geometer's Sketch Pad*

2. Recognize, identify, and describe geometric relationships and properties as they exist in nature, art, and other real world settings	*Groundworks Series – Geometry* *Van De Walle Chapter 20* *Geometer's Sketch Pad*
C. Coordinate Geometry	
Create geometric shapes with specified properties in the first quadrant on a coordinate grid.(	*Everyday Mathematics, Book 6*- – Unit 5
D. Units of Measurement	
1. Select and use appropriate units to measure angles, area, surface area, and volume.	*Groundworks Series* – Measurement *Van De Walle* Chapters 19, 20 *Everyday Mathematics, Book 6*- – Unit 5
2. Use a scale to find a distance on a map or a length on a scale drawing	*Everyday Mathematics, Book 6*- – Unit 8
3. Convert measurement units within a system, e.g. 3 feet = ___ inches.	*NJ ASK Coach* Teacher created resources
4. Know approximate equivalents between standard and metric	*NJ ASK Coach* Teacher created resources
5. Use measurements and estimates to describe and compare phenomena	*NJ ASK Coach* Teacher created resources
E. Measuring Geometric Objects	
1. Use a protractor to measure angles.	*Everyday Mathematics, Book 6*- – Unit 5
2 Develop and apply strategies and formulas for finding perimeter and area: Triangle, square, rectangle, parallelogram, and trapezoid; Circumference and area of a circle;	*Groundworks Series* – Measurement *Van De Walle* Chapters 19, 20

3. Develop and apply strategies and formulas for finding the surface area and volume of rectangular prisms and cylinders.	*Everyday Mathematics, Book 6-* Unit 9
4. Recognize that shapes with the same perimeter do not necessarily have the same area and vice versa.	Teacher created resources
5.Develop informal ways of approximating the measures of familiar objects (e.g., use a grid to approximate the area of the bottom of one's foot)	*Van De Walle* Chapters 19

Grade: 6 Topic 4.3 Patterns and Algebra
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns involving whole numbers, and rational numbers: descriptions using tables, verbal simple equations and graphs; formal iterative formulas; recursive patterns, including Pascal's Triangle and the Fibonacci Sequence; Generating sequences by using calculators to repeatedly apply a formula.	Unit Assessments Do Now Teacher Observation Class Discussion Slate Assessments Open Ended Writing Tasks RSA Sections of EM3	Direct Instruction Cooperative – Collaborative Learning Experiences Written Explanations Open Ended Writing Tasks Games Geometer's Sketch Pad - Lesson Links	*Groundworks Series* ± Algebraic Reasoning *Van De Walle* Chapters 22-25 *Everyday Mathematics, Book 6-* ± Units, 3, 6, 9 * *!-R'!-A!-rIsE6N!-AhKEPad Lesson Links*
B. Functions and Relationships			
1. Describe the general behavior of functions given by formulas or verbal rules			*Van De Walle* Chapter 23
C. Modeling			
1. Use patterns, relations, and linear functions to model situations: Using variables to represent unknown quantities; Using concrete materials (manipulatives), tables, graphs, verbal rules, algebraic expressions/equations/ inequalities.			*Van De Walle* Chapter 23

D. Procedures

1. Solve simple equations with manipulatives and informally: whole number coefficients only, answers also whole numbers; variables on one or both sides of equation.	*Everyday Mathematics, Book 6-* – Units, 3, 6
2. Understand and apply the properties of operations and numbers: distributive property; the product of a number and its reciprocal is 1 .	*Everyday Mathematics, Book 6-* – Units, 3, 9 *NJ ASK Coach* Brain Pop www.brainpop.com - Properties *G eometer's Sketch Pad Lesson Links*
3. Evaluate numerical expressions	*Everyday Mathematics, Book 6-* – Units, 3, 6
4. Extend understanding and the use of inequality. Symbols (^{3}, ^{1}, £)	*Everyday Mathematics, Book 6-* – Unit 6

Grade: 6 Topic 4.4 Data Analysis, Probability, and Discrete Mathematics
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1. Collect, generate, organize, and display data; data generated from surveys.	Unit Assessments Do Now Teacher Observation Class Discussion Slate Assessments Open Ended Writing Tasks RSA Sections of EM3	Direct Instruction Cooperative – Collaborative Learning Experiences Written Explanations Open Ended Writing Tasks Games Geometer's Sketch Pad - Lesson Links	*Everyday Mathematics, Book 6-* Unit 1 *Navigations through Data Analysis* *TinkerPlots* New Jersey Math Frameworks, 5, 12 http://dimacs.rutgers.edu/njmathcoalition/framework.html
2.Read, interpret, select, construct, analyze, generate questions about, and draw inferences from displays of data: bar graph, line graph, circle graph, table, histogram; range, median, and mean; calculators and computers used to record and process information.			*Everyday Mathematics, Book 6-* Unit 1 *Navigations through Data Analysis* *TinkerPlots* *NJ ASK Coach* New Jersey Math Frameworks, 5, 12, 14 http://dimacs.rutgers.edu/njmathcoalition/framework.html
3. Respond to questions about data, generate their own questions and hypotheses, and formulate strategies for answering their questions and testing their hypotheses.			*Everyday Mathematics, Book 6-* Unit 1 *Navigations through Data Analysis* *TinkerPlots* *NJ ASK Coach* New Jersey Math Frameworks, 5, 12, 14 http://dimacs.rutgers.edu/njmathcoalition/framework.html

B. Probability

1. Determine probabilities of events: event, complementary event, probability of an event; Multiplication rule for probabilities; probability of certain event is 1 and of impossible event is 0; probabilities of event and complementary event add up to 1.	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series* Data and Probability
2. Determine probability using intuitive, experimental, and theoretical methods (e.g., using model of picking items of different colors from a bag. ● Given numbers of various types of items in a bag, what is the probability that an item of one type will be picked ● Given data obtained experimentally, what is the likely distribution of items in the bag.	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series* Data and Probability
3. Explore compound events.	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series* Data and Probability
4. Model situations involving probability using simulations (with spinners, dice) and theoretical models.	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series* Data and Probability
5. Recognize and understand the connections among the concepts of independent outcomes, picking at random, and fairness.	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series* Data and Probability

C. Discrete Mathematics-Systematic Listing and Counting

1. Solve counting problems and justify that all possibilities have been enumerated without duplication. ●Organized lists, charts, tree diagrams, tables ●Venn Diagrams	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series:* Data and Probability *NJ Ask Coach*
2. Apply the multiplication principle of counting: Simple situations (e.g., you can make 3x4 = 12 outfits using 3 shirts and 4 skirts); Number of ways a specified number of items can be arranged in order (concept of permutation); Number of ways of selecting a slate of officers from a class	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series* Data and Probability *NJ Ask Coach* *Explain It*
3. List the possible combinations of two elements chosen from a given set (e.g., forming a committee of two from a group of 12 students, finding how many handshakes there will be among ten people if everyone shakes each other person's hand once).	*Everyday Mathematics, Book 6-* Unit 7 *Groundworks Series:* Data and Probability *NJ Ask Coach* *Explain It,* Creative Publications

D. Discrete Mathematics - Vertex - Edge - Graphs and Algorithms

1. Devise strategies for winning simple games and express those strategies as sets of diagrams.	*Everyday Mathematics, Book 6-* New Jersey Math Frameworks, 14 http://dimacs.rutgers.edu/njmathcoalition/framework.html
2. Analyze vertex-edge graphs and tree diagrams: Can a picture or a vertex-edge graph be drawn with a single line? Can you get from any vertex to any other vertex?	New Jersey Math Frameworks, 14 http://dimacs.rutgers.edu/njmathcoalition/framework.html

3. Use vertex-edge graphs to find solutions to practical problems: delivery route that stops at specified sites but involves less travel; shortest route from one site on a map to another.	New Jersey Math Frameworks, 14 http://dimacs.rutgers.edu/njmathcoalition/framework.html

Grade: 6 Topic 4.5 Mathematical Processes

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference? How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving inquiry and discovery.	Unit Assessments Do Now Teacher Observation Class Discussion Slate Assessments Open Ended Writing Tasks RSA Sections of EM3	Direct Instruction Cooperative – Collaborative Learning Experiences Written Explanations Open Ended Writing Tasks Games Geometer's Sketch Pad - Lesson Links	*Everyday Mathematics, Book 6*- New Jersey Math Frameworks 1-4 http://dimacs.rutgers.edu/njmathcoalition/framework.html *Explain It* *Question Quest - Level B* *8 Step Model Drawing*
2. Solve problems that arise in mathematics and in other contexts: open ended problems; non-routine problems; problems with multiple solutions; problems that can be solved in several ways			
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.			
4. Pose problems of various types and levels of difficulty			

5. Monitor their progress and reflect on the process of their problem solving activity

B. Communication

1. Use communication to organize and clarify their mathematical thinking: Reading and writing; Discussion, listening and questioning.

2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.

3. Analyze and evaluate the mathematical thinking and strategies of others.

4. Use the language of mathematics to express mathematical ideas precisely.

C. Connections

1. Recognize recurring themes across mathematical domains (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).

Everyday Mathematics, Book 6
New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Explain It, Creative Publications, Creative Publications
Question Quest - Level B
8 Step Model Drawing, Char Forsten

Everyday Mathematics, Book 6- New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Explain It, Creative Publications
Question Quest - Level B
8 Step Model Drawing, Char Forsten

2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).

3. Recognize that mathematics is used in a variety of contexts outside of mathematics.

4. Apply mathematics in practical situations and in other disciplines.

5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).

6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

D. Reasoning

1. Recognize that mathematical facts, procedures, and claims must be justified.

2.Use reasoning to support their mathematical conclusions and problem solutions.

Everyday Mathematics, Book 6- New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Explain It, Creative Publications
Question Quest - Level B
8 Step Model Drawing, Char Forsten

3. Select and use various types of reasoning and methods of proof.

4. Rely on reasoning, rather than answer keys, teachers, or peers, the check the correctness of their problem solutions.

5. Make and investigate mathematical conjectures: counterexamples as a means of displaying conjectures; verifying conjectures using informal reasoning or proofs.

6. Evaluate examples of mathematical reasoning and determine whether they are valid.

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas: concrete; pictorial; symbolic; and graphical representations

2. Select, apply, and translate among mathematical representations to solve problems

3. Use representations to model and interpret physical, social, and mathematical phenomena.

Everyday Mathematics, Book 6- New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Explain It, Creative Publications
Question Quest - Level B
8 Step Model Drawing, Char Forsten

F. Technology

1. Use technology to gather, analyze, and communicate mathematical information.	*Geometer's Sketch Pad* *TinkerPlots* *Geometer's Sketch Pad Lesson Links* *Brain Pop*
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information	*Everyday Mathematics, Book 6-* – Unit 3 Lessons 3.7, 3.8
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	*TI 73 and TI 82 Calculators* *Everyday Mathematics, Book 6-* – Unit 3 Lessons 3.5, 3.10, 3.11
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	*Geometer's Sketch Pad*
5. Use computer software to make and verify conjectures about geometric objects.	*Geometer's Sketch Pad Lesson Links*
6. Use computer-based laboratory technology for mathematical applications in the sciences	

6th Grade Advanced Math

A student in the 6th grade Advanced math will have a more rigorous experience through discussion, activities, assessments and homework than a student placed in the grade level math class. The following is a list of skills for each state standard that a student placed in the 6th Grade Advanced Class will be expected to master beyond the 6th grade curriculum.

4.1 Number Sense

- possess automatic recall of all basic and extended math facts
- be able to use the most efficient representation of a number to solve a problem FDP
- convert proficiently between fraction, decimal, percent mentally
- master all integer operations
- recognize a situation that requires a proportion to arrive at a solution
- given a word problem, set up and solve a proportion for any missing part
- be secure with inverse operation concepts

4.2 Geometry

- use ratios to solve for similar figures
- use proportions to test for similarity
- apply the square root strategy to solve area problems
- apply formulas for geometric figures

4.3 Algebra

- solve two-step equations with variables and rational numbers on both sides
- gain experience with graphing calculator
- discover more complex number sequences and derive the rule using variables

4.4 Data & Probability

- interpret and create a histogram
- create an appropriate scale for a graph
- given the mean and a partial data set, find the missing data value
- apply data landmarks to problem solving situations

4.5 Processes

- Be able to use the most efficient strategy to solve a problem
- Be able to solve and write open ended and/or multi-step problems with fluency
- Be able to apply the most appropriate problem solving strategy.

Flemington-Raritan School District

Mathematics Curriculum

6th Grade Algebra 1A
Pacing Guide

Unit	Approximate Number of Class Days
Data Exploration	30
Proportional Reasoning	34
Probability	22
Variations and Graphs	36
Linear Equations	28
Slope and Fitting a Line to Data	10

Grade: 6 Algebra 1A Topic 4.1 Number and Numerical Operations

Essential Question: How can problems in the real world be solved with mathematics?

How can estimation be useful to us?

How do numbers help us reason out solutions to problems?

