Grade 3

CONTENTS

The Learner at This Level

THE THIRD-GRADE CHILD:

- Is full of energy and imagination, which need to be given direction and focus.
- Learns best when work is designed in bite-size pieces.
- Needs to experience "incremental success" in schoolwork, in gradually increasing quantities and levels of complexity, to remain motivated.
- Enjoys working cooperatively and is most productive in groups.
- Needs lots of physical activity.
- Has a rapidly expanding vocabulary.

Source: *Yardsticks; Children in the Classroom Ages 4-14* by Chip Woods Pages 83-92

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

- Develops varied representations for a single quantity.
- Looks for patterns in numbers and operations to facilitate estimation.
- Solves problems using patterns.
- Generates "If . . . then . . ." statements to formulate rules.

NUMERICAL AND PROPORTIONAL REASONING

- Understands that some ways of representing a problem are more helpful than others are.
- Explores, applies and shares a variety of computational strategies.
- Uses all four operations in problem solving, through models, arrays partitioning and fair shares.
- Links concrete models to written algorithms.
- Efficiently uses basic addition and subtraction facts.
- Develops fraction number sense through measuring, weighing, comparing models, and some paper and pencil tasks.

GEOMETRY AND MEASUREMENT

- Uses models and drawings to compare geometric figures and relationships.
- Identifies the attributes of two- and three-dimensional shapes.
- Uses nonstandard measures and standard measurement instruments.
- Uses benchmarks to make estimates in measurement.

WORKING WITH DATA: PROBABILITY AND STATISTICS

- Uses a variety of methods to collect and record data, including measuring devices, printed resources and tallies.
- Identifies and extends patterns and sequences in charts, graphs and tables.
- Discusses data, communicates conclusions and makes predictions and inferences.
- Interprets data by connecting it to prior knowledge.
- Generates new questions from displayed data.

Mathematics Background for Teachers

MATHEMATICS BACKGROUND FOR GRADE 3 TEACHERS

> ## ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS
>
> **Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies.**

Central Understanding: Relationships can be generalized and represented through rules.

Background: Relationships are illustrated by different representations such as language, tables or equations. The understanding of relationships relies on a strong foundation of numeric and geometric concepts. Language allows us to formalize these relationships. The exploration of patterns that are also functions, allows for flexible and fluent thinking and the formation of rules about numbers, quantities and relationships. Work with functions begins with meaningful situations within a context and uses proficiency with arithmetic to explore patterns and build generalizations.

> ## NUMERICAL AND PROPORTIONAL REASONING
>
> **Quantitative relationships can be expressed numerically in multiple ways in order to make connections and simplify calculations using a variety of strategies, tools and technologies.**

Central Understanding: Relationships between numbers and operations are discovered and learned in contextual situations

Background: The inquisitive nature of children fosters the development of different strategies for performing operations. Children initially solve multiplication and division problems by directly modeling the action and relations in the problems. The change to more efficient ways for solving these problems develops as children see the connections between different operations. Common algorithms are useful but do not demonstrate math concepts clearly. Estimation is a strategy, not a wild guess, which demonstrates a deeper understanding of the concepts of number and operations. Numerous experiences with multiple representations lead to the ability to make generalizations about number and operations and to a deeper knowledge of mathematical ideas.

MATHEMATICS BACKGROUND FOR GRADE 3 TEACHERS

GEOMETRY AND MEASUREMENT

Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies.

Central Understanding: Objects and geometric shapes and figures can be described and categorized based upon measurement and classification of specific attributes.

Background: Children at this age are usually firmly at Van Hiele Level 0 of geometric thought, and developing the capability to analyze shapes at Van Hiele Level 1. It is important to consider the child's level of geometric thought when examining geometric shapes and properties and investigating their position on space. Extensive opportunities to explore, construct and measure must be provided for all children. The ability to measure using standard tools will also be developed to a higher level of sophistication, given these opportunities.

WORKING WITH DATA: PROBABILITY AND STATISTICS

Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

Central Understanding: Decisions are made based upon relationships determined from data sets.

Background: Objects or data can be organized or categorized in collections or sets. Information about objects or sets of data can be represented and interpreted in different graphic ways. The method of representation used is governed by the type of information or data under consideration. Numbers or values that describe the characteristics of a selected group or population can be represented statistically. Generalizations, which support decision making, can be made from graphic and statistical representations.

Correlated Grade-Level Expectations

Click here to access correlated grade-level expectations for Grade 3 on the State Department of Education Web site.

Sequenced Grade-Level Expectations

GRADE 3 SEQUENCED GLES

Grade-Level Expectations	Fall	Winter	CMT	Spring
ALGEBRAIC REASONING				
1.1 Understand and describe patterns and functional relationships.				
1. Sort, classify and order a group of objects and numbers in more than one way and explain the reason or describe the rule used.				
2. Create and construct numerical and spatial patterns and sequences that repeat and grow.				
3. Analyze, describe and extend repeating and growing patterns and sequences, including those found in real-world contexts, by constructing and using tables, graphs and charts.				
1.2 Represent and analyze quantitative relationships in a variety of ways.				
4. Describe mathematical relationships and situations involving computation of whole numbers (addition, subtraction, multiplication and division) using words, symbols, open number sentences and equations e.g., $56 + \Delta = 100$ and $3 \times 5 = 9 + 6$.	Addition and subtraction			Multiplication and division
1.3 Use operations, properties and algebraic symbols to determine equivalence and solve problems.				
5. Demonstrate understanding of equivalence as a balanced relationship of quantities by using the equals sign to relate two quantities that are equivalent and the inequality symbols, $<$ and $>$, to relate two quantities that are not equivalent, e.g. $23 \times 5 > 23 \times 2$.				
6. Solve problems and demonstrate an understanding of equivalence using the equals sign in number sentences that reflect the commutative and associative properties of addition and multiplication of whole numbers, e.g. $3 \times 5 = 5 \times 3$.				
NUMERICAL AND PROPORTIONAL REASONING				
2.1 Understand that a variety of numerical representations can be used to describe quantitative relationships.				
1. Locate, label, compare, and order whole numbers up to 10,000 using place value models, number lines and number patterns (including multiples of 100 and 1000).				
2. Identify the number that is 100 and 1000 more or less than a given number up to 10,000 using place value models, pictures and number lines.				

Grade-Level Expectations	Fall	Winter	CMT	Spring
3. Round three- and four-digit numbers to the nearest hundred and thousand using place value models, number lines and number patterns.				
4. Represent three- and four-digit numbers up to 10,000 in expanded forms e.g., 5472 = (5x1000) + (4x100) + (7x10) + (2x1), and regrouped forms e.g., 5472 = (4x1000) + (14x100) + (6x10) + (12x1). Use the forms to support computational strategies.				
5. Represent fractions with like and unlike denominators of 2, 3, 4, 5, 6 and 8 using a variety of materials; label the fractional parts using words and fraction symbols.				
6. Locate, label and estimate fractions with like and unlike denominators of 2, 3, 4, 5, 6 and 8 by constructing and using models, pictures and number lines.				
7. Determine equivalence, compare and order fractions through the construction and use of models, pictures and number lines with like and unlike denominators of 2, 3, 4, 5, 6 and 8, including identifying a whole object or a whole set of objects as a fraction with the same numerator and denominator.				
8. Use models, number patterns and counting and grouping of objects, to find equal parts of a set of objects and identify amounts such as ⅔ of 12 is 8.				
9. Describe quantitative relationships using ratios and identify patterns with equivalent ratios such as 3 out of 6 crayons are red or 4 out of 8 crayons are red and are the same as 1 out of 2 crayons is red.				
2.2 Use numbers and their properties to compute flexibly and fluently and to reasonably estimate measures and quantities.				
10. Recall the multiplication and division facts for 1, 2, 3, 4, 5 and 10.				
11. Write multiplication and division story problems to match a given multiplication or division number sentence and vice versa; solve the problems and justify the solutions.				
12. Solve problems involving addition and subtraction of two- and three-digit whole numbers and money amounts up to $100.00 with and without regrouping, using a variety of strategies, including models.				
13. Create and solve addition and subtraction word problems by using place value patterns and algebraic properties (commutative and associative for addition).				