How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Extend understanding of the number system by constructing meanings for the following (**unless otherwise noted, all indicators for grade 8 pertain to these sets of numbers as well**): Rational numbers; Percents; Exponents; Roots; Absolute Values; Numbers represented in scientific notation	Unit Assessments Do Now Teacher Observation Discussion Investigation Results Open Ended Writing Tasks	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks Tinkerplots Software Geometer's Sketchpad Software Lesson Investigations Investigate decimal patterns using calculator	*Discovering Algebra* Chapters 2, 4 *UCSMP Transitions*
2. Demonstrate a sense of the relative magnitudes of numbers.		Number line graphing Lesson Investigations throughout the textbook	*Discovering Algebra* Chapters 1,2
3. Understand and use ratios, proportions, and percents (including percents greater than 100 and less than 1) in a variety of situations.		Lesson Investigations 2.2, 2.3, 3.1, 3.2, 3.3	*Discovering Algebra* Chapters 2,3
4. Compare and order numbers of all named types.		Lesson Investigation 2.2	*Discovering Algebra* Chapters 1,2
5. Use whole numbers, fractions, decimals, and percents to represent equivalent forms of the same number.		Lesson Investigation 2.1	*Discovering Algebra* Chapter 2

6. Recognize that repeating decimals correspond to fractions and determine their fractional equivalents.	Lesson Investigation 2.1	*Discovering Algebra* Chapter 2
B. Numerical Operations		
1. Use and explain procedures for performing calculations involving addition, subtraction, multiplication, division, and exponentiation with integers and all number types named above with: · Pencil-and-paper · Mental math · Calculator		*Math with Pizzazz* *Pre Algebra with Pizzazz* *Algebra with Pizzazz* *Discovering Algebra* Chapter 3
2. Use exponentiation to find whole number powers of numbers.		*Discovering Algebra* Chapter 4
3. Find square and cube roots of numbers and understand the inverse nature of powers and roots.	Lesson Investigation 4.2	*Discovering Algebra* Chapter 4
4. Solve problems involving proportions and percents. · Use unit-rate and means-extremes methods to solve proportion and percent problems including the following: tax, tip, discount, interest, and similar figures.	Lesson Investigations 2.2, 2.3	*Discovering Algebra* Chapters 2,3
5. Understand and apply the standard algebraic order of operations, including appropriate use of parentheses.		*Algebra with Pizzazz* *Discovering Algebra* Chapter 4
C. Estimation		
1. Use equivalent representations of numbers such as fractions, decimals, and percents to facilitate estimation.	Lesson Investigation 4.1	Ongoing throughout chapter investigations
2. Recognize the limitations of estimation and assess the amount of error resulting from estimation		Ongoing throughout chapter investigations *NJ ASK Coach*
Lesson Investigations 4.1. 4.2		*Math with Pizzazz* *Pre Algebra with Pizzazz*

Flemington-Raritan School District

Mathematics Curriculum

Grade: 6th Algebra 1A Topic 4.2 Geometry and Measurement
Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Understand and apply properties of polygons: Quadrilateral, including squares, rectangles, parallelograms, trapezoids, rhombi; regular polygons	Unit Assessments Do Now Teacher Observation Discussion Investigation Results Open Ended Writing Tasks	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks Tinkerplots Software Geometer's Sketchpad Software Lesson Investigations	Geometer's Sketchpad Geometer's Sketchpad Lesson Links
2. Understand and apply the concept of similarity: Using proportions to find missing measures; *scale drawings;* models of 3D objects		Lesson Investigation 3.3 Measure shadow of flagpole to determine height.	*Discovering Algebra* Chapter 3
3. Use logic and reasoning to make and support conjectures about geometric objects.		Lesson Investigation 3.3	*Discovering Algebra* Chapter 3 Geometer's Sketchpad Geometer's Sketchpad Lesson Links
B. Transforming Shapes			
1. Understand and apply transformations: Finding the image, given the pre-image, and vice-versa; Sequence of transformations needed to map one figure onto another; Reflections, rotations and translations result in images congruent to the pre-image; Dilations		Manipulatives	Geometer's Sketchpad Geometer's Sketchpad Lesson Links *NJ ASK Coach*

(stretching /shrinking) result in images similar

to pre-image.

C. Coordinate Geometry

1. Use coordinate in four quadrants to represent geometric concepts		
● Slope of a line segment	Lesson Investigations 1.6, 4.4, 4,6, 4.7, 5.1, 5.2 Graphing Calculator Applications	*Discovering Algebra* Chapter 1,4+5 *Algebra with Pizzazz* *Pre-Algebra with Pizzazz* *NJ ASK Coach* *Geometer's Sketchpad Lesson Links*
2. Use a coordinate grid to model and quantify transformations (e.g. translate right 4 units). Graphing Calculator		*NJ ASK Coach* *Geometer's Sketchpad Lesson Links*

D. Units of Measurement

1. Solve problems requiring calculations that involve different units of measurement within a measurement system (e.g. 4'3" plus 7'1 0" equals 12'1")	Lesson Investigations 2.3 , 3,2	*Discovering Algebra Chapters 2, 3*
2. Use approximate equivalents between stand and metric systems to estimate measurements.	Lesson Investigations 2.3 , 3,2	*Discovering Algebra Chapters 2*
3. Select and use appropriate units and tools to measure quantities to the degree of precision needed in a particular problem-solving situation.	Appropriate use throughout Lesson. Investigations	Ongoing
4. Recognize that all measurements of continuous quantities are approximations.	Appropriate use throughout Lesson. Investigations	Ongoing

5. Solve problems that involve compound measurement units, such as speed (miles per hour), air pressure (pounds per square inch), and population density (persons per square mile).	Lesson Investigation 2.3 Dimensional Analysis	*Discovering Algebra* Chapter 2 lesson 3
E. Measuring Geometric Objects		
1. Develop and apply strategies for finding perimeter and area: Geometric figures made by combining triangles, rectangles and circles or parts of circles; Estimation of area using grids of various size	Various Lesson Investigations	*Van De Walle* Chapter 19 Geometer's Sketchpad *Math with Pizzazz!* Book D *Pre-Algebra with Pizzazz*
2. Recognize that the volume of a pyramid or cone is 1/3 of the volume of the prism or cylinder with the same base and height. For example use rice to compare volumes of figures with same base and height.	Direct Instruction	*Van De Walle* Chapter 19 Geometer's Sketchpad *Math with Pizzazz!* Book D *Pre-Algebra with Pizzazz* *NJ Ask Coach*

Grade: 6th Algebra 1A **Topic 4.3 Patterns and Algebra**
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns involving whole numbers, rational numbers, and integers: Descriptions using tables, verbal and symbolic rules, graphs, simple equation or expressions; Finite and infinite sequences; Arithmetic sequences; Geometric sequences; Generating sequences by using calculators to repeatedly apply to a formula.	Unit Assessments Do Now Teacher Observation Discussion Investigation Results Open Ended Writing Tasks	Direct Instruction Lesson Investigation 4.3, 4.4, 4.6 Modeling Graphing Calculators	*Discovering Algebra* Chapter 4
B. Functions and Relationships			
1. Graph functions, and understand and describe their general behavior: Equations involving two variables; Rates of change (informal notion of slope).		Lesson Investigations 4.4, 4.6, 4.7, 5.1, 5.1, 5.2, 5.3	*Discovering Algebra* Chapters 4 and 5
C. Modeling			
1. Analyze functional relationships to explain how a change in one quantity can result in a change in another, using pictures, graphs, charts, and equations.		Lesson Investigations 3.2, 4.3, 4.4, 4.6, 4.7, 5.1, 5.2, 5.3	*Discovering Algebra* Chapters 3, 4, 5

2. Use patterns, relations, symbolic algebra, and linear functions to model situations: Using concrete materials (manipulatives), tables, graphs, verbal rules, algebraic expressions/equations/inequalities; Growth situations, such as population growth and compound interest, using recursive (e.g. NOW-NEXT) formulas (cf. science and social studies standards)	Lesson Investigations 3.2, 4.3, 4.4, 4.6, 4.7, 5.1, 5.2, 5.3	*Discovering Algebra* Chapters 3, 4, 5
D. Procedures		
1. Use graphing techniques on a number line. Arithmetic operations represented by vectors (arrows) (e.g., "-3 + 6 " is "left 3, right 6"	Geometer's Sketchpad Lesson Links	*Pre-Algebra with Pizzazz* Geometer's Sketchpad
2. Solve simple linear equations informally, graphically and using formal algebraic methods: multi-step, integer coefficients only (although answers may not be integers) simple literal equations (e.g.A=lw) Using paper-and-pencil, calculators, graphing calculators, spreadsheets, and other technology.		*Discovering Algebra* Chapters 2, 3, 4
3. Create, evaluate, and simplify algebraic expressions involving variables Order of operations, including appropriate use of parentheses; Distributive property; Substitution of a number for a variable; Translation of a verbal phrase or sentence into an algebraic expression, equation, or inequality, and vice versa	Lesson Investigation 4.1	*Discovering Algebra* Chapters 2, 3, 4 *Pre-Algebra with Pizzazz*

5. Understand and apply the properties of operations, numbers, equations, and inequalities: Additive inverse; Multiplicative inverse; addition and multiplication properties of equality	*Discovering Algebra* Chapters 2, 3, 4 *Pre-Algebra with Pizzazz*

Grade: 6 Algebra 1A Topic 4.4 Data Analysis, Probability, and Discrete Mathematics
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis 1. Select and use appropriate representations for sets of data , and measures of central tendency (mean , median, and mode): Type of display most appropriate for given data; Box-and-whisker plot, upper quartile, lower quartile; Scatter plot; Calculators and computer used to record and process information; Finding the median and mean (weighted average) using frequency data; Effect of additional data measures of central tendency	Unit Assessments Do Now Teacher Observation Discussion Investigation Results Open Ended Writing Tasks	Direct Instruction Collaborative and Cooperative Learning Open Ended Writing Tasks Tinkerplots Software Geometer's Sketchpad Software Lesson Investigations 1.1 to 1.7 Investigate decimal patterns using calculator	*Discovering Algebra* Chapter 1 TinkerPlots
2. Make inferences and formulate and evaluate arguments based on displays and analysis of data.		Lesson Investigations 1.1-1.7	*Discovering Algebra* Chapter 1 TinkerPlots
3. Estimate lines of best fit and use them to interpolate within the range of data		Lesson Investigation 5.3	*Discovering Algebra* Chapter 5
B. Probability			
1. Interpret probabilities as ratios, percents, and decimals.		Lesson Investigations 2.6, 2.7 Selected Experiments from *Connected Mathematics "What Do You Expect"*	*Discovering Algebra* Chapter 2 *Connected Mathematics "What Do You Expect"* *Math With Pizzazz Book E* *Pre Algebra with Pizzazz*

2. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models: Frequency, relative frequency.	Lesson Investigations 2.6, 2.7 Selected Experiments from *Connected Mathematics "What Do You Expect"*	*D i i A l b* C h a p t e r 2 *Connected Mathematics "What Do You Expect"* *M h Wi h Pi* *Bk E* *Alb* *i h Pi*
3. Estimate probabilities and make predictions based on experimental and theoretical probabilities.	*D i i A l b* C h a p t e r 2 *Connected Mathematics "What Do You Expect"* *Mth With Pi* *Bk E*	*D i i A l b* C h a p t e r 2 *Connected Mathematics "What Do You Expect"*
4. Play and analyze probability-based games, and discuss the concepts of fairness and expected value.	Selected Experiments from *C t d M t h t i " W h a t Do You Expect"*	*Connected Mathematics "What Do You Expect"*

C. Discrete Mathematics - Systematic Listing and Counting

1. Apply the multiplication principle of counting: permutations; ordered situations with replacement vs. ordered situations without replacement.	Experiments from *Wht D Y*	New Jersey Math Frameworks 12 http://dimacs.rutgers.edu/njmathcoalition/framework.html *G d k S i C* D a t a a n d P r o b a b i l i t y
2. Explore counting problems involving Venn diagrams with three attributes	Experiments from *Wht D Y*	New Jersey Math Frameworks 12 http://dimacs.rutgers.edu/njmathcoalition/framework.html *G d k S i C* D a t a a n d P r o b a b i l i t y
3. Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.	Experiments from *Wht D Y*	New Jersey Math Frameworks 12 http://dimacs.rutgers.edu/njmathcoalition/framework.html *G d k S i* D a t a a n d P r o b a b i l i t v

D. Discrete Mathematics - Vertex- Edge Graphs and Algorithms

1. Use vertex-edge graphs to represent and find solutions to practical problems: finding the shortest network connecting specified sites; Finding the shortest route on a map form one site to another: Finding the shortest circuit on a map that makes a tour of specified sites.

What Do You Expect?
New Jersey Math Frameworks 12
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Groundworks Series Data and Probability
NJ Ask Coach

Grade: 6 Algebra 1A Topic 4.5 Mathematical Processes
Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.
Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference? How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving inquiry and discovery.	Unit Assessments Do Now Teacher Observation Class Discussion Slate Assessments Open Ended Writing Tasks	Direct Instruction Cooperative – Collaborative Learning Experiences Written Explanations Open Ended Writing Tasks Games Geometer's Sketch Pad - Lesson Links	*Discovering Algebra* New Jersey Math Frameworks 1-4 http://dimacs.rutgers.edu/njmathcoalition/framework.html *Explain It* *Question Quest . Level B* *8 Step Model Drawing*
2. Solve problems that arise in mathematics and in other contexts: open ended problems; non-routine problems; problems with multiple solutions; problems that can be solved in several ways.			
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.			
4. Pose problems of various types and levels of difficulty			

5. Monitor their progress and reflect on the process of their problem solving activity

B. Communication

1. Use communication to organize and clarify their mathematical thinking: Reading and writing; Discussion, listening and questioning.

Discovering Algebra
New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Explain It
Question Quest - Level B
8 Step Model Drawing

2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.

3. Analyze and evaluate the mathematical thinking and strategies of others.

4. Use the language of mathematics to express mathematical ideas precisely.

C. Connections

1. Recognize recurring themes across mathematical domains (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).

Discovering Algebra
New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/nj math coalition/framework.htm l
Explain It
Question Quest - Level B
8 Step Model Drawing

2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).

3. Recognize that mathematics is used in a variety of contexts outside of mathematics.

4. Apply mathematics in practical situations and in other disciplines.

5. Trace the development of mathematical concepts over time and across cultures.

6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

D. Reasoning

1. Recognize that mathematical facts, procedures, and claims must be justified.

2.Use reasoning to support their mathematical conclusions and problem solutions.

Discovering Algebra
New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Explain It
Question Quest - Level B
8 Step Model Drawing

3. Select and use various types of reasoning and methods of proof.

4. Rely on reasoning, rather than answer keys, teachers, or peers, the check the correctness of their problem solutions.

5. Make and investigate mathematical conjectures: counterexamples as a means of displaying conjectures; verifying conjectures using informal reasoning or proofs.

6. Evaluate examples of mathematical reasoning and determine whether they are valid.

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas: concrete; pictorial; symbolic; and graphical representations

2. Select, apply, and translate among mathematical representations to solve problems

3. Use representations to model and interpret physical, social, and mathematical phenomena.

F. Technology

Discovering Algebra Chapters 1-5
New Jersey Math Frameworks 1-4
http://dimacs.rutgers.edu/njmathcoalition/framework.html
Explain It
Question Quest - Level B
8 Step Model Drawing

1. Use technology to gather, analyze, and communicate mathematical information.	*Geometer's Sketch Pad* *TinkerPlots* *Geometer's Sketch Pad Lesson Links* *Brain Pop*
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information	*Discovering Algebra* Chapter 1 Geometer's Sketchpad Lesson Links Geometer's Sketchpad Tinker Plots
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	*TI 73 and TI 84 Calculators* *Discovering Algebra* – Chapters 1-5
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	*Discovering Algebra* – Chapters 1-5
5. Use computer software to make and verify conjectures about geometric objects.	*Geometer's Sketch Pad* *Geometer's Sketch Pad Lesson Links* *Tinker Plots*
6. Use computer-based laboratory technology for mathematical applications in the sciences	*Discovering Algebra* – Chapters 1-5 *Geometer's Sketch Pad* *Geometer's Sketch Pad Lesson Links* *Tinker Plots*

Flemington-Raritan School District

Mathematics Curriculum

3rd Grade Gifted and Talented Math Pacing Guide

Unit	Number of Days (Approximate)	Unit	Number of Days (Approximate)
1 . Naming & Constructing Geometric Figures	12	**7** . Fractions & Their Uses, Probability	17
2 . Using Numbers & Organizing Data	13	**8** . Perimeter & Area	11
3 . Multiplication & Division Number Sentences & Algebra	19	**9** . Fractions, Decimals, & Percents	12
4 . Decimals & Their Uses	14	**10** . Reflections & Symmetry	10
5 . Big Numbers; Estimation & Computation	14	**11** . 3-D Shapes, Weight, Volume, & Capacity	10
6 . Division, Map Reference, Measure of Angles	13	**12 -** Rates	9
		Hands on Algebra	5

Grade: 3rd - Gifted and Talented Topic 4.1 Number and Numerical Operations

Essential Question: How can problems in the real world be solved with mathematics?