Grade-Level Expectations	Fall	Winter	CMT	Spring
14. Solve problems involving the multiplication and division of two- and three-digit numbers by one digit (2, 3, 4, 5 or 10) with models, arrays and pictures of sets.				
15. Determine when an estimate for a problem involving two- and three-digit numbers is appropriate or when an exact answer is needed.				
16. Use a variety of estimation strategies to determine and justify the reasonableness of an answer to a computation or word problem involving addition and subtraction of two- and three-digit whole numbers and money amounts up to $100.00.				
17. Determine when a strategy will result in an over estimate or an underestimate in problems involving two- and three-digit numbers.				
18. Determine and compare the value of sets of coins and write the values using decimal notation, e.g., two quarters = 50 cents or $0.50 (50 of 100 cents in a dollar) and is less than 2 quarters, 2 dimes and one nickel or $0.75.				
19. Determine, compare and write the value of money amounts up to $100.00 and identify equivalent ways to represent a given amount of money, including combinations of pennies, nickels, dimes, quarters and half dollars (e.g., $0.25 can be five nickels, two dimes and 1 nickel, or one quarter).				
GEOMETRY AND MEASUREMENT				
3.1 Use properties and characteristics of two- and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas and solve problems.				
1. Identify, describe, construct and draw two- dimensional shapes such as quadrilaterals (including parallelograms), pentagons, and hexagons.				
2. Identify, describe, construct and represent three-dimensional figures such as cubes, spheres, cylinders, cones, pyramids, prisms.				
3. Compare and classify polygons and solids and determine congruence by using attributes such as the number and length of sides, faces and edges, and the number and kinds of angles (acute, right and obtuse).				
3.2 Use spatial reasoning, location and geometric relationships to solve problems.				
4. Create two-dimensional figures with one or more lines of reflective symmetry.				

Grade-Level Expectations	Fall	Winter	CMT	Spring
5. Draw and interpret simple maps using shapes or pictures on a coordinate grid.				
6. Investigate ways to tile or tessellate a shape or region using a variety of polygons.				
3.3 Develop and apply units, systems, formulas and appropriate tools to estimate and measure.				
7. Use calendar and clocks to plan and sequence events and identify events and times as occurring in the a.m. and p.m.				
8. Solve problems involving telling time to the nearest quarter hour, five minutes and minute using analog and digital clocks.				
9. *Develop an understanding and describe the relationships between appropriate units of measure through concrete experiences (ounces and pounds; gram and kilograms; inches, feet and yards; meters and kilometers; cups, pints and quarts; and milliliters and liters).*				

10. Estimate and measure using nonstandard units and appropriate customary and metric tools and units:
  •   length and perimeter to the nearest ¼ inch or ½ centimeter,
  •   area in square inches or square centimeters,
  •   capacity in cups, pints, quarts, milliliters or liters,
  •   weight in ounces, pounds, and grams *[mass is weighed in grams]*
  •   temperature to the nearest degree, and
  •   volume using inch cubes and centimeter cubes.
	length	area		

11. Describe and use estimation strategies that can identify a reasonable answer to a measurement problem when an estimate is appropriate.				
WORKING WITH DATA				
4.1 Collect, organize and display data using appropriate statistical and graphical methods.				
1. Pose questions that can be used to guide data collection, organization, and representation.				
2. Collect and organize the data that answer the questions using diagrams, charts, tables, lists, pictographs, bar graphs and line plots.				

Grade-Level Expectations	Fall	Winter	CMT	Spring
4.2 Analyze data sets to form hypotheses and make predictions				
3. Analyze data that have been collected and organized, to draw and defend conclusions based on the data.				
4. Describe an event or element as typical based upon the range, median and mode of a set of data.				
4.3 Understand and apply basic concepts of probability				
5. Experiment to test predictions and determine probability in practical situations such as investigating the fairness of games using a variety of spinners and dice.				
6. Describe the probability of an outcome as ___ out of ___ (e.g., 3 out of 5).				
7. Investigate combinations using models.				

Correlated GOALS 2000 Criterion Referenced Test

GRADE 3 CORRELATED GOALS 2000 CRT

The Goals 2000 Mathematics Curriculum was written as a companion to the 1998 Mathematics Framework. The Goals 2000 resources cited in this 2008 Model for Mathematics Curriculum are aligned to the 2005 Mathematics Curriculum Framework, 2007 Curriculum Standards and the fourth generation Connecticut Mastery Test.

The Grade 3 Criterion Referenced Test Part A from the Goals 2000 Mathematics Curriculum is aligned to the Grade 3 sequenced GLEs and can be used for pre- and post-assessment.

Please use the link below to access the electronic version of the complete document, which includes other activities, such as opportunities for open-ended and challenge experiences that must be examined for alignment prior to use.

http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=321084

Grade 3 Mathematics CRT

Coding indicates related 2007 grade-level expectations

GLE 1.1.2 Complete the following pattern: 36 30 __   18 12 __

GLE 2.1.4 Which means the same as 700 + 4?

   a. 70,004

   b. 7,004

   c. 704

   d. 740

GLE 2.1.4 Which means the same as 680?
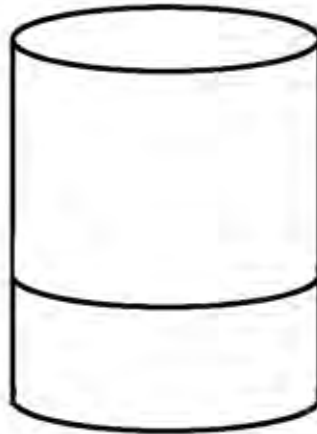
   a. 600 + 800

   b. 6 + 8 + 0

   c. 68 + 0

   d. 600 + 80

GLE 2.1.5 About how full is the glass?
  About:

  a. 1/2
  b. 3/4
  c. 1/4
  d. 4/1

GLE 2.1.3 Our library has 740 books on bats. This number is **CLOSEST** to:

  a. 800
  b. 600
  c. 700
  d. 500

GLE 2.2.17 Cathy and her friend sold 48 boxes of girl scout cookies. **ABOUT** how many boxes of cookies is that?

  a. A little more than 40
  b. A little less than 50
  c. A little more than 50
  d. A little less than 40

GLE 3.3.10 Measure each side of the shape to the nearest centimeter with your ruler. What is the perimeter of the shape? _____
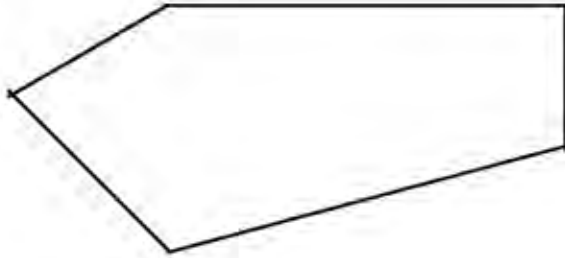
GLE 3.3.8 It is now 9:30. What time will it be in 2 hours?

a. 10:45

b. 11:30

c. 11:45

d. 12:00

GLE 3.3.8 Robert set his alarm clock so that he could wake up early. The alarm went off at the time shown on the clock. What time did the alarm ring?

a. 6:45

b. 5:45

c. 5:15

GLE 3.3.8 If your brother looked at the clock and said, "It's quarter to six, we're going to be late" What time would the clock show?

a. 5:45

b. 6:15

c. 6:45

d. 6:30

GLE 3.3.7 Mary overheard her cousin telling her mom she would come to visit on the second Monday in April. What date will that be?

a. April 18

b. April 11

c. April 19

d. April 25

APRIL						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

GLE 3.3.7 Use the above calendar. If your cousin arrives on the second Monday and stays 8 days, what is the date she will leave?

a. April 26

b. April 12

c. April 19

d. April 25

GLE 2.1.4 Which means the same as 395?

   a. 3 hundreds and 8 tens and 5 ones

   b. 3 hundreds and 7 tens and 5 ones

   c. 3 hundreds and 8 tens and 15 ones

   d. 3 hundreds and 5 tens and 15 ones

GLE 2.1.4 Which means the same as 6 tens and 16 ones?

   a. 616
   b. 6010
   c. 66
   d. 76

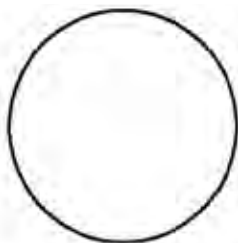**GLE 2.1.5** What fraction of the group of colored markers is shaded?

   a. 2/6
   b. 4/6
   c. 2/4
   d. 5/6

GLE 2.1.6 Shade in 1/4 of the circle.

GLE 2.1.6 Which picture shows 2/3 shaded?

a.

b.

c.

d.

GLE 4.3.5 The game which Jack and Tom are playing uses a spinner like the one shown below. Which number will be landed on **MOST** often during their game? Explain.

a. 1
b. 2
c. 3
d. 4

4

1

2

3
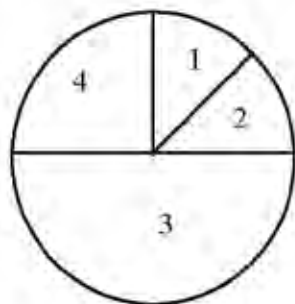
GLE 2.2.18 Connie bought her sister a sticker book. It cost $1.06. Here is what Connie got for change.

How much change did Connie get? _____

GLE 2.2.12 John's dad bought him 12 tickets at the school carnival. He wants to know how many rides he can go on. What does he need to know to find out how many rides he can go on?

GLE 3.3.9 What is a REASONABLE height for a kitchen table?

    a. 3 feet
    b. 3 inches
    c. 3 miles
    d. 3 yards

GLE 3.3.9 What is a REASONABLE weight of a student in Grade 4?

    a. 70 tons
    b. 70 ounces
    c. 70 pounds

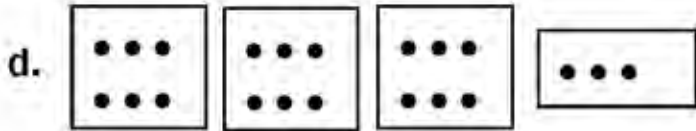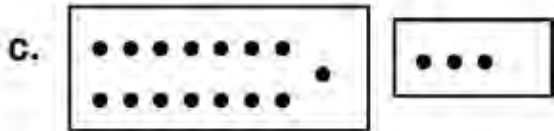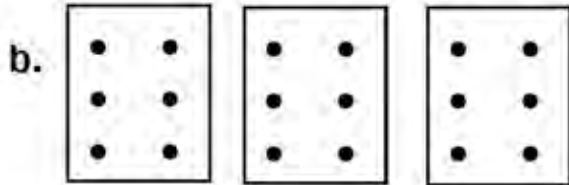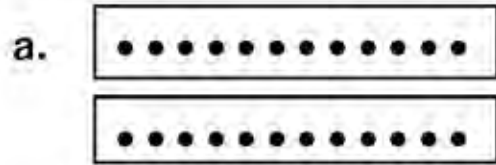**GLE 3.3.9 Which of the following would most likely be the length of a tube of toothpaste?**

    a. 5 inches
    b. 5 feet
    c. 20 inches
    d. 20 feet

GLE 3.3.9 What is a REASONABLE weight (or mass) of a small button?

    a. 2 kilograms
    b. 2 grams
    c. 2 liters
    d. 2 milliliters

GLE 2.2.11 Which picture goes with the number sentence 18 ÷ 3? Write a story problem to match.

a.
```
[• • • • • • • • • • • • • •]
[• • • • • • • • • • • • • •]
```

b.
```
[•  •]  [•  •]  [•  •]
[•  •]  [•  •]  [•  •]
[•  •]  [•  •]  [•  •]
```

c.
```
[• • • • • • •    ]   [• • •]
[  • • • • • • •  •]
```

d.
```
[• • •]  [• • •]  [• • •]   [• • •]
[• • •]  [• • •]  [• • •]
```

GLE 2.2.11 Which number sentence goes with this picture? Write a problem that can be solved using the picture.

a. 15 ÷ 3 =5
b. 5 x 3 = 15
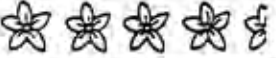c. 15 x 1 = 15
d. 3 + 5 = 8

GLE 2.2.11 Juan was getting ready to play a game using marbles. He has 24 marbles and wants to share them with his 3 friends. Which fact could he use to find how any marbles each friend will get?

a. 24 ÷ 4
b. 24 – 4
c. 4 ÷ 24
d. 4 x 24

GLE 4.2.3 Rodrigo and John made graphs of flowers they saw on their walk. Use the graph to answer the questions below.

FLOWERS JOHN SAW	
Daisy	✿ ✿ ✿ ✿
Rose	✿ ✿ ✿ ✿ ✿
Tulip	✿ ✿ ✿
Violet	✿ ✿ ✿ ✿ ⸙

Each ✿ stands for 4 flowers

GLE 4.2.3 How many tulips did John see?

a. 10 tulips
b. 3 tulips
c. 12 tulips
d. 4 tulips

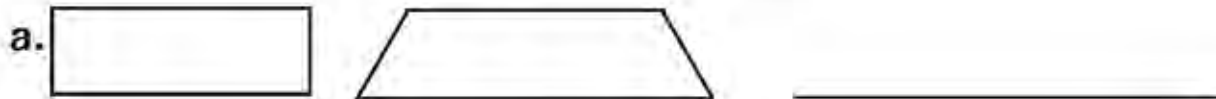**GLE 4.2.3** How many daisies did John see? Explain your reasoning.

a. 4
b. 5
c. 16
d. 10

GLE 3.2.4 Draw a line of symmetry through the rectangle.

GLE 3.1.1 Draw a 5 sided polygon.

GLE 3.1.3 How are the following shapes alike?

a. _____

b. _____

GLE 3.1.1 Which of these shapes are polygons? Explain how you know.
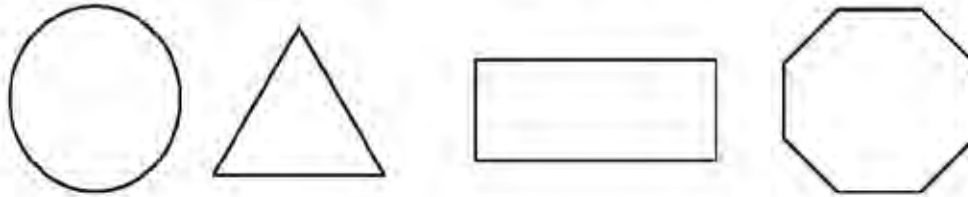
GLE 3.1.1 Draw the following.

a. a square _____

b. a trapezoid _____

c. a hexagon _____

GLE 1.1.2 What 2 shapes are next in this sequence? Write a sentence that explains how you decided what to draw.
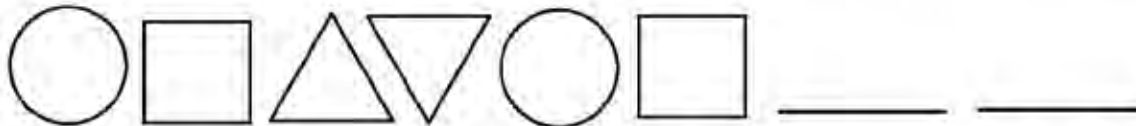
GLE 1.1.2 Fill in the table.