How can estimation be useful to us?

How do numbers help us reason out solutions to problems?

How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 6 pertain to these sets of numbers as well).	Teacher observation Teacher play with student	Games: Chip Trading, High Number Toss, Top It (*Everyday Mathematics*) Digit Place or Pico, Fermi, Bagels	Sheet # 37 *Family Math*, Lawrence Hall of Science, Berkeley, CA, 1986
● Whole numbers through millions	Do Now: SL.2.3	Metric Model Class Project 1-Million (picture) SP 134 & 135	
● Commonly used fractions (denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 10) as part of a whole, as a subset of a set, and as a location on a number line	Unit 7 W-Up Quiz and *Everyday Mathematics* assessment 7.13	*Everyday Mathematics* Unit 7 MB Fraction Kit, Circle Fractions Fraction Factory Do Now Sheet #28	
● Decimals through hundredths	Decimal Quiz Sheet # 2	Decimal Factory, Decimal Model (picture) SL. 4.1	
2.Demonstrate an understanding of place value concepts.		*Everyday Mathematics* 2.3 & 2.4 Decimal Do Now Sheet #27	
3. Demonstrate a sense of the relative magnitudes of numbers.	Slates: *Everyday Mathematics* Manual p. 225 Adjusting the Activity	*Everyday Mathematics* 4.3, SRB p. 24 Game: Smaller to Larger SL 4.9 Ordering and Comparing Decimals	*TERC: Name that Portion*, Dale Seymour Publishing, 1996 Sheet #38

4. Understand the various uses of numbers.	Math congress	SRB p. 2 More About Dates	www.mathsolutions.com Past Issues: Fall/Winter 2000-2001
● Counting, measuring, labeling (e.g., numbers on baseball uniforms), locating (e.g., Room 235 is on the second floor)	Students share strategies	Game: Number Paths, Sheet # 8 Calling All Students	www.exemplars.com/materials/samples
5. Use concrete and pictorial models to relate whole numbers, commonly used fractions, and decimals to each other, and to represent equivalent forms of the same number.	Quiz: JP 29		
	Anecdotal notes with observation rubric	Pattern blocks Geoboards Tangram Cuisenaire Rods Games: Fraction Fish Capture Fractions Clock Fractions	*TERC: Name that Portion*, Dale Seymour Publishing, 1996
6. Compare and order numbers.	Performance task: students create page for ___ ways to get to 15	Literature Link (manual p. 86)	*Twelve Ways to Get to 11*, Eve Merriam, Aladdin Paperback, 1995
7. Explore settings that give rise to negative numbers.	3rd grade addition/subtraction problems sheet #10	*Everyday Mathematics* 2.3	
	Create a number sentence sheet #13	Above/below Sea level 4 Quadrant Coordinate Grid	
● Temperatures below zero degrees, debts ● Extension of the number line			

B. Numerical Operations

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1 .Develop the meanings of the four basic arithmetic operations by modeling and discussing a large variety of problems.	Teacher observes and checks off on class recording sheet reasoning, justifying, listen to partner	Frame Fun Cooperative cards 24 Game Tiguous Sheet # 6	*Math Homework that Counts*, A. Raphel *Math Solutions 2000*
● Addition and subtraction: joining, separating, comparing	SL. 3.7 Teacher observation	*Everyday Mathematics* 2.7 & 2.9 Games: Rio, Four in a Row, The Winning Touch	*Multiplication Games*, Kamii & Anderson *Teaching Children Math,* November 2003
● Multiplication: repeated addition, area/array ● Division: repeated subtraction, sharing	Journal prompt: What I know about square numbers	Literature. Link: Things That Come in Groups Class Project	*What Comes in 2's, 3's, 4's?*, Suzanne Aker, Simon & Schuster, 1990 *Math by All Means Mult. 3*, M. Burns, Cuisenaire, 1991
2. Develop proficiency with basic multiplication and division number facts using a variety of fact strategies (such as "skip counting" and "repeated subtraction") and then commit them to memory.	Teacher observation	I Have... Who Has Cards Multiplication Tic Tac Toe How Long How Many Circles and Stars Literature. Link: Each Orange Had 8 Slices Amanda Bean's Amazing Dream	*Math Literature (4-b), Rusty Bresser, Math Solutions, 1995* *www.mathsolutions.com Past Issues: Fall/Winter 98-99*
● Multiplication of 2-digit numbers	Group solutions Recorded by teacher Individual paper & pencil Multiplication Quiz Sheet # 3 Jack Had 14 Scoops # 5 Beans & Scoops # 15	Teaching Multiplication lesson with 5th grade Pathways JP 125 & 8 & 9, 131 SL 5.7 Lesson 3.1-3.4	www.mathsolutions.com Past Issues: Spring/Summer 99 *Lessons for Extending Multiplication Grades 4-5*, Wickett & Burns, Math Solutions, 2001
● Division of 3-digit numbers by 1-digit numbers	*Everyday Mathematics* 3.12 Assessment Unit 3 Warm-up Quiz	MB lesson from VIDEO using Base 10 Blocks JP 147 SL 6.1 JP 153 & 4 & 6 & 7	*Mathematics: Teaching for Understanding* Video in Robert Hunter Library

	Performance task: Write riddle. Exchange with partner and solve *Everyday Mathematics* 6.11 Unit 6 Warm-up Quiz Journal paragraph	Leftovers sheet # 17 Roll 15 Literature. Link: Remainder Riddles What I Know About Division	*A Remainder of One, E.J. Pin czes (From Math & Literature. 4-6),* *Writing in Math Class*, M. Burns, Math Solutions, 1995 *Bresser M.S., 1995*
3. Construct, use, and explain procedures for performing whole number calculations and with: ● Pencil-and-paper ● Mental math ● Calculator	SL 2.9 Quiz Teacher observation	*Everyday Math* 2.7 & 2.9 Game: Name That Number	 SRB p. 188
4. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers. ● Addition of 3-digit numbers ● Subtraction of 3-digit numbers	Teacher observation of students Math Message Do Now Manual p. 121	Game: Subtraction Target	
5. Construct and use procedures for performing decimal addition, subtraction, multiplication, and division.	Quiz: Sam does not believe... # 16 Do Now: A Third Grader was Trying # 24 Quiz on Metrics # 13 *Everyday Mathematics* Assessment 4.11 Unit 4 Warm-up Quiz	Decimal Factory Lessons The Point in Question # 14 *Everyday Mathematics* unit 4 (all) *Everyday Mathematics* lessons 9.8 & 9..9 JP 333	*The Decimal Factory*, Holden-Charles & Randolph, Brummett Creative Publications, 1990
6. Count and perform simple computations with money. ● Standard dollars and cents notation	Which Would You Rather Have... Sheet # 12	*Everyday Mathematics* 4.5 Literature Link: The Lunch Line	www.mathsolutions.com Past Issues Fall/Winter 2000/01 Making Change for 20¢

7. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.	Portfolio Prompts Individual interview	Write number stories, exchange and solve Write and solve place value puzzles Describe a problem solving strategy	
	Everyday Mathematics 9.10 Unit 9 Warm-up Quiz Slates	*Everyday Mathematics* Unit 9 Percents Percents, Proportions, and Grids Big Idea: Another name for Hundredth Models that connect fractions, decimals, percents	*Fractions, Decimals, Ratios, and Percents*, Barnett, Goldenstein, & Jackson, Heinemann, 1994. Van De Walle p. 288-289
	Individual writing assignment	What I Know About Percents (so far)	*Writing in Math Class*, M. Burns, 1995
8. Check the reasonableness of results of computations. 9. Use concrete models to explore addition and subtraction with fractions.	Fraction Problems Att # 25	JP 123 SL 5.4 Fraction Kit Fraction Factory Pattern Blocks Cuisenaire Rods Sheet # 21 Fractions with Cookies # 22 Sharing Brownies # 22 Which Would You Rather Have # 12	*The Marilyn Bums Fraction Kit Gr 4-6*, Math Solutions Publications, 2003 *Fraction Factory Puzzles*, Creative Publications, 1987, OUT OF PRINT, copies attached, sheet # 35
10. Understand and use the inverse relationships between addition and subtraction and between multiplication and division.		*Everyday Mathematics* 6.3	
	Observe and play with students	Chip Trading Sheet # 37	

C. Estimation

1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.	Slates	Quick flashes on overhead	
2. Construct and use a variety of estimation strategies (e.g., rounding and mental math) for estimating both quantities and the results of computations.	Journal Entry	Beans and Scoops Investigation Foot Figuring: Introducing the Metric System sheet # 26	*Lessons for Extending Multiplication*, Wickett & Burns, Math Solutions, 2001 *About Teaching Mathematics*, Marilyn Bums, Math Solutions, 2000
3. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.	Journal Prompt: If I were 1 cm tall....	Literature Link: How Big is a Foot?	Author: Rolf Myller, Dell Yerling, 1990
4. Use estimation to determine whether the result of a computation (either by calculator or by hand) is reasonable.	*Everyday Mathematics* 5.12 Unit 5 Warm-up Quiz	*Everyday Mathematics* Unit 5	

Grade: 3rd - Gifted and Talented Topic 4.2 Geometry and Measurement
Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Identify and describe spatial relationships of two or more objects in space.	Hand out packet	*Everyday Mathematics* Project 6: Building & Viewing Structures Cuisenaire Rods: Front, top, side views	*Spatial Problem Solving with Cuisenaire Rods*, Davidson & Willett, ETA/Cuisenaire, 2002
● Direction, orientation, and perspectives (e.g., which object is on your left when you are standing here?)	Observation of vocabulary	Polygon Tiles Geoboard shape sorting: Polygons are....	*Super Source* CD Rom video clip # 20
● Relative shapes and sizes ● Shadows (projections) of everyday objects			
2. Use properties of standard three-dimensional and two-dimensional shapes to identify, classify, and describe them. ● Vertex, edge, face, side, angle	Students create poster comparing faces of 2 different solids *Everyday Mathematics* Assessment 11 .8 Unit 22 Warm-up Quiz Time to Reflect	Geometric solids and their parts 12 Wooden shapes -- Nets -- Pentominoes Literature Link: *The Greedy Triangle* Polydron Tiles -- students construct 3D solids Polygon Tiles -- students identify 2D shapes Roping in Quadrilaterals with Applet: Mystery Rings Everyday Mathematics Polygon Riddles Geometry riddles sheet # 11	*TERC: Containers and Cubes*, Dale Seymour Publishing, 1998 *The Greedy Triangle*, Marilyn Burns, Math Solutions 1994 *NCTM Navigations Geometry 3-5*
● 3D figures -- cube, rectangular prism, sphere, cone, cylinder, and pyramid ● 2D figures -- square, rectangle, circle, triangle, quadrilateral, pentagon, hexagon, octagon ● Inclusive relationships -- squares are rectangles, cubes are rectangular prisms			

		Everyday Mathematics 6.6 - 6.10 Applets: Mirror Tool: reflections, slides, flips, turns Applets: Cutting Corners Tool Applets: Two Geoboards *Everyday Mathematics* Unit 11	
3. Identify and describe relationships among 2D shapes. ● Congruence ● Lines of symmetry	*Everyday Mathematics* Assessment 10.7 Unit 10 Warm-up Quiz Time to Reflect	*Everyday Mathematics* unit 10 Geoboard Shapes Sheet # 20	
4. Understand and apply concepts involving lines, angles, and circles. ● Point, line, line segment, endpoint ● Parallel, perpendicular ● Angles -- acute, right, obtuse ● Circles -- diameter, radius, center	*Everyday Mathematics* Assessment 1.9 Unit 1 Warm-up Quiz Time to Reflect Tangrams sheet # 9	*Everyday Mathematics* Unit 1 Notes from class: Vocabulary presented by teacher using overhead and picture poster Students copy, discuss, ask questions. Construct angles with Geostrips Literature Link: *Grandfather Tang's Story* Tangram Challenges	*NCTM Addenda Series Grades 5-8*, 1992 *Grandfather Tang's Story*, Ann Tom pert, Crown Publishing 1990 Navigations: Geometry 3-5, Applet
5. Recognize, describe, extend, and create space-filling patterns.	Observation with checklist	Students build patterns with Pattern Blocks	*Share and Compare*, Larry Bushman, NCTM, 2003, p. 52
B. Transforming Shapes 1. Use simple shapes to cover an area (tessellations).		Students informally create tessellations with Pattern Blocks	

2. Describe and use geometric transformations (slide, flip, turn).	SL 10.5	*Everyday Mathematics* 10.1 - 10.6	
	Time to Reflect: My Week in Review	Math Arena: Flipster	*Everyday Mathematics* manual, p. 754
	Teacher observation	Dot Patterns	Thinking Goes to School, Furth & Wachs, Oxford University Press, 1974, p. 162-4
		SRB p. 92-93	
		Pattern Blocks on overhead: students create reflections, rotations, translations	
3. Investigate the occurrence of geometry in nature and art.		Posters - Notes from Class SRB	
C. Coordinate Geometry			
1. Locate and name points in the first quadrant on a coordinate grid.		Battle Ship *Everyday Mathematics* 6.5 Animal Grid masters: Give a Hoot, R-R-Ribbet	Own made sheets # 32-33
		Hit or Miss	*Super Source Tan grams 5-6*, Cuisenaire, 1996
		Coordinate Graphing	www.mathsolutions.com Past issues Winter 2002-03
2. Use coordinates to give or follow directions from one point to another on a map or grid.			
D. Units of Measurement			
1. Understand that everyday objects have a variety of attributes, each of which can be measured in many ways.			
2. Select and use appropriate standard units of measure and measurement tools to solve real-life problems.	My Metric Benchmarks Sheet #1	NFC Units of Measure: Standard & Metric	