Golf balls	3	6	9	12
cost	$5	$10	$15	

GLE 4.3.5 Players drop counters onto this game board. A player scores a point each time a counter is completely inside the space with his or her letter.
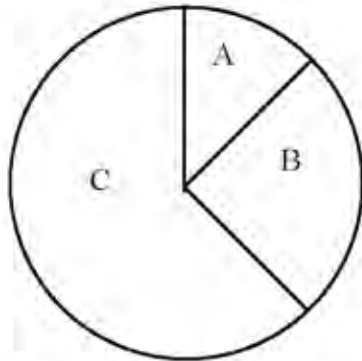
a. Is it a fair game? Explain. _____

_____

_____

b. Which player will probably have the highest score?

_____

_____

GLE 1.1.3 Which number belongs in the blank space?

Start	End
20	16
16	12
12	_____
8	4

What is the Rule? _____

GLE 2.2.16 Lisa bought 37 bananas and Mary bought 44 apples. About how many pieces of fruit did they buy together? Which number sentence gives the most REASONABLE estimate?

    a. 40 + 50
    b. 40 + 40
    c. 30 + 40
    d. 30 + 50

Explain why your answer is reasonable.

_____

_____

_____

GLE 2.2.12 Mr. Will Derness bought one first aid kit, one jackknife, and three flashlights. What was the total cost?

_____
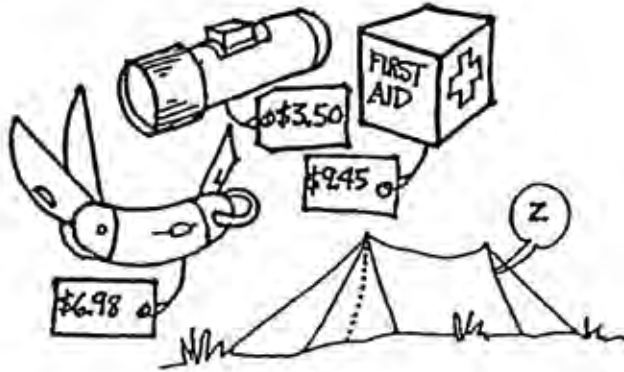
GLE 3.1.1 How many angles and sides does this figure have?

a. _____angles

b. _____sides

c. What name can we use to describe this shape?_____

GLE 3.1.1 Draw a polygon that has 4 sides. Make 2 sides longer than the other 2 sides.

GLE 2.2.15 Sarah has 83 basketball cards in her collection. About how many cards does she have? Which would be the best estimate and why?

    a. 85
    b. 95
    c. 80
    d. 90

GLE 3.3.7 An airplane that was due to land at 10:40 was 20 minutes late.

    What time did the plane land? _____

GLE 3.3.8 I drove my car from Maine to New York. I left at 10:00 a.m. I arrived in New York at 5:00 p.m.

    How many hours was I driving? _____

GLE 3.1.3
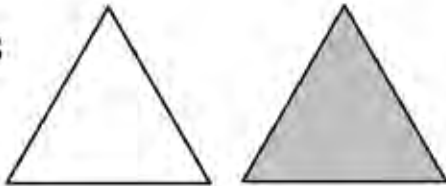
How are these two figures the same?

a. size and shape
b. size only
c. shape and coloring
d. shape only

GLE 3.3.10 If this paper clip is two inches long, ABOUT how long is the line?

GLE 4.3.2 Use the pictograph below to answer the question.
How many spectators were at Game 3?

a.

b. 8

c. 3

d. 24

e. 32

Number of spectators
at Kane Stadium

Game 1 ⚲⚲⚲⚲
Game 2 ⚲⚲⚲⚲⚲⚲
Game 3 ⚲⚲⚲
Game 4 ⚲
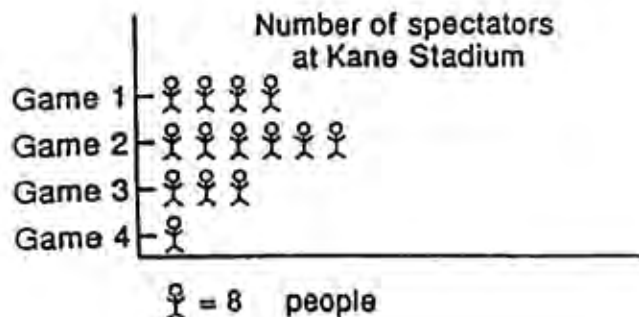
⚲ = 8   people

GLE 4.2.3 Use the table to answer this question: How many napkins will you need for 6 people?

PLANNING A PICNIC

Supplies	4 People	6 People	8 People
Bags of Chips	5	7	9
Cookies	8	12	16
Drinks	6	8	10
Napkins	7	9	11
Sandwiches	4	6	8

GLE 4.2.3 Use the graph to answer the questions below.

Students Running in the Relay Race
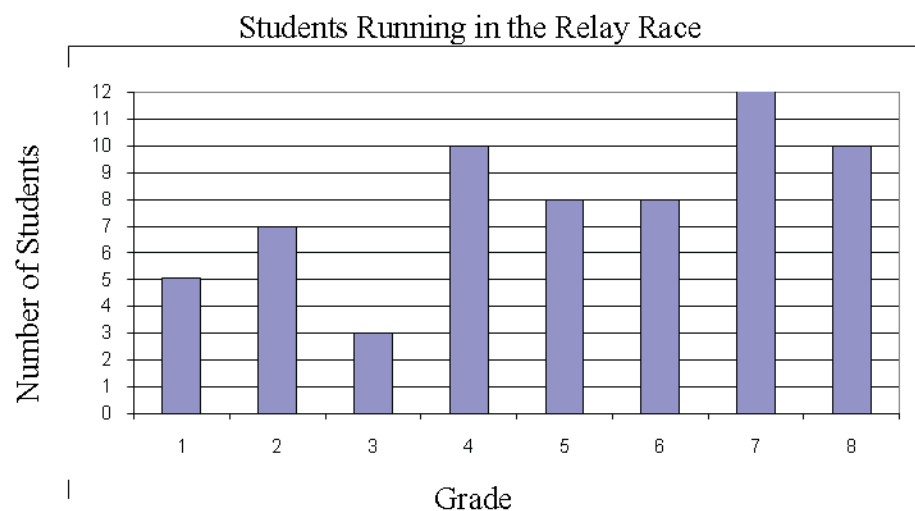
How many more sixth graders than third graders ran in the relay race?

_____

GLE 4.1.1 Write 2 more questions this graph could answer for you?

_____

_____

_____

GLE 3.3.10 Use your ruler to measure the toothpaste tube to the nearest inch.

_____

GLE 3.3.10 Measure the pen to the nearest centimeter.

_____

GLE 3.3.10 Use a ruler to draw a line 3 inches long.

GLE 3.3.10 Use a ruler to draw a line 9 centimeters long.

GLE 3.3.11 About how many shaded squares will fit in the shape?