● Length -- fractions of an inch (1/8, 1/4, 1/2), mile, decimeter, kilometer	Project: Poster: Measure Me	Perimeter with Cuisenaire Rods The Master Rulers Students make and use: 20 cm Rulers Folding Meter Stick Milliliter Measure Liter Measure The Perimeter Stays the Same	*About Teaching Mathematics*, M. Burns Handout from Workshop sheets # 34 packet NCTM Addenda 5-8 Measurement p. 19 *About Teaching Mathematics*, M. Burns
● Area -- square inch, square centimeter		Literature Link: *Inchworm and a Half*	*Inchworm and a Half*, E. Pinczes, Houghton Mifflin, 2001
● Capacity -- fluid ounce, cup, gallon, milliliter ● Solve problems involving elapsed time		11 Party Planning	● Volume -- cubic inch, cubic centimeter *Best of Math Exemplars II* CD Rom
3. Develop and use personal referents to approximate standard units of measure (e.g., a common paper clip is about an inch long).			
4. Incorporate estimation in measurement activities (e.g., estimate before measuring).	Journal: what I learned at the Measurement Fair Prompt: I used the _____ benchmark to measure _____.	How good is your estimate? Measurement day: Estimation Fair Estimating Lengths with Benchmarks	NCTM Addenda p. 15 NCTM Addenda p. 18 *TERC Measurement Benchmarks 5-6*, Dale - Seymour, 1996
E. Measuring Geometric Objects			
1. Determine the area of simple two-dimensional shapes on a square grid.	*Everyday Mathematics* 8.9 Assessment Unit 8 Warm-up Quiz	*Everyday Mathematics* 8.1-8.8	
2. Distinguish between perimeter and area and use each appropriately in problem-solving situations.		Fixed Areas Fixed Perimeters	*Van De Walle: Elementary and Middle School Math*, 2004

	Authentic Performance Students use color tiles and record solutions on graph paper	Literature Link: *Spaghetti and Meatballs for All*	*Math by All Means: Perimeter and Area Grades 5-6,* mathsolutions.com
3. Measure and compare the volume of three-dimensional objects using materials such as rice or cubes.	Ticket out the Door	*Everyday Mathematics* 11.4, 11.5, 11.7 Folding Geometric set (3D -- 2D) View Thru geometric solids set	
	Completion of worksheet How Many Cubes?		NCTM 2003 Yearbook, p. 136

Grade: 3 - Gifted and Talented Topic 4.3 Patterns and Algebra
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns.	Math Master p. 163	Frieze Patterns *Everyday Mathematics 10.5* SRB p.94	
● Descriptions using words, number sentences/expressions, graphs, tables, variables (e.g., shape, blank, or letter) ● Sequences that stop or that continue infinitely	Students complete worksheets and present a solution at overhead. Math Congress: pairs of students present poster to classmates	Hands On Algebra book I I Spy Patterns Algebra Scales	www.borenson.com Navigations through Algebra 3-5 *Navigations through Algebra 3-5*
● Whole number patterns that grow or shrink as a result of repeatedly adding, subtracting, multiplying by, or dividing by a fixed number (e.g., 5, 8, 11,...or 800, 400, 200,...)		The Variable Machine Hundred Board Wonders Function Machine & Pan Balance Applets Patterns that grow: Patterns on charts with online calculator	NCTM.org.Illuminations - lesson
● ,Sequences can often be extended in more than one way (e.g., the next term after 1, 2, 4, ... could be 8, or 7, or...)	Students share ideas at overhead	Number Patterns It All Adds Up!	Van de Walle p. 425 www.mathsolutions.com Past issues Fall/winter 2000/01
B. Functions and Relationships			
1. Use concrete and pictorial models to explore the basic concept of a function.			

● Input/output table, T-charts		*Everyday Mathematics* What's my rule? JP 59 & 64 (Mbox)	
		Rate Tables 12.2	
● Combining two function machines ● Reversing a function machine	Completion of Blackline Masters	Tiling a Patio	*Navigations through Algebra 3-5*
		Growing Patterns	
		Equilateral Triangles	
		Triangle-Rule Machine	
C. Modeling			
1. Recognize and describe change in quantities.	NFC	*Everyday Mathematics* 2.8 9.6	
● Graphs representing change over time (e.g., temperature, height)	Class graph	Grow and measure Amaryllis Bulb. Help students focus on the shape of the data: range, maximum, minimum, outlier	
● How change in one physical quantity can produce a corresponding change in another (e.g., pitch of a sound depends on the rate of vibration)			
2. Construct and solve simple open sentences involving any one operation (e.g., 3 x 6 = _____, n = 15 ÷ 3, 3 x ____ = 0, 16 - c = 7).	Whole class discussion manual p. 191	Number Balance	Van De Walle, p. 428
		Everyday Mathematics 3.10	
		Different uses of variables	
		Variables as unknowns	
	Class discussion: Solve b + b + b - 20 = 16	Number sentences involving relational thinking, p.31	*Thinking Mathematically: Integrating Arithmetic & Algebra in Elementary Schools*, Carpenter, Franke, Levi Heinemann, 2003

D. Procedures

1. Understand and use the concepts of equals, less than, and greater than in simple number sentences.	Students share posters in Math Congress SL 3.8	Equality, relational thinking *Everyday Mathematics* 3.8	*Thinking Mathematically: Integrating Arithmetic & Algebra in Elementary Schools*, Carpenter, Franke, Levi Heinemann, 2003
● Symbols (=, <, >)	Journal paragraph: What I know now about =, <, and >	True, false, and open number sentences	www.mathsolutions.com Past Issues Fall 2002
2. Understand, name, and apply the properties of operations and numbers.	NFC: Big Ideas	Meanings for Operations	Van De Walle p. 135
● Commutative (e.g., 3 x 7 = 7 x 3)		Multiplication and Division Properties	Van De Walle p. 149 & 150
● Identity element for multiplication is 1 (e.g., 1 x 8 = 8)	Class Discussion: a + b - b = a k + k + 13 = k + 20 56 + 75 + 25 = ____	The Broken Multiplication Key The Broken Division Key Representing Conjectures Symbolically Ordering multiple operations	*Thinking Mathematically: Integrating Arithmetic & Algebra in Elementary Schools*, Carpenter, Franke, Levi Heinemann, 2003 Van De Walle p. 106
● Division by zero is undefined ● Any number multiplied by zero is zero			

Grade: 3 Gifted and Talented Topic 4.4 Data Analysis, Probability, and Discrete Mathematics
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1 .Collect,generate,organize,and display data in response to questions, claims, or curiosity.	SL 2.6 Journal prompt: calculate maximum, minimum, range, mode, and median for Adults and kids. Explain: what do you find interesting when comparing the two sets of data?	*Everyday Mathematics* 2.5, 2.6, & 2.8 Enrichment: Bulletin Board Display Above number line - Adults head circumference Below number line - 3rd grade head circumference	
● Data generated from the school environment		Questions Please? Long Jump How many stars can you draw in 1 minute? Do you get enough sleep? Chores - How many hours a week are typical? SRB p. 63 Roll 15 game sheet # 15	*NCTM Navigations through Data Analysis and Probability,* 3-5, 2002
2. Read ,interpret,select,construct,analyze, generate questions about, and draw inferences from displays of data.	Notes from Class	BIG Ideas	Van De Walle p. 386
● Pictograph, bar graph, line plot, line graph, table		What's in a name? Lesson: First	NCTM.org.Illuminations - lesson Names First
● Average (mean), most frequent (mode), middle term (median)	*Everyday Mathematics* 2.10 Unit 2 Warm-up	Finding the Balance Point	Van De Walle p. 401

B. Probability

1. Use everyday events and chance devices, such as dice, coins, and unevenly divided spinners, to explore concepts of probability	Observe students/play with students	How many rolls to get a 1? The Two-Dice Sum Game Fair Game 2	*About Teaching Mathematics*, p. 70, 73, 74
● Likely, unlikely, certain, impossible, improbable, fair, unfair ● More likely, less likely, equally likely ● Probability of tossing "heads" does not depend on outcomes of previous tosses	NFC BIG Ideas # 4 & 5	Exploring concepts of probability	Van De Walle p. 386
2. Determine probabilities of simple events based on equally likely outcomes and express them as fractions.	SL 7.11	*Everyday Mathematics* 7.11 & 7.12	
3. Predict probabilities in a variety of situations (e.g., given the number of items of each color in a bag, what is the probability that an item picked will have a particular color).	Journal prompts Ticket out the door	Color Tile Sampling Roll 2 dice Tiles in Three Bags Pigs, testing pig strategies	*Probability 3-4*, M. Burns, 1995
● What students think will happen (intuitive) ● Collect data and use that data to predict the probability (experimental)	Matching line plots with spinners	Is there such a thing as a lucky coin? Spin City Is it fair?	*NCTM Navigating through Data Analysis and Probability 3-5*
● Analyze all possible outcomes to find the probability (theoretical)	Observation of students	Applets: Preset Spinner Dice Sums Coin Toss	*NCTM Navigating through Data Analysis and Probability 3-5*

C. Discrete Mathematics-Systematic Listing and Counting

1. Represent and classify data according to attributes, such as shape or color, and relationships.	Observe students playing the games	Attribute blocks Venn Diagrams Difference Chains Difference Grids Difference Problems	*Attribute Acrobatics*, Sternberg Activity Resources, 1974
● Venn diagrams	Exit slip: I played ____ today. I liked ____.	Venn Diagram on Math Arena	Math Arena
● Numerical and alphabetical order			
2. Represent all possibilities for a simple counting situation in an organized way and draw conclusions from this representation.	Class discussion to create class chart	Combinations: Shorts and Skirts Ice Cream cones	NCTM.org. Illuminations -Lessons
● Organized lists, charts, tree diagrams	Ticket out the door	Cooperative Logic	*Group Solutions, Too!*, GEMS, University of California, Berkeley
● Dividing into categories (e.g., to find the total number of rectangles in a grid, find the number of rectangles of each size and add the results)	Completion of worksheet	Squares in a square with color tiles	*Super Source* CD Rom, Grades 3-4, p. 74

D. Discrete Mathematics - Vertex - Edge - Graphs and Algorithms

1. Follow, devise, and describe practical sets of directions (e.g., to add two 2-digit numbers).

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2. Play two-person games and devise strategies for winning the games (e.g., "make 5" where players alternately add 1 or 2 and the person who reaches 5, or another designated number, is the winner.)	Teacher observation/play with individual students Try to write down a strategy for winning	Game of Nim Game of Pig Odd Number Wins Begin with 15 cubes. Take 1, 2, or 3 cubes. Whoever has an odd number of counters when all blocks have been picked is the winner.	www.csm.astate.edu/Nim.html-2k Probability 3-4, M. Burns, 1995
3. Explore vertex-edge graphs and tree diagrams. ● Vertex, edge, neighboring/adjacent, number of neighbors ● Path, circuit(i.e., path that ends at its starting point)			
4. Find the smallest number colors needed to color a map or a graph.			

Grade: 3 Gifted and Talented Topic 4.5 Mathematical Processes
Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.
Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference? How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving inquiry and discovery	Observe pairs playing/play with a student Extension: Newspaper article Journal: work with partner, report your answer, and how you figured it out	Picture This The Product Game Lesson: The Factor Game Triangles Lesson: What's Important about Triangles? A Long Division Activity Match or No Match	NCTM.org.Illuminations - lessons NCTM.org.Illuminations - lessons *Problem Solving Lessons*, Marilyn Burns, Math Solutions, 1996
2. Solve problems that arise in mathematics and in other contexts			
● Open ended problems	Teacher observation	24 Game	*Young Children Reinvent Arithmetic*, Kamii& Housman, Teachers College Press, 2000
● Non-routine problems	Students share and teacher records on a class chart Teacher collects papers and responds with post-it "nudge notes"	Julia's Dartboard sheet # 29 Poyla activity: Cows & Chickens sheet # 30	NJ Curriculum Framework grade 3-4 Standard 1: Problem Solving
● Problems with multiple solutions	Check your understanding	SRB p. 149	
● Problems that can be solved in several ways			
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.			

4. Pose problems of various types and levels of difficulty			
5. Monitor their progress and reflect on the process of their problem solving activity			
B. Communication			
1. Use communication to organize and clarify their mathematical thinking	Completion of tally sheet	Count on Mathematics for Number Sense	NCTM.org.Illuminations lesson
		Lesson: Every Breath You Take	
● Reading and writing	Completion of worksheet	Literature Link: *A Tale of Two Stories: Pigging Out*	
		Mathematics and Children's Literature: Getting the Facts: Counting on Frank	
● Discussion, listening and questioning	Collect and respond with post-it "nudge note"	Explain to a student in 2nd grade what you learned about decimals today	Van De Walle p. 70
	Class discussion	Even/Odd Class Discussion	*Classroom Discussions: Using Math Talk to Help Students Learn*, Chapin O'Connor, Canavan/Anderson Math Solutions, 2003
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	Class discussion	*Everyday Mathematics* lesson 3.7-3.10	
	Writing Prompt: What about the work we did today was easy? What was hard? What do you still have questions about?		
3. Analyze and evaluate the mathematical thinking and strategies of others.	Math Congress: Teacher uses scoring rubric for feedback to students	Parent Volunteers	*Best of Math Exemplars II* CD Rom

4. Use the language of mathematics to express mathematical ideas precisely.			
C. Connections			NCTM.org.Illuminations lesson
1. Recognize recurring themes across mathematical domains (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Exit slip	Exploration of a Balance Lesson: Maintaining the Balance Shifting the Balance Completion of worksheet Games, Measurement, and Statistics Lesson: Pitching Cards	NCTM.org.Illuminations lesson
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Students create a class book of their own	Literature Link: *Only One* Literature Link: *The Important Book*	*Only One*, Harshman, Coblehill Books, 1993*The Important Book*, Wise Brown, Harper Collins, 1949
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	*Everyday Mathematics* Assessment 12.7 Unit 12 Warm-up Quiz	*Everyday Mathematics* Rates 12.1 - 12.5 *Everyday Mathematics* Project 7: Numbers Maya Style	
4. Apply mathematics in practical situations and in other disciplines.			
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).			
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.			
D. Reasoning			
1. Recognize that mathematical facts, procedures, and claims must be justified.	Class posters to be used for math congress	Mathematics and Environmental Concerns Lesson: How to Bag It	NCTM.org.Illuminations -lesson

	Completion of worksheet followed by class discussion	Numbers and Language Lesson: Post Office Numbers	
2.Use reasoning to support their mathematical conclusions and problem solutions.	Class Brainstorm: can we find all possible combinations?	Possible Solution Sets Lesson: Create an Address Number	NCTM.org.Illuminations -lesson
3. Select and use various types of reasoning and methods of proof.	Math Congress Partners create organized list of all possible combinations	*Roads to Reasoning* Packets Grade 4 Build the Yellow Hexagon The Last Block with Pattern Blocks Be a Logician with Color Tiles	*Roads to Reasoning*, Krulik & Rudwick, Creative Publications, 2001 *Super Source* CD Rom Video Clip # 2, Cuisenaire Co., 1996 *Super Source* CD Rom lesson, Cuisenaire Co., 1996, p. 62 *Super Source* CD Rom lesson, Cuisenaire Co., 1996, p. 18
4. Rely on reasoning, rather than answer keys, teachers, or peers, the check the correctness of their problem solutions.	Journal prompt: I used the strategy of ____ to guess the sequence of colors.	Writing Prompt sheet # 31 Writing Prompt sheet # 36	NCTM 2001 Yearbook: Promoting the Use of Diagrams as Tools for Thinking, pp. 77-89 NCTM 1999 Yearbook: Reasoning About Operations, pp. 62-81
5. Make and investigate mathematical conjectures. ● Counterexamples as a means of displaying conjectures ● Verifying conjectures using informal reasoning or proofs.			
6. Evaluate examples of mathematical reasoning and determine whether they are valid.			

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas.	Students share at overhead	Problem: What happens to the area of a rectangle if the lengths of its sides are doubled?	*Principles and Standards for School Mathematics*, NCTM, 2000, p. 205
● Concrete representations (e.g., base-ten blocks or algebra tiles)	Students create graphs using spreadsheet	Collecting, Representing, and Interpreting Data	*Principles and Standards for School Mathematics*, NCTM, 2000, E - example 5.5 (members only)
● Pictorial representations (e.g., diagrams, charts, or tables)	whole class discussion	Are there more even or odd products in the multiplication table?	*Principles and Standards for School Mathematics*, NCTM, 2000, pp. 208-9
● Symbolic representations (e.g., a formula)	math congress	Problem Prompts adaptations	NCTM 2001 Yearbook, pp. 77-89
● Graphical representations (e.g., a line graph)	Writing Prompt: Reflection on playing the game	Chip Trading	
2. Select, apply, and translate among mathematical representations to solve problems			
3. Use representations to model and interpret physical, social, and mathematical phenomena.			

F. Technology

1. Use technology to gather, analyze, and communicate mathematical information.	Teacher reflection after observing students (see last page of article)	Virtual Tile Turning	NCTM On-Math Journal, Spring 2003, (members only), Printed copy of article attached.
		Applets: Patterns Shape Tool (Illuminations)	
	Math Congress/class discussion	Problem of the week	http://mathforum.org
		Math Arena	

2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).	Class Discussions	Electronic Abacus Applet Equivalent Fractions Applet Fraction Pie Overview Applet Patch Tool: Fitting Shapes Together to Form Designs Product Game	NCTM.org. Illuminations
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.			
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).			
5. Use computer software to make and verify conjectures about geometric objects.			
6. Use computer-bases laboratory technology for mathematical applications in the sciences (cf.science standards).A39			

Flemington-Raritan School District

Mathematics Curriculum

4th Grade Gifted and Talented
Pacing Guide

Unit	Number of Days (Approximate)	Unit	Number of Days (Approximate)
1 . Number Theory	13	**7** . Exponents and Negative Numbers	14
2 . Estimation and Computation	13	**8** . Fractions and Ratio	16
3 . Geometry Explorations and the American Tour	13	**9** . Coordinates, Area, Volume and Capacity	13
4 . Division	10	**Hands On Equations**	10
5 . Fractions, Decimals, and Percent	15	**10** . Using Data; Algebra Concepts and Skills	12
6 . Using Data; Addition and Subtraction of Fractions	13	**11 -** Volume, & Capacity	10
		12 . Probability, Ratio, and Rates	11
Mid-Year Benchmark Assessment	1	End-of-the-Year Benchmark Assessment	1

Grade: 4 - Gifted and Talented **Topic 4.1 Number and Numerical Operations**
Essential Question: How can problems in the real world be solved with mathematics?
How can estimation be useful to us?
How do numbers help us reason out solutions to problems?
How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (**unless otherwise noted, all indicators for grade 5 pertain to these sets of numbers as well**).	Teacher observation Teacher made exit slips (attachment 3)	Practice Master pm 5-41, 5-82 Pizzazz, E-61 "Pattern Blocks" Variety of Games	Open Court, 1991 *Everyday Mathematics* Units 5, 6, and 8 *Name That Portion*, TERC, 1996 *Middle School with Pizzazz*, Booke *Teaching Children Mathematics*, Janet Caldwell, November 1995 TERC, *Name That Portion* Geoboard Puzzles (attachment 4 & 5)
• Whole numbers through millions	Student journals	Whole Class Discussion "Fraction Track" "Geoboard Puzzles"	
• All fractions as part of a whole, as subset of a set, as a location on a number line, and as divisions of whole numbers • All decimals			

2. Demonstrate an understanding of place value concepts.	State assessment	"Capture Decimals" Mental Math & Reflexes, *Everyday Mathematics* 2.5	TERC, *Name That Portion* *Everyday Mathematics* - 5 Units 2,4,5
3. Recognize the decimal nature of United States currency and compute with money.			
4. Demonstrate a sense of the relative magnitudes of numbers.	Observation of students playing game	Do Now: Mental Math & Reflexes (*Everyday Mathematics* 2.10) First to 100 "Number Names"	*Everyday Mathematics* - 5 Units 2,4,7 Problem Parade
5. Use whole numbers, fractions, and decimals to represent equivalent forms of the same number.	*Everyday Mathematics* Unit 5 Assessment	PM 5-59 Pizzazz C-25, C-74	*Everyday Mathematics* - 5 Unit 5 Open Court (1991) *Middle School with Pizzazz*
6. Develop and apply number theory concepts in problem solving situations. • Primes, factors, multiples	*Everyday Mathematics* Unit 1 Assessment Authentic Performance Task Project	Factor Capture Game Candy Box Research Ryan's Primes PM 6-52 Variety of Problems "The Sieve of Eratosthenes" "Deficient, Abundant, & Perfect Numbers"	*Everyday Mathematics* - 5 Unit 1 *Multiplication* - Grade 3, M. Burns, 1991 *Teaching Children Mathematics*, May 1997 *Practice Masters*, Open Court, 1991 Logic Number Problems *Everyday Mathematics* - 5, Project 1,2

6. Compare and order numbers.		Whole Class Division Review	*Everyday Mathematics* - 5, Unit 4
B. Numerical Operations			
1. Recognize the appropriate use of each arithmetic operation in problem situations.	*Everyday Mathematics* Unit 2 Assessment Everyday Mathematics Unit 4 Assessment Everyday Mathematics Unit 5 Assessment	*Everyday Mathematics* Journal pages "Ancient Multiplication Algorithm"	*Everyday Mathematics* - 5 Units 2, 4, 5, 6, 8 *Everyday Mathematics* - 5 Project 3
2. *Everyday Mathematics - 5* performing addition and subtraction with fractions and decimals with: Pencil-and-paper Mental math Calculator		Construct, use, and explain procedures for	Pizzazz D-28, D-21 *Units 5, 6* *Middle School with Pizzazz*
3. Use an efficient and accurate pencil-and-paper procedure for division of a 3-digit number by a 2-digit number.	Everyday Mathematics - 5 Unit 4 Assessment Math Congress	Notes from class Small group work Student presentations	*About Teaching Mathematics*, Marilyn Burns (2000) *Everyday Mathematics* - 5 Unit 4
4. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.	Completion of enrichment activities	Supplemental enrichment activities	*Everyday Mathematics* - 5 Units 1, 2, 3, 8, 10 *Roads to Reasoning*, Stephen Krulik & Jesse A. Rudnick, 2001 *Crossmatics*, Dudley, 1990 *Logic Number Problems*, Wade H. Sherard III, 1987

5. Check the reasonableness of results of computations.		*Everyday Mathematics Journal* pages and Study Links	*Everyday Mathematics* - 5, Units 1, 2, 4, 7, 8, 9, 10, 11, 12
6. Understand and use the various relationships among operations and properties of operations.	*Everyday Mathematics* Unit 7 Assessment	"First Four" The Four 4's Problem Project	*Everyday Mathematics* - 5 Unit 7 Problem Parade *Everyday Mathematics* - 5 Journal 2
C. Estimation			
1. Use a variety of estimation strategies for both number and computation.	Authentic performance piece State assessment	"Lima Bean Estimation Strategy" Mental Math & Reflexes *Everyday Mathematics* - 5 (2.4)	KSK Attachment 1 *Everyday Mathematics* - 5 Units 2, 4
2. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.		*Everyday Mathematics* Journal page 29 *Everyday Mathematics* Study 2.1 *Counting on Frank* Group Project	*Everyday Mathematics* - 5 Unit 2 *Math & Literature*, Rusty Bresser, 1995
3. Determine the reasonableness of an answer by estimating the result of operations.			
4. Determine whether a given estimate is an overestimate or an underestimate.	*Everyday Mathematics* - 5 Unit 2 Assessment		*Everyday Mathematics* - 5 Unit 2

Grade: 4 - Gifted and Talented Topic 4.2 Geometry and Measurement
Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Understand and apply concepts involving lines and angles. • Notation for line, ray, angle, line segment • Properties of parallel, perpendicular, and intersecting lines • Sum of the measures of the interior angles of a triangle is 180°	Everyday Mathematics Unit 3 Assessment		Everyday Mathematics - 5 Unit 3 Assessment
2. Identify, describe, compare, & classify polygons. • Triangles by angles & sides • Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi • Polygons by number of sides • Equilateral, equiangular, regular • All points equidistant from a given point form a circle	Everyday Mathematics Unit 3 Assessment	"Polygon Capture" "Geodeo's Sorting Scheme" "Geoshapes"	Everyday Mathematics - 5 Unit 3 *Navigation through Geometry* in Grades 6-8, 2001 The Greedy Triangle, Marilyn burns, 1994 Geometry in the Middle Grades (6-8), Illuminations Geoshapes (games), Talicor, 1996
3. Identify similar figures.	Everyday Mathematics Unit 3 Assessment		Everyday Mathematics - 5 Unit 3 Assessment
4. Understand and apply the concepts of congruence and symmetry (line and rotational).	Student Journals	Exploring Geometry (2-day activities)	"Exploring Geometry" *Arithmetic Teacher*, September 1992

B. Transforming Shapes

1. Use a translation, a reflection, or a rotation to map one figure onto another congruent figure.	Authentic Performance Task	"Shape Cutter" by Illuminations "Tessellemania"	Everyday Mathematics - 5 Unit 9 Lesson 3 Everyday Mathematics - 5 Unit 3 Lesson 6 *Tools*, Illuminations *Tessellemania* CD Rom
2. Recognize, identify, and describe geometric relationships and properties as they exist in nature, art, and other real-world settings.		"Geometry in the World of Art" - Grades 3-5	Everyday Mathematics - 5 Unit 3 *Lesson*, Illuminations

C. Coordinate Geometry

1. Create geometric shapes with specified properties in the first quadrant on a coordinate grid.	Everyday Mathematics Unit 9 Assessment Teacher observation	"Battleship" game "Hurkle" game "Lost in the Crowd" Math Arena Activity	Everyday Mathematics - 5 Unit 9 "Hurkle" *Family Math*, 1986 *Math Arena*, 1994

D. Units of Measurement

1. Select and use appropriate units to measure angles and area.	Everyday Mathematics Unit 3 Assessment	"Geoboard Triangle Search"	Everyday Mathematics - Unit 3 *Everyday Mathematics* - Unit 9 Lessons 4-7 *Math by All Means: Geometry* Grades 3-4, Marilyn Burns, 1994

2. Convert measurement units within a system (e.g., 3 feet = ___ inches).		"Measuring Up" (9 lessons) Pizzaz D-69	Lessons, Illuminations Middle School with Pizzazz
3. Know approximate equivalents between the standard and metric systems (e.g., one kilometer is approximately 6/10 of a mile).			Everyday Mathematics Unit 6 Lesson 2
4. Use measurements and estimates to describe and compare phenomena.	Observation of students' performance	Project 8 *Everyday Mathematics* Lesson 2.5 Everyday Mathematics Lesson 10.5	Everyday Mathematics - 5 Units 9 & 11 *Everyday Mathematics - 5* Unit 2 Lesson 5 *Everyday Mathematics* - 5 Unit 10 Lesson 5
E. Measuring Geometric Objects			
1. Use a protractor to measure angles.	Everyday Mathematics Unit 3 Assessment	PM 5-67 "Mrs. Claus" D-26	Everyday Mathematics Unit 3 Open Court, 1991 Middle School with Pizzazz
1. Develop and apply strategies and formulas for finding perimeter and area. • Square • Rectangle		Project 7 - *Everyday Mathematics*	Everyday Mathematics - 5 Units 9 & 11
3. Recognize that rectangles with the same perimeter do not necessarily have the same area and vice versa.		"The Perimeter Stays the Same" "Perimeter with Cuisenaire Rods"	Everyday Mathematics Unit 9 *About Teaching Mathematics*, Marilyn Burns

4. Develop informal ways of approximating the measures of familiar objects (e.g., use a grid to approximate the area of the bottom of one's foot).	Authentic Performance Task	"Foot Area Perimeter"	About Teaching Mathematics, Marilyn Burns *Everyday Mathematics* Units 6 & 9

Flemington-Raritan School District
Mathematics Curriculum

Grade: 4 - Gifted and Talented Topic 4.3 Patterns and Algebra
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns involving whole numbers.	Unit 10 Assessment	" Patterns that Grow" (5 lessons)	*Everyday Mathematics* - 5 Units 1, 2, 7, 10 Illuminations - "Lessons"
• Descriptions using tables, verbal rules, simple equations, and graphs			
B. Functions & Relationships			
1. Describe arithmetic operations as functions, including combining operations and reversing them.	Unit 7 Assessment	*Everyday Mathematics* - The Four 4's Project	*Everyday Mathematics* - 5 Unit 7 *Everyday Mathematics* - 5 Unit 9
2. Graph points satisfying a function from T-charts, from verbal rules, and from simple equations.	Unit 10 Assessment Student completion of booklet. Student demonstration	First to 100 - *Everyday Mathematics* Hands on Algebra	*Everyday Mathematics* - 5 Unit 10 (Lessons 4 & 6) *Everyday Mathematics* - Units 3, 4, 10 *Hands on Algebra*, Borenson & Assoc., 1994
C. Modeling			
1. Use number sentences to model situations. • Using variables to represent unknown quantities • Using concrete materials, tables, graphs, verbal rules, algebraic expressions/equations	Circulate, complete, and share Journal p. 360	*Everyday Mathematics* 10.5 - Predicting Old Faithful's Next Eruption	*Everyday Mathematics* - Unit 10 Lesson 5

2. Draw freehand sketches of graphs that model real phenomena and use such graphs to predict and interpret events.

- Changes over time

• Rates of change (e.g., when is plant growing slowly/rapidly, when is temperature dropping most rapidly/slowly)			
D. Procedures			
1. Solve simple linear equations with manipulatives and informally • Whole-number coefficients only, answers also whole numbers • Variables on one side of equation	Unit 9 Assessment Unit 10 Assessment	Hands on Algebra	*Everyday Mathematics* - Units 9 & 10 *Hands on Algebra*, Groundworks - Creative Publications, 1994