_____

GLE 2.2.11 Write a story problem that could be solved using this number sentence: 5 x 6 = 30

GLE 2.2.11 Abel put his butterfly collection in the case shown. If each square holds 1 butterfly, which fact can be used to find the number of butterflies the case will hold when full?

a. 4 x 4 =

b. 4 ÷ 4 =

c. 4 − 4 =

d. 4 + 4 =

GLE 2.2.11 Write a division sentence for this picture. _____
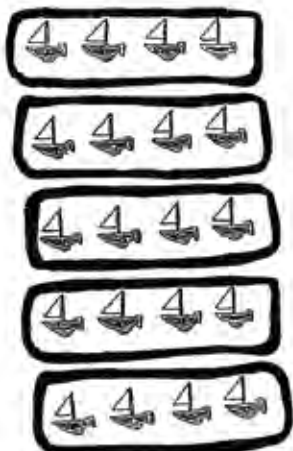
GLE 2.2.12 Joe rode his bicycle 28 miles one day. He rode 12 miles the next day. About how many more miles did ride the first day?

    a. 10
    b. 20
    c. 30
    d. 40

GLE 2.2.12 At the pet store, there are 15 kinds of fresh water fish, 26 kinds of salt water fish, and 18 kinds of birds. How many kinds of fish are there at the pet store? _____

GLE 2.2.16 Susan made $15.00 delivering newspapers. She spent $11.45 on a birthday present. ABOUT how much does she have left?

    a. A little more then $2.00
    b. A little more than $3.00
    c. A little less than $4.00
    d. A little less than $5.00

GLE 2.2.16 Cleo and Roger rented videotapes for $15.00 and spent $38.00 to buy cassette tapes. Which statement shows the most REASONABLE estimate for what they spent?

    a. $10 + $40
    b. $10 + $30
    c. $20 + $30
    d. $20 + $40

GLE 2.2.11 Mrs. Penny divided 18 colored markers equally among three students. Which expression could be used to find the number of markers each student received?

    a. 18 + 3
    b. 3 ÷ 18
    c. 18 ÷ 3
    d. 18 x 3

GLE 2.2.10 Complete each fact family.

2 x 5 = 10   4 x 3 = 12

5 x 2 = 10   12 ÷ 3 = 4

10 ÷ 5 = 2   3 x 4 = 12

_____   _____

GLE 2.2.10 Write the fact family for 2, 4, and 8

a. _____

b. _____

c. _____

d. _____

GLE 2.2.11 Write a multiplication sentence for this picture.

```
O   O   O
O   O   O
O   O   O
O   O   O
O   O   O
```
_____
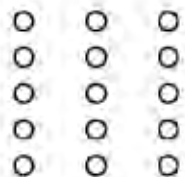
GLE 2.2.11 Which number sentence goes with this picture?

a. 8 ÷ 2
b. 4 ÷ 2
c. 8 x 2
d. 2 + 4
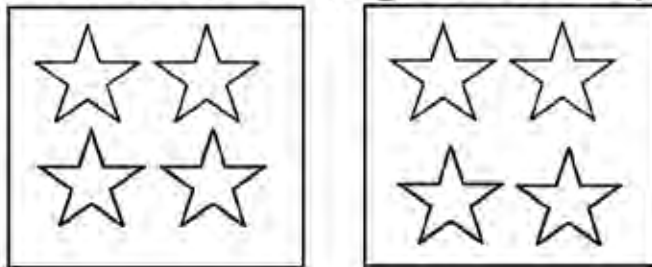
GLE2.2.10 Write a division sentence for this picture. _____
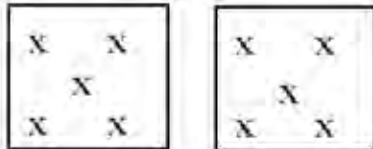
GLE2.2.10 Write a multiplication sentence for this picture. _____
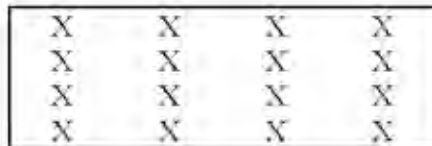
GLE 2.2.14 There were 45 soccer players in a league. 28 new players joined the league. To find out how many players are in the league, you should:

a. Divide 45 by 28
b. Subtract 28 from 45
c. Multiply 28 by 45
d. Add 28 to 45

GLE 2.2.12 A paint store ordered an extra 125 cans of paint for a sale. On Monday, they sold 31 cans of paint. On Tuesday, 53 cans of paint were sold. How many more cans of paint were sold on Tuesday than on Monday? Show your work.

    a. 72
    b. 22
    c. 84
    d. 209

GLE 4.1.2 Boxes of cookies sold.

Susan	𝍸𝍸𝍷
Jill	|||
Beth	𝍸𝍸𝍷 ||
Kelly	||||
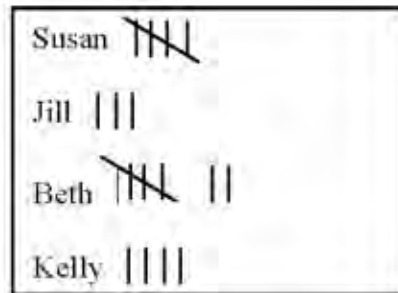
Use the data above to create a graph that shows the amount of cookies sold.

GLE 2.1.2 On Sunday, the bagel shop sold 372 bagels before noon, and 100 more bagels after noon. How many bagels did the bagel shop sell on Sunday? Show your work.

GLE 4.2.3 The graph below show how many tropical fish are in Dan's, Jesse's, Tamara's, Neil's and Maria's aquariums.
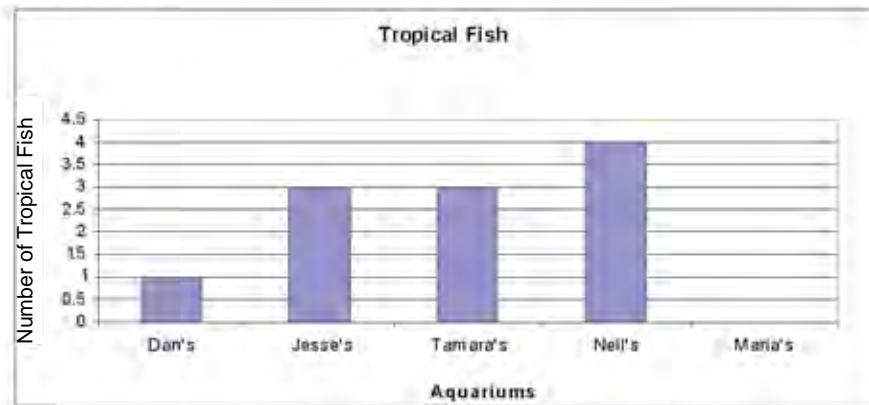
a. One of Neil's fish died. How many fish does he have now? _____

b. Who has the most fish? _____

c. Who do you think has the largest aquarium? Explain.

_____

_____

GLE 2.2.12 Sue went to the store with $6.00. She wants to buy all these items. Show your work.

a. How much will it cost her? _____

b. Will she have enough money? _____

$1.49

$1.39

$1.60

$0.99

GLE 2.2.12 The phone store has 25 different phones. 16 phones are black. How many phones are not black? _____

Curriculum Standards Connections

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS. Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies.

〰 *COMPONENT STATEMENT: 1.1. UNDERSTAND AND DESCRIBE PATTERNS AND FUNCTIONAL RELATIONSHIPS.*

Grade-Level Expectations

1. **Sort, classify and order a group of objects and numbers in more than one way and explain the reason or describe the rule used.**

2. **Create and construct numerical and spatial patterns and sequences that repeat and grow. (See also attached Growing Patterns lesson.)**

    • Translate repeating patterns from one medium to another (e.g., keys to pattern blocks).

    • Use centimeter grid paper to explore changes in growing patterns (e.g., make steps.)

    • Extend repeating patterns using numbers, various materials or drawings including orientations (e.g., changing smiles on smiley faces, or repositioning single shapes.) △ ▷ ▽

    • Demonstrate repeating and growing patterns through physical movements (e.g., repeating: the steps in a dance; growing: clap once, clap twice, clap four times)

    • Examine numeric patterns and identify the next number or the missing elements. (e.g. 1, 2, _, 8)

3. **Analyze, describe and extend repeating and growing patterns and sequences, including those found in real-world contexts, by constructing and using tables, graphs and charts. (See also attached Growing Patterns lesson.)**

- Investigate growing patterns (1, 3, 5, 7) and create a table to record and extend the pattern.

- Start with a number on a hundreds chart and discuss the difference between that number and the one above it, below it, and to each side. Ask questions such as:

  1. What stays the same?

  2. What changes?

  3. Describe any patterns you notice.

- Use sections of a hundreds chart with missing numbers to be identified. Ask children to share the thinking used to identify the missing numbers. Example: Begin with a 2x2 rectangle from the chart 21, 22, __, 32 and then, over time, increase the size of the rectangles, have more missing numbers or give a section of the chart that is not a rectangle.

COMPONENT STATEMENT: 1.2. REPRESENT AND ANALYZE QUANTITATIVE RELATIONSHIPS IN A VARIETY OF WAYS.

Grade-Level Expectations

4. **Describe mathematical relationships and situations involving computation of whole numbers (addition, subtraction, multiplication and division) using words, symbols, open number sentences and equations e.g., $56 + \triangle = 100$ and $3 \times 5 = 9 + 6$.**

- Explore and describe skip counting and multiplication patterns found by using hundreds charts.

- Use constant keys on calculators to: (a) create multiplication tables (b) predict and then verify the next number in a growing pattern.

❖ **Possible Assessment Opportunity**

  ❖ Have the children explore different operations to reach a target number and describe the patterns they noticed in a journal.

  Intervention: Begin with addition and subtraction.

  Challenge: Include multiplication and find the least number of steps needed to reach the target number.

∿ *COMPONENT STATEMENT: 1.3. USE OPERATIONS, PROPERTIES AND ALGEBRAIC SYMBOLS TO DETER-MINE EQUIVALENCE AND SOLVE PROBLEMS.*

Grade-Level Expectations

5. **Demonstrate understanding of equivalence as a balanced relationship of quantities by using the equals sign to relate two quantities that are equivalent and the inequality symbols, < and >, to relate two quantities that are not equivalent. (23 x 5 > 23 x 2)**

   • Have the children record different number combinations that will yield the same sum [e.g., $3 + 3 = 6$, $5 + 1 = 6$, or $1 + 5 = 6$, $2 + 4 = 6$, or $4 + 2 = 6$, etc. or $2 + 1 + 3$ is equal to $2 + (1 + 3)$ is equal to 6] and explain why another combination is not equivalent to the same sum (e.g., $2 + 5 = 7$ or $8 + 7 > 6 + 6$).

   • Activities with a balance scale and counters or paper clips on an equal arm balance can also be used to demonstrate this concept.

   • Investigate a variety of numeric patterns that demonstrate ratios (e.g., one orange has eight segments; two oranges have 16 segments, etc.)

❖ **Possible Assessment Opportunity**

❖ Have the children create a table to identify patterns or simple ratios that show equivalence in a given problem such as:

If ⭘ ⭘ = ☐ ☐   Then ⭘ ⭘
    ⭘ ⭘   ⭘ ⭘   =
                                ⭘ ⭘
                                ⭘ ⭘

Intervention: Provide a graphic organizer (table) with a few numbers inserted as cues. Have the children predict how the pattern will extend on the table and then test to check the prediction.

Challenge: If there are three wheels on a tricycle and two wheels on a bicycle what is the total number of bicycles and tricycles you would need to have an equal number of wheels for both bicycles and tricycles?

6. **Solve problems and demonstrate an understanding of equivalence using the equals sign in number sentences that reflect the commutative and associative properties of addition and multiplication of whole numbers, e.g. 3 x 5 = 5 x 3.**

SAMPLE INTEGRATED LESSON — GROWING PATTERNS (A MULTI-DAY LESSON)

Adapted from a lesson prepared by Grace M. Burton for NCTM Illuminations.

Objective:

Students will:

- create growing patterns

- describe growing patterns

- analyze how growing patterns are created

- find number patterns in Pascal's triangle

Grade-Level Expectations: 1.1.3, 1.2.4

Time: Multiple days

Procedure: Open the following link to complete the lesson: http://illuminations.nctm.org/LessonDetail.aspx?ID=L304. For lesson materials, click the following links:

- http://mathforum.org/workshops/usi/pascal/images/blank.comb.gif

- http://mathforum.org/workshops/usi/pascal/images/fill.comb.gif.

1. Explain that students will be exploring patterns that grow according to a rule. Display the "bowling pin" pattern (which is a "counting-on" pattern):

2. Then ask, "What will come next in this pattern?" (Students may find this question easier to answer if they use cubes on a blank grid or copy the pattern onto paper.) When students give the correct answer [a row of five dots], ask them to explain how they got that answer. Repeat with several more rows. Then ask the students to state the rule that they would use to add more figures to the pattern. Encourage alternate expressions of the rule. (This activity requires higher-order thinking and involves solving numerical problems.)

3. Make a "corner pattern" by making a right angle with three dots, then one with five dots, then one with seven dots. What will come next in this growing pattern? Then what? How do you know? Have you seen this pattern before? (It is a list of the odd numbers.)

4. Next display the pattern below, and ask students what they might call the pattern (a T pattern). Ask questions such as: How many dots are in the first figure of the T growing pattern? How many dots will be in the fourth figure? In the fifth? How do you know? What is the rule? How would you demonstrate that you have found the rule? (Each figure contains four dots more than the previous figure.) How long could we continue this pattern? (Forever.)
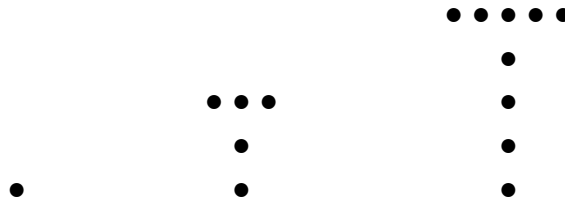
5. Then repeat the steps used in the counting-on pattern above with the new pattern below. (The next three figures will contain 13, 17, and 21 dots.) Ask several students to state the rule that they would use to add more figures to the pattern. (Each time, two dots are added to each part of the previous figure.) Then ask them to add more rows to the table below.

Figure	Dots
1	1
2	5
3	9

6. Next introduce the students to Pascal's triangle by using the first 6 rows of the triangle. Use the worksheets on the links listed on the previous page or open Exploring Pascal's Triangle. Ask for volunteers to name any patterns that they see. Ask questions such as: Here is a row from Pascal's triangle (1 4 6 4 1), what would be the row after that? How do you know? What is the sum of this row? What is the sum of the first four rows (1, 2, 4, 8)? Do you notice a pattern in the sum of the rows? (Each row's sum is double the previous sum.) Do you notice any other patterns in the triangle?

7. To conclude the lesson, have the students make patterns that grow and exchange them with a friend to extend. At the end of the class, ask for volunteers to share their growing patterns and their rules. Ask questions such as: What was the rule for one of the patterns that you made? Did anyone else make a different pattern with that rule?

Interdisciplinary Framework Connections			
Science	**English/Language Arts**	**Visual and Performing Arts**	**Physical Education**
B INQ.1 Make observations and ask questions about objects, organisms and the environment. **B INQ.10** Use mathematics to analyze, interpret and present data.	• Use content vocabulary appropriately and accurately. • Develop a critical stance and cite evidence to support the stance.	• Demonstrate non–locomotor movements (such as bend, twist, stretch, sway, swing). • Demonstrate eight basic locomotor movements. • Demonstrate accuracy in moving to a musical beat and responding to change in tempo. • Identify and demonstrate basic dynamic contrasts (slow/quick, gentle/strong).	• Explore and adapt fundamental movement skills to meet a variety of challenges. • Interact with peers while participating in group activities.