Grade: 4 Gifted and Talented **Topic 4.4 Data Analysis, Probability, and Discrete Mathematics**
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1. Collect, generate, organize, and display data.	Unit 6 Assessment	"The Search for $1.00 Words"	www.mathsolutions.com Attachment 2a & b
		"Food Court" grade 3-5 (6 lessons)	Everyday Mathematics Unit 6 *Lessons* - Illuminations
• Data generated from surveys			
2. Read, interpret, select, construct, analyze, generate questions about, and draw inferences from displays of data.	Unit 6 Assessment	"Information Represented Graphically"	*Lessons* - Illuminations *Everyday Mathematics* - 5 Unit 5 Lesson 10, 11 *Everyday Mathematics* - 5 Unit 6 *Everyday Mathematics* - 5 Unit 10 Lesson 7
• Bar graph, line graph, circle graph, table •		Range, median, and mean "Problem Solving: Dealing with	*Lessons* - Illuminations
3. Respond to questions about data and generate their own questions and hypotheses.	Unit 6 Assessment		*Everyday Mathematics* - Unit 6
B. Probability			

1. Determine probabilities of events. • Event, probability of an event • Probability of certain event is 1 and of impossible event is 0	Unit 12 Assessment Math Congress	First to 21 - Journal p. 176 "Is It Fair?"	*Everyday Mathematics* - 5 Unit 12 *Everyday Mathematics* - 5 Unit 6 Lesson 2
2. Determine probability using intuitive, experimental, and theoretical methods (e.g., using model of picking items of different colors from a bag). • Given numbers of various types of items in a bag, what is the probability that an item of one type will be picked • Given data obtained experimentally, what is	Unit 12 Assessment Authentic performance task "Tiles in a Bag" (version 2)		*Everyday Mathematics* - Unit 12 *Teaching Children Mathematics*
1. Model situations involving probability using simulations (with spinners, dice) and theoretical models.		"Spinner Sums" "Game of Pig"	*Everyday Mathematics* - Units 2 & 12 *Math by All Means - Probability*, Marilyn Burns, 1995
C. Discrete Mathematics-Systematic Listing and Counting			
the likely distribution of items in the bag 1. Solve counting problems and justify that all possibilities have been enumerated without duplication. • Organized lists, charts, tree diagrams, tables	Circulate, complete, and share	"map coloring" "The Handshake Problem"	Discrete Mathematics Workshop, Lisa Ryden, September 2000 *About Teaching Mathematics*, Marilyn Burns, 2000
2. Explore the multiplication principle of counting in simple situations by representing all possibilities in an organized way (e.g., you can make 3 x 4 = 12 outfits using 3 shirts and 4 skirts).	Think, pair, share	Fourth Grade Extension Activity: "Four-by-Four Block"	*Discrete Mathematics Across the Curriculum K-12*, Yearbook NCTM, 1991

D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms			
1. Devise strategies for winning simple games (e.g., start with two piles of objects, each of two players in turn removes any number of objects from a single pile, and the person to take the last group of objects wins) and express those strategies as sets of directions.	Circulate, complete, and share	"Vertex coding"	Discrete Mathematics Workshop - Lisa Ryden, September 2000

Grade: 4 Gifted and Talented Topic 4.5 Mathematical Processes
Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.
Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference? How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving	***Note - Since Everyday Mathematics is a spiraling program, NJ standard 4.5 occurs throughout daily lessons. Additional resources that are used in conjunction with the program are listed below.***		
1. Learn mathematics through problem solving, inquiry, and discovery.			
2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3). • problems • • •			*Continental Mathematics League: Euclidean* Grade 4 Open-ended *Thinker Math* Grades 5-6, 1989 Non-routine problems *Mindbenders - Deductive Thinking Skills,* Anita Harnadek Problems with multiple solutions *Problem Parade*, Dale Seymour Problems that can be solved in several ways *Favorite Problem*, Dale Seymour *Problem of the Month*, Math Olympiads, www.moens.org
3. Select and apply a variety of appropriate problem-solving strategies (e.g., "try a simpler problem" or "make a diagram") to solve problems.			*Elementary and Middle School Mathematics*, John A. Van de Walle, Fifth Edition, 2004
4. Pose problems of various types and levels of difficulty.			*Get It Together*, Tim Erickson, 1989 *Tiguous*, Constance Kamii
5. Monitor their progress and reflect on the process of their problem solving activity.			SET - www.setgame.com *Frameworks - First 4 Standards - Grades 5-6*
B. Communication			
1. Use communication to organize and clarify their			*Continental Mathematics League: Euclidean*

mathematical thinking.

- Reading and writing
- Discussion, listening, and questioning

Grade 4

Thinker Math Grades 5-6, 1989
Problem of the Month, Math Olympiads,

2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	www.moens.org *Get It Together*, Tim Erickson, 1989 *Writing in Math Class Grades 2-8*, Marilyn Burns
3. Analyze and evaluate the mathematical thinking and strategies of others.	*Classroom Discussions Grades 1-6*, Suzanne H. Chapin, et al., 2003 *Frameworks - First 4 Standards - Grades 5-6*
4. Use the language of mathematics to express mathematical ideas precisely.	
C. Connections	
1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	*Math Connections Linking Manipulatives and Critical Thinking*, Joyce Glatzer, 1997
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	*Everyday Mathematics* Project 3 - An Ancient Multiplication Algorithm *Everyday Mathematics Master* p. 43
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	*Frameworks - First 4 Standards - Grades 5-6* *Mindbenders - Deductive Thinking Skills,* Anita Harnadek
4. Apply mathematics in practical situations and in other disciplines.	*Problem Parade*, Dale Seymour *Favorite Problem*, Dale Seymour
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	

D. Reasoning

1. Recognize that mathematical facts, procedures, and claims must be justified.

SET - www.setgame.com

Continental Mathematics League: Euclidean Grade 4
Thinker Math Grades 5-6, 1989

2. Use reasoning to support their mathematical conclusions and problem solutions.

Problem of the Month, Math Olympiads, www.moens.org
Frameworks - First 4 Standards - Grades 5-6

3. Select and use various types of reasoning and methods of proof.

Mindbenders - Deductive Thinking Skills, Anita Haradek
Problem Parade, Dale Seymour
Frameworks - First Four Standards Grade 5-6

4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.

5. Make and investigate mathematical conjectures.

- **Counterexamples as a means of disproving conjectures**
- **Verifying conjectures using informal reasoning or proofs.**

6. Evaluate examples of mathematical reasoning and determine whether they are valid.

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas.

- Concrete representations (e.g., base-ten blocks or algebra tiles)
- Pictorial representations (e.g., diagrams, charts, or tables)
- Symbolic representations (e.g., a formula)
- Graphical representations (e.g., a line graph)

Fraction Factory (out of print)

2. Select, apply, and translate among mathematical representations to solve problems.

3. Use representations to model and interpret physical, social, and mathematical phenomena.

F. Technology

1. Use technology to gather, analyze, and communicate mathematical information.

2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).

3. Use graphing calculators and computer software to investigate properties of functions and their graphs.

4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).

5. Use computer software to make and verify conjectures about geometric objects.

6. Use computer-based laboratory technology for mathematical applications in the sciences (cf. science standards).

Illuminations

Math Arena
SET - www.setgame.com

Navigation Series
Tessellemania

mathsolutions.com
Elementary and Middle School Mathematics, John A. Van de Walle

Flemington-Raritan School District

Mathematics Curriculum

5th Grade Gifted and Talented
Pacing Guide

Unit	Number of Days (approximate)	Unit	Number of Days (approximate)
1 - Data & Landmarks (include histograms)	15	6 - Number Systems & Algebra Concepts	14
2 - Operations with Whole Numbers & Decimals (division included)	20	5 - Geometry	15
Metric/Customary Measurement	8	3-D Geometry	7
3 - Variables, Formulas, & Graphs (Algebra, Number Properties, Order of Operations, adding integers)	20	8 - Rates & Ratios	13
4 - Rational Number Uses & Operations (Fractions	20	7 - Probability	5
Mid-Term	1	9 - Variables, Formulas, & Graphs (more)	10
Hands on Equations	15	Final	1

Grade: 5th Gifted and Talented Topic 4.1 Number and Numerical Operations

Essential Question: How can problems in the real world be solved with mathematics?

How can estimation be useful to us?

How do numbers help us reason out solutions to problems?

How do basic operations help us understand numbers?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Number Sense			
1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 6 pertain to these sets of numbers as well).	*Everyday Mathematics* Assessments 2 4 6 and 9 Teacher made tests/quizzes White Boards Student sharing Exit Slips	Direct Instruction * collaborative learning * Written explanations Land Fractions Open Ended Tinkerplots SketchPad Everyday Math Game CMLs Menu of Problems Cuisenaire Rods	*A Collection of Math Lessons*, Marilyn Burns *Problem Parade* Doug Monteath & Don Volle Continental Math League monthly problems *Mathematics Teaching in Middle School* *Middle School with Pizzazz;* "Mathematics Teaching in Middle School" (May 1997)
● All integers			Van de Walle books *Everyday Math* Books 1 and 2 Hand on Equations *About Teaching Mathematics,* Marilyn Burns *Developing Number Sense Series*,
● All fractions as part of a whole, as subset of a set, as a location on a number line, and as divisions of whole numbers			
● All decimals			
● Percents			
● Whole numbers with exponents			

2. Recognize the decimal nature of United States currency and compute with money.

3. Demonstrate a sense of the relative magnitudes of numbers.

4. Explore the use of ratios and proportions in a variety of situations.

5. Understand and use whole-number percents between 1 and 100 in a variety of situations.

6. Use whole numbers, fractions, and decimals to represent equivalent forms of the same number.

7. Develop and apply number theory concepts in problem solving situations.

8. Demonstrate a sense of relative magnitudes of numbers

9. Compare and order numbers of all types.

10. Understand that all fractions can be represented as repeating or terminating decimals.

11. Understand and use ratios, proportions, and percents in a variety of situations.
- Primes, factors, multiples
- Common multiples, common factors

12. Compare and order numbers.

B. Numerical Operations

1 .Recognize the appropriate use of each arithmetic operation in problem situations.

2. Construct, use, and explain procedures for performing calculations with fractions and decimals with:

- Pencil-and-paper
- Mental math
- Calculator

3. Use an efficient and accurate pencil-and-paper procedure for division of a 3-digit number by a 2-digit number.

4. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.

5. Find squares and cubes of numbers.

6. Check the reasonableness of results of computations.

7. Understand and use the various relationships among operations and properties of operations.

8. Understand and apply the standard algebraic order of operations for the four basic operations, including appropriate use of

parentheses.

9. Use and explain procedures for performing calculations involving addition, subtraction, multiplication, division, and exponentiation with integers and all number types named above with:

- Pencil-and-paper
- Mental math
- Calculator

10. Understand and apply the standard algebraic order of operations, including appropriate use of parentheses.

C. Estimation

1. Use a variety of strategies for estimating both quantities and the results of computations.

2. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.

3. Determine the reasonableness of an answer by estimating the result of operations.

4. Determine whether a given estimate is an overestimate or an underestimate.

5. Use equivalent representations of numbers such as fractions, decimals, and percents to facilitate estimation.

Grade: 5th Gifted and Talented Topic 4.2 Geometry and Measurement
Essential Questions: How can knowledge of geometric properties help in problem solving situations?
How can coordinate grid systems help in understanding locations?
How does the mathematics of geometry enable us to wonder and understand our natural and physical world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Geometric Properties			
1. Understand and apply concepts involving lines, angles.	Everyday Mathematics Assessments 5 & 10 Teacher made tests/quizzes White Boards Student sharing Exit Slips EM Star questions	Direct Instruction * collaborative learning * Written explanations GeoBoards Open Ended Tinkerplots SketchPad Everyday Math Game CM Ls Menu of Problems Tangrams Graphing Investigations	*Everyday Mathematics* Book 6, Unit 5 & 10 *Navigation through Geometry Van de Walle, pages 345-385; Illuminations* *NCTM Addendum Grades 5-8 Geometry;* *Geometer's Sketchpad,* *Seeing Solids and Silhouettes, Terc pages 83-95*
		Pi Day Land Fractions Pi Packet Slides, Flips & Turns Isometry Transformations Pattern Blocks Journaling	*Principles and Standards for School Mathematics* pgs. 240-247 Van De Walle pgs. 331-336; Adapted from *About Teaching Mathematics,* Marilyn Burns
● Notation for line, ray, angle, line segment. ● Properties of parallel, perpendicular, and intersecting lines. ● Sum of the measures of the interior angles of a triangle is 180^{o}			

2. Identify, describe, compare, and classify polygons and circles
   - Triangles, by angles and sides.
   - Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi
   - Polygons by number of sides
   - Equilateral, equiangular, regular
   - All points equidistant from a given point from a circle.

3. Identify similar figures

4. Understand and apply the concepts of congruence and symmetry (line and rotational)

5. Compare properties of cylinders, prisms, cones, pyramids, and spheres.

6. Identify, describe, and draw the faces or shadow (projections) of three-dimensional geometric objects from different perspectives.

7. Identify a three dimensional shape with given projections (top, front and side views).

8. Identify a three dimensional shape with a given net (i.e., a flat pattern that folds into a 3-d shape)

9. Understand and apply properties of polygons.
10. Understand and apply the concept of similarity.
    - Using proportions to find missing measures
    - Scale drawings
    - Models of 3D objects

11. Use logic and reasoning to make and support conjectures about geometric objects.

B. Transforming Shapes

1. Understand a translation, a reflection, or a rotation to map one figure onto another congruent figure.

2. Recognize , identify, and describe geometric relationships and properties as they exist in nature, art, and other real world settings

C. Coordinate Geometry

1. Create geometric shapes with specified properties in the first quadrant on a coordinate grid.

2. Use coordinates in four quadrants to represent geometric concepts.

3. Use a coordinate grid to model and quantify transformations.

D. Units of Measurement

1. Select and use appropriate units to measure angles, area, surface area, and volume.

2. Use a scale to find a distance on a map or a length on a scale drawing.

3. Convert measurement units within a system, e.g. 3 feet = ___ inches.

4. Know approximate equivalents between standard and metric

5. Use measurements and estimates to describe and compare phenomena.

6. Solve problems requiring calculations that involve different units of measurement within a measurement system.

E. Measuring Geometric Objects

1. Use a protractor to measure angles.

2 Develop and apply strategies and formulas for finding perimeter and area.

- Triangle, square, rectangle, parallelogram, and trapezoid.
- Circumference and area of a circle

3. Develop and apply strategies and formulas for finding the surface area and volume of rectangular prisms and cylinders

4. Recognize that shapes with the same perimeter do not necessarily have the same area and vice versa.

5. Develop informal ways of approximating the measures of familiar objects (e.g., use a grid to approximate the area of the bottom of one's foot).