Vocabulary: function, rule, equal, not equal, ratio, trends, , flip, rotate, slide, construct, pattern, function, relationship, sort, classify, sequence, analyze, equivalence, inequalities, CMT Web site - http://www.sde.ct.gov/sde/lib/sde/pdf/curriculum/math/cmtgrade3.pdf

Resources:

Electronic Resources:

National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_1.html

Math Forum http://mathforum.org/

Interactive Resources http://www.globalclassroom.org/ecell00/javamath.html

Mirror Tool http://illuminations.nctm.org/ActivityDetail.aspx?ID=24

Star Child http://starchild.gsfc.nasa.gov/docs/StarChild/

Illuminations http://illuminations.nctm.org/

3-D Patterns – Goals 2000 -

Color Combinations – Goals 2000

Teacher References:

Navigating through Algebra – Grades 3-5 NCTM

Children's Literature:

Right in Your Own Backyard, by Time Life for Children	*The Nature and Science of Patterns,* by Jane Burton
Two of Everything, by Lily Toy Hong	*Sam Johnson and the Blue Ribbon Quilt,* by Lisa Campbell Ernst
A Cloak for a Dreamer, by Aileen Friedman	*The Coin Counting Book,* by Rozanne Lanczak Williams

Only One, by Marc Harshman

The King's Chessboard, by David Birch

How Much, How Many, How Far, How Heavy, How Long, How Tall...is 1000? by Helen Nolan

The April Rabbits, by David Cleveland

Equal Shmequal, by Virginia Kroll

Mrs. Fitz's Flamingos, by Kevin McCloskey

Notes:

NUMERICAL AND PROPORTIONAL REASONING. Quantitative relationships can be expressed numerically in multiple ways in order to make connections and simplify calculations using a variety of strategies, tools and technologies.

~ *COMPONENT STATEMENT: 2.1. UNDERSTAND THAT A VARIETY OF NUMERICAL REPRESENTATIONS CAN BE USED TO DESCRIBE QUANTITATIVE RELATIONSHIPS*

Grade-Level Expectations

1. **Locate, label, compare and order whole numbers up to 10,000 using place value models, number lines and number patterns (including multiples of 100 and 1,000).**

   - Build upon children's existing sense of number and number patterns. Reinforce the fact that it takes 10 units, or ones, to make a ten, and that it takes 10 tens to make 100, and 10 hundreds to make 1000, and so on. Have children demonstrate with place value models for numbers up to 1000 and explain their thinking orally and in writing.

   - Give children nonconsecutive three-digit numbers on index cards. (Extend this activity to four- and five-digit numbers as soon as children are ready). Have the children line up in order of their numbers. Ask questions such as:

     1. Is this the only way to line up? Why or Why not?

     2. Name a number that comes between "Joe's number" and "Susie's number." Explain how you know that to be true.

     3. Have the children place all of their numbers in order (least to greatest or greatest to least) on a number line across a board or on a line made of string. Ask each child to pick one of the numbers as a favorite and write or illustrate as much as she can about the number in terms of place value (each digit) and its proximity to the nearest 100 or 1000.

     4. Ask a child to use printed number lines or number charts (use hundreds chart as a model) to count by tens, hundreds or thousands up to a target number and explain how to get to the number by adding or taking away ones, tens and/or

hundreds to get to the target. Ex: For target number 6,453, star with 5,950 and count by 50's-6,000, 6,050, 6,100, 6,150… to get to 6,453, then describe the target number position in relation to 5,000 and 6,000 when counting by hundreds on a number line (the number is closer to 6,500 than to 6,400).

2. **Identify the number that is 100 and 1,000 more or less than a given number up to 10,000 using place value models, pictures and number lines.**

- Give children nonconsecutive three- or four-digit numbers on index cards. Have the children:

   1. Name a number that is 10 more or less than _____ 100 more or less than _____ 1,000 more or less than_____.

   2. Identify the number which is closest to _____?

   3. Use a string line and place cards with each of the hundreds (or thousands) on the line and have the children place their numbers in the appropriate location on the number line.

   ❖ **Possible Assessment Opportunities**

   ❖ Play "I'm thinking of a number" and have children hold up their answers using digit cards or on slates.

   Give clues such as:

   1. I'm thinking of a three-digit number that is between 3̲00 and 4̲00.

   2. My number has a digit in the tens place that is twice the digit in the ones place. What could my number be? Some possibilities are 342, 363 or 384.

   3. My number is a multiple of 2. What could my number be?

   4. If I were to place my number on a number line, it would be closer to 300 than to 400. What could my number be?

   Explain to your neighbor how you know that your answer is correct.

   Intervention: Preteach for the game by modeling, explaining and recording strategies to get to the written two-digit number. Ask the child to explain the process. Move to three- and four-digit numbers when the child is

ready.

> **Challenge:** Have children think of target numbers to the extent of their capabilities and develop clues for others to figure out the number.

3. **Round three- and four-digit numbers to the nearest hundred and thousand using place value models, number lines and number patterns. (See GLEs 2.1.1 and 2.1.2.)**

4. **Represent three- and four-digit numbers up to 10,000 in expanded forms 5472 = (5 x 1000) + (4 x 100) + (7 x 10) + (2 x 1) and regrouped forms e.g., 5472 = (4 x 1000) + (14 x 100) + (6 x 10) + (12 x 1). Use the forms to support computational strategies.**

    -   Use a place-value chart and base-ten materials to represent a number in standard form and develop number names. Record the number using pictures and numbers in expanded and standard notation.

    -   Ask students to identify how they are using place value when computing. Ex: 72 - 69 means that 72 must be regrouped as 60 + 12, or 6 tens and 12 ones in order to perform the indicated operation.

    ❖ **Possible Assessment Opportunities**

    > ❖ Provide each child with a three- or four-digit number and ask them to find a variety of ways to represent that number. Models and pictures as well as numbers should be encouraged.

    > **Intervention:** Ask children to build a two-digit number using models or pictures before moving to three digits and then on to four digits. Have children describe the number while composing and decomposing with models.

    > **Challenge:** Expect a greater variety of representations (e.g., expanded notation, multiples, or a fractional part of another number). Have the children explain when these representations would be useful.

5. **Represent fractions with like and unlike denominators of 2, 3, 4, 5, 6 and 8 using a variety of materials; label the fractional parts using words and fraction symbols.**

    -   Give students multiple opportunities to use a variety of material such as pattern blocks (½, ⅓, ⅙), paper squares, paper strips, spinners or fraction circles to represent fractions and frame discussions.

- Identify times over the course of a week when fractions were used at home, school, shopping, etc. Write story problems that describe and illustrate how the fractions were use at home, school, etc.

6. **Locate, label and estimate fractions with like and unlike denominators of 2, 3, 4, 5, 6 and 8 by constructing and using models, pictures and number lines.**

    - Create models of fractions, such as fraction bars, to show a whole and parts of the whole. Guide the children in writing the appropriate fraction names on each piece. Encourage the children to manipulate the pieces to explore how the fractional pieces make a whole.

    - Label missing unit fractions on a given number line marked in halves, or thirds, or fourths

    - Compare fraction strips or bars (two or three at a time) that have been divided into halves, thirds, fourths, fifths, sixths and eighths to determine the size of each unit fraction and the relative placement of each on a number line, bar or strip that represents a whole.

7. **Determine equivalence, compare and order fractions through the construction and use of models, pictures and number lines with like and unlike denominators of 2, 3, 4, 5, 6 and 8, including identifying a whole object or a whole set of objects as a fraction with the same numerator and denominator.**

    - Construct models such as fraction bars or fraction squares (e.g., use different colors of 6 x 6 squares of construction paper divided into equal pieces of 2, 3, 4, 5, 6, 8 and label each pieces with the appropriate fraction). Use the models to identify equivalent fractions and to compare and order fractions.

    - Find fractional parts of sets. Give groups of children small sets of objects and discuss how they would split them in half. Discuss the relationship between fractions and division such as ½ of 8 is 4 or ⁴/₈ and the corresponding division problem 8 ÷ 2. Continue the process with other common fractions.