Grade: 5th Gifted and Talented Topic 4.3 Patterns and Algebra
Essential Questions: How can patterns help in problem solving?
How can symbols be used to help us in problem solving?
How does the study of algebra help us understand mathematical patterns as the patterns found in nature & the real world?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Patterns			
1. Recognize, describe, extend, and create patterns involving whole numbers, and rational numbers and integers	Everyday Mathematics Assessments 4,6 8 &9 Teacher made tests/quizzes White Boards Student sharing Exit Slips Mental Math	Modeling/Collaborative Activity Direct Instruction * collaborative learning * Written explanations Various puzzles Open Ended Tinkerplots SketchPad Everyday Math Game CMLs Menu of Problems Cuisenaire Rods Group Investigation	*Everyday Mathematics unit 3, 6, 8, 9;* *NCTM Addendum Grades 5-8, Patterns & Functions* *Van de Walle pg 417-435 Chap. 18-21 22-25;*
● Descriptions using tables, verbal and symbolic rules, expressions, simple equations or graphs.		Journaling Groundworks Hands on Algebra Do Nows	*In the Balance*, Creative Publications (Grades 4-6) *Problem Parade* *About Teaching Mathematics,* M. Burns, pages 112-124; *Hands On Algebra Book III*
● Finite and infinite sequences ● Formal iterative formulas ● Recursive patterns, including Pascal's Triangle and the Fibonacci Sequence: 1, 1, 2, 3, 5, 8			
● Generating sequences by using calculators to repeatedly apply a formula			
B. Functions and Relationships			

1. Describe the general behavior of functions given by formulas or verbal rules

- Graph Functions

C. Modeling

1. Use patterns, relations, and linear functions to model situations.

- Using variables to represent unknown quantities

- Using concrete materials (manipulatives), tables, graphs, verbal rules, algebraic expressions/equations/inequalities

2. Draw freehand sketches of graphs that model real phenomena and use such graphs to predict and interpret graphs

- Using concrete materials (manipulatives), tables, graphs, verbal rules, algebraic expressions/equations/inequalities

- Changes over time
- Relations between quantities
- Rates of change

D. Procedures

1. Solve simple equations with manipulatives and informally.

- Whole number coefficients only, answers also whole numbers.

- Variables on one or both sides of equation

2. Understand and apply the properties of operations and numbers

- Distributive property
- The product of a number and its reciprocal is 1

3. Evaluate numerical expressions

4. Extend understanding and the use of inequality.
- Symbols (^{3}, ^{1}, £)

5. Create evaluate and simplify algebraic expressions involving variables

- Order of operations
- Substitution of a number for a variable.

6. Understand and apply the properties of operations, number equations and inequalities

- Additive inverse
- Multiplicative inverse

Grade: 5th Gifted and Talented Topic 4.4 Data Analysis, Probability, and Discrete Mathematic6
Essential Questions: How can classifying help me in organizing data to solve problems?
How can statistics help us to understand real world situations?
How can the study of real world data help us understand and make accurate predictions?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Data Analysis			
1 .Collect, generate, organize, and display data. ● Data generated from surveys	Graph display Everyday Mathematics Assessments 1 & 7 Teacher made tests/quizzes White Boards Student sharing Exit Slips Mental Math Class Sharing Teacher Observation	Modeling/Collaborative Activity Direct Instruction * collaborative learning * Written explanations Various puzzles Open Ended Tinkerplots SketchPad Everyday Math Game CM Ls Menu of Problems Snap Cubes Group Investigation	*Everyday Mathematics* units 1 & 7 *Van de Walle* *Used Numbers, Dale Seymour Publications (1992);Navigations through Probability* *Math by All Means,* Marilyn Burns *NCTM Illuminations;* *Problem Parade*
2. Read, interpret, select, construct, analyze, generate questions about, and draw inferences from displays of data.		Journaling Groundworks Partner work/ Disease Z Do Nows Partner work/ "Tiles in the Bag" Spinner Puzzles; Shake-n-Spill Pascals Triangle	Discrete Math packet
● Bar graph, line graph, circle graph, table, histogram		Shop-Rite Problem Game of Pig	
●Range, median, and mean			

● Calculators and computers used to record and process information

3. Respond to questions about data, generate their own questions and hypotheses, and formulate strategies for answering their questions and testing their hypotheses.

B. Probability

1. Determine probabilities of events.

● Event, complementary event, probability of an event

● Multiplication rule for probabilities

● Probability of certain event is 1 and of impossible event is 0

● Probabilities of event and complementary event add up to 1.

2. Determine probability using intuitive, experimental, and theoretical methods (e.g., using model of picking items of different colors from a bag.

● Given numbers of various types of items in a bag, what is the probability that an item of one type will be picked

● Given data obtained experimentally, what is the likely distribution of items in the bag.

3. Explore compound events.

4. Model situations involving probability using simulations (with spinners, dice) and theoretical models.

5. Recognize and understand the connections among the concepts of independent outcomes, picking at random, and fairness.

6. Interpret probabilities as ratios, percents, and decimals

7. Play and analyze probability-based games, and discuss the concepts of fairness and expected value.

C. Discrete Mathematics-Systematic Listing and Counting

1. Solve counting problems and justify that all possibilities have been enumerated without duplication.

- ●Organized lists, charts, tree diagrams, tables
- ●Venn Diagrams

2. Apply the multiplication principle of counting.

- ● Simple situations (e.g., you can make 3x4 = 12 outfits using 3 shirts and 4 skirts).

- ● Number of ways a specified number of items can be arranged in order (concept of permutation)

- ● Number of ways of selecting a slate of officers from a class

3.List the possible combinations of two elements chosen from a given set (e.g., forming a committee of two from a group of 12 students, finding how many handshakes there will be among ten people if everyone shakes each other person's hand once).

4. Explore counting problems involving Venn diagrams with two attributes

5. Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.

D. Discrete Mathematics - Vertex - Edge - Graphs and Algorithms

1. Devise strategies for winning simple games and express those strategies as sets of diagrams.

2. Analyze vertex-edge graphs and tree diagrams.
   - Can a picture or a vertex-edge graph be drawn with a single line? (degree of vertex)
   - Can you get from any vertex to any other vertex? (connectedness)

3. Use vertex-edge graphs to find solutions to practical problems.
   - Delivery route that stops at specified sites but involves less travel
   - Shortest route from one site on a map to another.

Grade: 5 Gifted and Talented **Topic 4.5 Mathematical Processes**

Big Idea: Mathematical understandings are an essential part of our lives in and out of school and as such all children need to have an instinctive sense of mathematical resources that they can rely on to help them progress through life.

Essential Questions: How will learning to "think" mathematically enable us to make a life, make a living, and make a difference? How does the use of technology enable us to have a deeper understanding of mathematics?

Knowledge/Skills/Understandings	Assessments	Learning Experiences	Resources
A. Problem Solving			
1. Learn mathematics through problem solving	Exit slips Teacher observation with feedback Mental Math Reflexes Estimation Making Conjectures Showing use of efficient math strategies Effective use of technology	Various open-ended questions Monthly CM L's Monthly menu problems Portfolio evaluation Various activities Sharing problem-solving strategies	CMLs *Exemplars* *Teaching Children Mathematics, NCTM* -Menu of Problems KSK attachments # 17a & 17b Van de Walle
2. Solve problems that arise in mathematics and in other contexts		Journaling; reflexive writing; class discussions Division with Fractions attachment #18 "Fat Content in Foods" "Golden Ratio"	

inquiry and discovery

Math Curse
Sir Circumference

Everyday Mathematics, Unit 8 Lesson 5
Everyday Mathematics, Unit 8 Lesson 1 2
Everyday Mathematics, embedded throughout
Hands-On Algebra, Book III
Everyday Mathematics, Unit 4 Lesson 10
About Teaching Mathematics, M. Burns, pages 102 and 105

● Open ended problems	Group discussion; Examining & use student Reference Book Strategy Share Student Discourse	NCTM illuminations grades 6-8 NCTM illuminations; *Navigations through Geometry* *Geometer's Sketch Pad* *Tinkerplots* Game of Set
● Non-routine problems	Partner work; Journal pages; "Graphing Garbage" King Arthur Problem; Prison Problem	*Get-it-Together* Family Math Book *Kagan Cooperative Learning Activities* Super Source
● Problems with multiple solutions ● Problems that can be solved in several ways		
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.		
4. Pose problems of various types and levels of difficulty		
5. Monitor their progress and reflect on the process of their problem solving activity		
B. Communication		
1. Use communication to organize and clarify their mathematical thinking		
● Reading and writing ● Discussion, listening and questioning		
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.		

3. Analyze and evaluate the mathematical thinking and strategies of others.

4. Use the language of mathematics to express mathematical ideas precisely.

C. Connections

1. Recognize recurring themes across mathematical domains (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).

2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).

3. Recognize that mathematics is used in a variety of contexts outside of mathematics.

4. Apply mathematics in practical situations and in other disciplines.

5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).

6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

;

D. Reasoning

1. Recognize that mathematical facts, procedures, and claims must be justified.

2.Use reasoning to support their mathematical conclusions and problem solutions.

3. Select and use various types of reasoning and methods of proof.

4. Rely on reasoning, rather than answer keys, teachers, or peers, the check the correctness of their problem solutions.

5. Make and investigate mathematical conjectures.

- Counterexamples as a means of displaying conjectures
- Verifying conjectures using informal reasoning or proofs.

6. Evaluate examples of mathematical reasoning and determine whether they are valid.

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas.

- Concrete representations (e.g., base-ten blocks or algebra tiles)

● Pictorial representations (e.g., diagrams, charts, or tables)

● Symbolic representations (e.g., a formula)

● Graphical representations (e.g., a line graph)

2. Select, apply, and translate among mathematical representations to solve problems

3. Use representations to model and interpret physical, social, and mathematical phenomena.

F. Technology

1. Use technology to gather, analyze, and communicate mathematical information.

2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cf. workplace readiness standard 8.4-D).

3. Use graphing calculators and computer software to investigate properties of functions and their graphs.

4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).

5. Use computer software to make and verify conjectures about geometric objects.

6. Use computer-bases laboratory technology for mathematical applications in the sciences (cf. science standards).

CORE MATERIALS
Kindergarten

*Everyday Kindergarten Math – 3rd edition

* Developing Number Concepts: Counting, Comparing and Patterns
by Kathy Richardson

- MANIPULATIVES
- Pattern Blocks and templates
- Geoboards and rubberbands
- Unfix cubes
- Attribute Blocks
- Blank Dice; Dot Dice; Number Dice
- Large Foam Dice: Numerals and Dots
- Dominoes (double-six)
- Centimeter Cubes
- Interlocking Cubes
- Number Lines – Growing Number Line - Walk on Number Line (0-20)
- 100 Number Grid
- Number Card Decks
- Pan Balance
- Collection of Real or Play Coins
- Coin Cubes
- Standard measuring devices – ruler, yardstick, tape measure, etc.
- Thermometer for classroom
- Counters
- Craft Sticks
- Items for sorting... .buttons, beads, toy animals, etc.
- Judy Clock
- Student Calculators
Water, sand or dry bean “table”

Flemington-Raritan School District

SUPPLEMENTAL MATERIALS- Kindergarten

1. NUMBER AND NUMERICAL OPERATIONS

First Big Book of Numbers
Second Big Book of Numbers
Publisher: Rigby Education ISBN 0731200187

BOOM – game to review number names
Write numbers from 1-20 on index cards. Write 3 cards with the word BOOM. Shuffle cards. Have students line up in a line. Go down the line and show the cards. If the student identifies the number correctly they stay up. If the student identifies the number incorrectly or gets a BOOM cad they sit out. The last student standing wins the game.

TEN FRAME – activity to review number sense (1-10)
Students are given a card with ten boxes on it. Five on one side, and five on the other side. Students are given a stack of 10 Unifix cubes. On the overhead the teacher shows a number set. The students look at it for 2-4 seconds. The teacher turns off the light and students reproduce the set they saw. Discuss how they knew how many were in the set. Start out with small sets of numbers and build up to 10.

NUMBER BINGO – game to review number names – School Specialty

Emily's First 100 Days of School – Rosemary Wells
Read a page (number) a day until you reach he 100th day of school

"The Counting Song"; "The Counting Cadence"
Feldman, Jean*, Kiss Your Brain.* New York: Scholastic

"Money Song"
Feldman, Jean. *Best of Dr. Jean: Science and Math*. New York: Scholastic

2. GEOMETRY AND MEASUREMENT

Go Away Big Green Monster – Ed Emberley
Review shapes. Have students create their own green monster using Construction paper shapes and glue.

DIFFERENTIATION/SPECIAL EDUCATION

*NUMBER WORLD (Project Achieve)
*SINGAPORE MATH
*PINPOINT (Intervention)

Flemington-Raritan School District

Mathematics Curriculum

6th Grade Supplemental Resources

Title of Resource	Author(s)	Publisher	Copyright
Everyday Mathematics Book 6 – Third Edition	Bell, Bretzlauf, Dillard, Hartfield, Isaacs, McBride, McCarty, Pitvorec,Saecker, Balfanz, Carroll	Wright Group	2007
Algebra With Pizzazz	Steve Marcy, Janis Marcy	McGraw Hill	2002
Teaching Student Centered Math Grades 5-8 , Vol 3	John Van DeWalle, LoAnn Lovin	Pearson Education	2006
Connected Mathematics - Prime Time	Lappan, Fey, Fitzgeral, Friel, Phillips	Prentice Hall	2002
Pre-Algebra With Pizzazz	Steve Marcy, Janis Marcy	McGraw Hill	2002
Middle School Math with Pizzazz- Books A-E	Steve Marcy, Janis Marcy	McGraw Hill	2002
New Jersey ASK Coach	Jerome Kaplan Ed.D	Triumph Learning	2005
Question Quest Level B	Paul Lawrence	LL Teach, Inc.	2002
Groundworks Series: Data and Probability, Geometry, Numbers, Algebraic Thinking	Findell, Greenes, Irvin, Tsankova	Wright Group	2006
TinkerPlots	Clifforf Konold , Craig D. MIller	Key Curriculum Press	2005
8 Step Model Drawing	Bob Hogan, Char Forsten	Crystal Spring Books	2007
Primary Mathematics- Challenging Word Problems Grade5 and Grade 6	Joseph D. Lee	EPB Pan Pacific	2006
Elementary and Middle School Mathematics 5th Edition	John A. Van DeWalle	Pearson Education	2004
Geometer's Sketchpad 4.07	Nicholas Jackiw	Key Curriculum Press	2006
Explain It!	Lepore, Fleetwood, Hall	Creative Publications	2001
Get It Together- Math Problems for Groups Grades 4-12	Tim Erickson	Lawrence Hall of Science	1989

6th Grade Supplemental Resources (continued)

United We Solve- Math Problems for Groups Grades 5-10	Tim Erickson	Eeps	1996
Brain Pop Subscription	www.brainpop.com		

6th Grade Algebra 1A Supplemental Resources

Title of Resource	Author(s)	Publisher	Copyright
Discovering Algebra An Investigative Approach	Jerald Murdock, Ellen Kamischkle, Eric Kamischke	Key Curriculum Press	2002
Algebra With Pizzazz	Steve Marcy, Janis Marcy	McGraw Hill	2002
What Do You Expect?	Lappan, Fey, Fitzgeral, Friel, Phillips	Dale Seymour Publications	1998
Pre-Algebra With Pizzazz	Steve Marcy, Janis Marcy	McGraw Hill	2002
Middle School Math with Pizzazz- Books A-E	Steve Marcy, Janis Marcy	McGraw Hill	2002
New Jersey ASK Coach	Jerome Kaplan Ed.D	Triumph Learning	2005
Question Quest Level B	Paul Lawrence	LL Teach, Inc.	2002
Groundworks Series: Data and Probability, Geometry, Numbers, Algebraic Thinking	Findell, Greenes, Irvin, Tsankova	Wright Group	2006
TinkerPlots	Clifforf Konold , Craig D. MIller	Key Curriculum Press	2005
8 Step Model Drawing	Bob Hogan, Char Forsten	Crystal Spring Books	2007
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Flemington-Raritan School District

Mathematics Curriculum

Addendum to K-2 Math Curriculum

Alignment to Common Core Standards in Mathematics

The following grade level addendums describe the areas in need of greater focus as defined by the Common Core Standards for Mathematics for each grade level. A description of what students will do to demonstrate understanding is given.

Kindergarten Addendum to Curriculum

Counting & Cardinality

Children will:

- (old 4.1#1) count forward beginning from a given number within the known sequence (instead of having to begin at 1)
- (old 4.1#2) write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).
- (old 4.1#1) understand that the number of objects is the same regardless of their arrangement of the order in which they were counted.
- understand that each successive number name refers to a quantity that is one larger.

Comparing Numbers

Children will:

- (old 4.1#5) have opportunities to determine which group contains the most or least objects.
- Display written numerals from 1 to 10.

Operations & Algebraic Thinking

Children will:

- (old 4.1 B #1) represent addition and subtraction with mental images, drawings, verbal explanations, expressions, or equations.
- solve addition and subtraction word problems, add and subtract within 10, e.g., by using objects or drawings to represent the problem.
- (old 4.1 B #3) decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 1 + 4)
- for any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
- fluently add and subtract within 5.

Classify Objects and Count the Number of Objects in Each Category

Children will:

- (old 4.4#2) classify objects into given categories; count the numbers of objects in each category and sort the categories by count (limiting the category counts to be less than or equal to 10)

Geometry

Children will:

- (old 4.2#2) compose simple shapes to form larger shapes. For example, “Can you join these two triangles with full sides touching to make a rectangle?”

Grade 1 Addendum to Curriculum

Operations and Algebraic Thinking 1.OA

A. *Represent* and *solve* addition and subtraction problems:

- **1.OA.1.** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
- **1.OA.2.** Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

B. Work with addition and subtraction equations.

- **1.OA.7.** Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*
- **1.OA.8.** Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = □ – 3, 6 + 6 = □*

C. Extend the counting sequence.

- **1.NBT.1**. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.

D. Use place value understanding and properties of operations to add and subtract.

- **1.NBT.4.** Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
- **1.NBT.5.** Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
- **1.NBT.6.** Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), **using concrete models** or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Measurement and Data 1.MD

A. Measure lengths indirectly and by iterating length units.

- **1.MD.1**. Order three objects by length; compare the lengths of two objects indirectly by using a third object.

B. Tell and write time.

- **1.MD.3.** Tell and write time in **hours and half-hours** using analog and digital clocks.

Geometry 1.G

A. Reason with shapes and their attributes.

- **1.G.1.** Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
- **1.G.2.** Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. **[***Students do not need to learn formal names such as "right rectangular prism." (Footnote to Common Core State Standards)***]**
- **1.G.3.** Partition circles and rectangles into two and four equal shares, describe the shares using the words ***halves*****, *fourths*****, and *quarters***, and use the phrases ***half of*****, *fourth of*****, and *quarter of***. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Grade 2 Addendum to Curriculum

Operations and Algebraic Thinking 2.OA

A. Represent and solve problems involving addition and subtraction.

- **2.OA.1.** Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with **unknowns in all positions***,* e.g., by using drawings and equations with a symbol for the unknown number to represent the problem*.*

B. Work with equal groups of objects to gain foundations for multiplication

- **2.OA.3.** Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
- **2.OA.4.** Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Number and Operations in Base Ten 2.NBT

A. 2.NBT.1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.

B. 2.NBT.3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

C. 2.NBT.4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

D. 2.NBT.6. Add up to four two-digit numbers using strategies based on place value and properties of operations.

E. 2.NBT.7. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

F. 2.NBT.9. Explain why addition and subtraction strategies work, using place value and the properties of operations. [*Explanations may be supported by drawings or objects.*]

Measurement and Data 2.MD

A. **2.MD.1.** Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. (Less emphasis on capacity)
B. **2.MD.5.** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
C. **2.MD.6.** Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.
D. **2.MD.7.** Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. (Omit Project #8)
E. **2.MD.8.** Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and χ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*
F. **2.MD.9.** Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

** Remove all probability, discrete math and venn diagrams – moved to upper grades

Geometry 2.G

A. **2.G.1.** Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. [*Sizes are compared directly or visually, not compared by measuring.*] Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. (Cubes are the only 3-D shape discussed)
B. Perimeter is postponed to grade 3 but KEEP area and multiplication model
C. **2.G.3.** Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves*, *thirds*, *half of*, *a third of*, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Geometry is used to show multiplication and fractions; ie. The number of rows and columns (area), and fraction of whole.

Flemington-Raritan Regional School District
Flemington, New Jersey

K-6
Mathematics Curriculum Addendum

Gregory Nolan, Superintendent
Daniel Bland, Assistant Superintendent
Sandra Pollock, Mathematics Supervisor
Linda Alsop
Karen Amundsen
Beth Casal
Kristin DeLorenzo
Debbie Ricard
Carri Strunk
Michele Tonge

Council of Instruction Review — Date: May 9, 2012
BOE Curriculum Committee Review — Date: June 7, 2012
Board of Education Approval — Date: June 18, 2012

Alignment to Common Core Standards in Mathematics

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Children will:

- (old 4.1#1) count forward beginning from a given number within the known sequence (instead of having to begin at 1)
- (old 4.1#2) write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).
- (old 4.1#1) understand that the number of objects is the same regardless of their arrangement of the order in which they were counted.
- understand that each successive number name refers to a quantity that is one larger.

Comparing Numbers

Children will:

- (old 4.1#5) have opportunities to determine which group contains the most or least objects.
- Display written numerals from 1 to 10.

Operations & Algebraic Thinking

Children will:

- (old 4.1 B #1) represent addition and subtraction with mental images, drawings, verbal explanations, expressions, or equations.
- solve addition and subtraction word problems, add and subtract within 10, e.g., by using objects or drawings to represent the problem.
- (old 4.1 B #3) decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 1 + 4)
- for any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
- fluently add and subtract within 5.

Classify Objects and Count the Number of Objects in Each Category

Children will:

- (old 4.4#2) classify objects into given categories; count the numbers of objects in each category and sort the categories by count (limiting the category counts to be less than or equal to 10)

Geometry

Children will:

- (old 4.2#2) compose simple shapes to form larger shapes. For example, “Can you join these two triangles with full sides touching to make a rectangle?”

Grade 1 Addendum to Curriculum

Operations and Algebraic Thinking 1.OA

A. *Represent* and *solve* addition and subtraction problems:

1.OA.1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

1.OA.2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

B. Work with addition and subtraction equations.

1.OA.7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*

1.OA.8. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = □ – 3, 6 + 6 = □*

C. Extend the counting sequence.

1.NBT.1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.

D. Use place value understanding and properties of operations to add and subtract.

1.NBT.4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

1.NBT.5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

1.NBT.6. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), **using concrete models** or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Measurement and Data 1.MD

A. Measure lengths indirectly and by iterating length units.

1.MD.1. Order three objects by length; compare the lengths of two objects indirectly by using a third object.

B. Tell and write time.

1.MD.3. Tell and write time in **hours and half-hours** using analog and digital clocks.

Geometry 1.G

A. Reason with shapes and their attributes.

1.G.1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.

1.G.2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. **[***Students do not need to learn formal names such as "right rectangular prism." (Footnote to Common Core State Standards)***]**

1.G.3. Partition circles and rectangles into two and four equal shares, describe the shares using the words ***halves*****, *fourths*****, and *quarters***, and use the phrases ***half of*****, *fourth of*****, and *quarter of***. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Grade 2 Addendum to Curriculum

Operations and Algebraic Thinking 2.OA

A. Represent and solve problems involving addition and subtraction.

2.OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with **unknowns in all positions***,* e.g., by using drawings and equations with a symbol for the unknown number to represent the problem*.*

B. Work with equal groups of objects to gain foundations for multiplication

2.OA.3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

2.OA.4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Number and Operations in Base Ten 2.NBT

A. Understand place value

2.NBT.1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.

2.NBT.3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

2.NBT.4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

B. Use place value understanding and properties of operations to add and subtract.

2.NBT.6. Add up to four two-digit numbers using strategies based on place value and properties of operations.

2.NBT.7. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

2.NBT.9. Explain why addition and subtraction strategies work, using place value and the properties of operations. [*Explanations may be supported by drawings or objects.*]

Measurement and Data 2.MD

A. Measure and estimate lengths in standard units.

2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. (Less emphasis on capacity)

B. Relate addition and subtraction to length

2.MD.5. Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD.6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.

C. Work with time and money

2.MD.7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. (Omit Project #8)

2.MD.8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and χ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

D. Represent and interpret data.

2.MD.9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

** De-emphasize probability, discrete math and venn diagrams – moved to upper grades

Geometry 2.G

A. Reason with shapes and their attributes

2.G.1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. [*Sizes are compared directly or visually, not compared by measuring.*] Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. (Cubes are the only 3-D shape discussed)

Perimeter is postponed to grade 3 but KEEP area and multiplication model

2.G.3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves*, *thirds*, *half of*, *a third*

of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Geometry is used to show multiplication and fractions; ie. The number of rows and columns (area), and fraction of whole.

Grade 3 Addendum to Curriculum

Numbers and Operations in Base Ten 3.NBT

A. Use place value understanding and properties of operations to perform multi-digit arithmetic.

3.NBT.3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using

Number and Operations- Fractions 3.NF

A. Develop understanding of fractions as numbers.

3.NF.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.

b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.

3.NF.3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

Measurement and Data 3.MD

Telling time to the nearest minute has moved from 2nd grade to 3rd grade.

A. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

3.MD.1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

3.MD.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).1 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. **More emphasis is placed on metric measurement.**

3.MD.4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.

B. Represent and interpret data.

3.MD.3. Draw a scaled picture graph and a scaled bar graph to represent a
data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in*
the bar graph might represent 5 pets.

C. Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

3.MD.7. Relate area to the operations of multiplication and addition.

c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.

De-emphasize formal lessons on lines of symmetry, transformations, probability, discrete math (tree diagrams, combinations)

Grade 4 Addendum to Curriculum

Operations and Algebraic Thinking 4.OA

A. Use the four operations with whole numbers to solve problems.

4.0A2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

4.0A.3. Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

B. Gain familiarity with factors and multiples

4.0A.4. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Number and Operations—Fractions 4.NF

A. Extend understanding of fraction equivalence and ordering.

4.NF.1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

B. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

4.NF.3. Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*

c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or

by using properties of operations and the relationship between addition and subtraction.

d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

4.NF4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

a. Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*

b. Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*

c. Solve word problems involving multiplication of a fraction by a whole number, e.g.,by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

Measurement and Data 4.MD

A. Solve problems involving measurement and conversion of measurement from a larger unit to a smaller unit.

4.MD.2 Use the four operations to solve word problems involving distances,intervals of time, liquid volumes, masses of objects, and money,including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

B. Geometric measurement: understand concepts of angle and measure angles.

4.MD.7. Recognize angle measure as additive. When an angle is decomposed
into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

De-emphasize formal lessons on lines of symmetry, transformations, probability, discrete math (tree diagrams, combinations)

Grade 5 Addendum to Curriculum

Operations and Algebraic Thinking 5.OA

A. Write and interpret numerical expressions.

5.OA.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Number and Operations in Base Ten 5.NBT

A. Understand the place value system.

5.NBT.1. Recognize that in a multi-digit number, a digit in one place represents
10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

5.NBT.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

B. Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.5. Fluently multiply multi-digit whole numbers using the standard algorithm.

5.NBT.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Number and Operations—Fractions 5.NF

A. Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) $\times$ 4 = 8/3, and create a story context for this equation. Do the same with (2/3) $\times$ (4/5) = 8/15. (In general, (a/b) $\times$ (c/d) = ac/bd.)*

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

5.NF.5. Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]

([1]Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.)

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*

b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*

c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

Measurement and Data 5.MD

A. Represent and interpret data.

2.MD.2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

B. Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

5.MD.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

5.MD.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with wholenumber edge lengths in the context of solving real world and mathematical problems.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Geometry 5.G

A. Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second

number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

B. Classify two-dimensional figures into categories based on their properties.

5.G.3. Understand that attributes belonging to a category of two dimensional figures also belong to all subcategories of that category.
For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

Grade 6 Addendum to Curriculum

Ratios and Proportional Relationships 6.RP

A. Understand ratio concepts and use ratio reasoning to solve problems.

6.RP.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

6.RP.2. Understand the concept of a unit rate *a*/*b* associated with a ratio *a:b* with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*1

6.RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

The Number System 6.NS

A. Compute fluently with multi-digit numbers and find common factors and multiples.

6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.

B. Apply and extend previous understandings of numbers to the system of rational numbers.

6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

6.NS.7. Understand ordering and absolute value of rational numbers.

c. Understand the absolute value of a rational number as its distance

from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.*

d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*

6.NS.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Expressions and Equations 6.EE

A. Apply and extend previous understandings of arithmetic to algebraic expressions.

6.EE.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

Statistics and Probability 6.SP

A. Develop understanding of statistical variability.

6.SP.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*

6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

6.SP.5. Summarize numerical data sets in relation to their context, such as by:

b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.