8. **Use models, number patterns and counting and grouping to find equal parts of a set of objects and identify amounts such as ⅔ of 12 is 8.**

    - Have children use objects, pictures and models to complete statements such as: If ⅓ of 6 is 2, then ⅔ of 6 is __. ⅓ of 12 would be__ if ⅔ of 12 equals 8.

9. **Describe quantitative relationships using ratios and identify patterns with equivalent rations such as 3 out of 6 crayons**

are red or 4 out of 8 crayons are red and are the same as 1 out of 2 crayons is red.

❖ **Possible Assessment Opportunities**

    ❖ Use hexagon, trapezoid, blue rhombus and triangle pattern blocks to show different ways to equal one whole,

    ❖ Using the hexagon as one whole, ask children to find different ways to make the same design in fractional parts using hexagons, blue rhombuses, green triangles and red trapezoids. The children should record the various solutions as number sentences using fraction notation or the first letter of the color of the blocks used. (This can also be done on a computer)

Intervention: Provide appropriate terminology in a bank (¼ and one-fourth, ½ and one-half). Place pattern blocks directly on top of a shape template to record the pieces used to cover the hexagon..

Challenge: Create other fraction pattern block puzzles that have values greater than one (such as a hexagon, trapezoid and triangle clown, hexagon and trapezoid fish, or "peanut shape" made from two hexagons side by side). Encourage other children to solve the puzzles and record the appropriate fractions using drawings, fraction symbols and number sentences.

OR, use Fraction Concept lessons from the National Library of Virtual Manipulatives:

http://enlvm.usu.edu/ma/classes/__shared/emready@fraction_concepts/info/lessonplan.html

∼ COMPONENT STATEMENT: 2.2. USE NUMBERS AND THEIR PROPERTIES TO COMPUTE FLEXIBLY AND FLUENTLY AND TO REASONABLY ESTIMATE MEASURES AND QUANTITIES

Grade-Level Expectations

10. **Recall the multiplication and division facts for 1, 2, 3, 4, 5 and 10.**

    • Use pictures of objects to develop the understanding of multiplication and divisions (e.g., the wings of butterflies, a group of

stoplights, legs on chairs or tables, wheels on a tricycle, fingers on hands). Have children write story problems and complete number sentences such as: <u>3</u> groups of <u>5</u> and <u>3</u> X <u>5</u> = <u>15</u>, or repeated addition 5+ 5+ 5 = 15.

- Create arrays with color tiles to represent multiplication and division facts. Replicate the arrays on graph paper, record corresponding number sentences and state the facts.

- Give children multiplication charts and have them shade in the multiples of 2, 3, 4, 5 and 10 using different colors. Discuss how the patterns are developing in the chart, record the corresponding number sentences, and state all the facts they have found.

❖ **Possible Assessment Opportunities**

    ❖ Writing Prompt: Write a letter to a new student in our class who does not know multiplication. Explain what you understand about multiplication and the best ways to learn and use multiplication. You can use diagrams to help to show what you mean. You must write in complete sentences.

    Intervention: Provide a word bank of key words (e.g., repeating, arrays, addition, groups, etc.).

    Challenge: Explain how multiplication is related to division.

- Provide sets of objects for groups of children to divide and share equally. Ask questions such as:

  1. What happens if we can't divide the set up equally among the group members?

  2. What do you notice about the number of people in the group and whether you can divide the set of objects equally?

  3. Write about what happens when you divide a set of objects among a group of children.

11. **Write multiplication and division story problems to match a given multiplication or division number sentence and vice versa; solve the problems and justify the solutions.**

12. **Solve problems involving addition and subtraction of two- and three-digit whole numbers and money amounts up to $100.00 with and without regrouping, using a variety of strategies, including models.**

- Supply children with base-ten materials to discover three-digit addition and subtraction with regrouping using given number sentences (e.g., 646 + 175 = __).

- Using a number line that children have created, choose two children and ask them to add their numbers together (using any strategies) and determine where the sum will be placed on the number line. Ask questions such as:

  1. How did you get the sum?

  2. How did you know where to place the sum on the number line?

  3. Can anyone share why they think the sum is in the correct or incorrect place?

  4. What would happen to the sum if we change the digit in the tens place to__?

     - What would the new number be?

     - Where would we place the new number on our line and why?

13. **Create and solve addition and subtraction word problems by using place value patterns and algebraic properties (commutative and associative for addition).**

- Give children opportunities throughout the year to use contextual situations to compute flexibly.

  Ex: Gil is proud that he rode his bicycle 30 miles today, especially when he heard that yesterday Gail had ridden her bicycle 7 miles and Abe had ridden 28 miles on his bicycle. Barbara wanted to know how many miles her three friends had ridden all together. She thought 30 + 7 + 28 could be added in different ways: 30 + 28 + 7 or 30 + 20 + 15 or 37 +28 or 50 + 15.

14. **Solve problems involving the multiplication and division of two- and three-digit numbers by one digit (2, 3, 4, 5 or 10) with models, arrays and pictures of sets.**

- Match illustrations and models of multiplication and division problems to the appropriate number sentences

15. **Determine when an estimate for a problem involving two- and three-digit numbers is appropriate or when an exact answer is needed**

16. **Use a variety of estimation strategies to determine and justify the reasonableness of an answer to a computation or word problem involving addition and subtraction of two- and three-digit whole numbers and money amounts up to $100.00.**

- Using a number line the children have created, ask each child to pick a number and work in pairs to estimate what number their sum would be close to on the number line. Ask questions such as:

1. How do you know your estimate is reasonable?

2. Check your estimate to determine if it is reasonable, an overestimate or an underestimate.

3. What do you need to think about when estimating?

❖ **Possible Assessment Opportunities**

❖ Create a grocery store with priced empty packages. Provide a target amount the children have to spend.

Version 1- Have children "shop" in pairs. Challenge the children to see which pair can get closest to the target amount in the shortest amount of time. Allow children to choose various strategies to determine the accuracy of the estimated purchase.

Version 2 – Have the children shop by choosing at least four items and then make an estimate on how much they spent. Find out if their estimate was reasonable and calculate the real cost. Have the children explain in writing how they arrived at their estimate.

Intervention: Provide number lines or hundreds charts to help facilitate estimation. Orally explain each step of estimation during the process.

Challenge: Describe the estimation strategies used for the two different shopping trips compare and determine the efficiency of each

❖ **Possible Assessment Opportunities**

❖ Furnish simple number sentences for addition or subtraction and have the children write story problems for the

number sentences

Intervention: Analyze the components of addition and subtraction story problems with the children. Discuss how they are written and the necessary components. Provide a graphic organizer showing two sentences and a line ending with a question mark. Add some key words if necessary and gradually reduce the given words as ability increases.

Challenge: Write a story problem for a multiple step number sentence (e.g., $12 + 9 - 2$).

17. **Determine when a strategy will result in an over- or and under-estimate in problems involving two- and three-digit numbers.**

18. **Determine and compare the value of sets of coins, and write the values using decimal notation, i.e. 2 quarters = 50¢ or $0.50 (fifty of 100 cents in a dollar) and is less than 2 quarters, 2 dimes and a nickel or $0.75.**

19. **Determine, compare and write the value of money amounts up to $100.00 and identify equivalent ways to represent a given amount of money, including combinations of pennies, nickels, dimes, quarters and half dollars (e.g., $0.25 can be five nickels, two dimes and 1 nickel, or one quarter).**

- Given various amounts of coins, the children identify the amount, compare amounts and write the value of coins using cent and decimal notation.

❖ **Possible Assessment Opportunities**

❖ Write down a specific amount of money, less than one dollar. Have the children list all the ways to make that amount of money.

Intervention: Use real money and, if adding or counting on is difficult, provide support such as a hundreds chart.

Challenge: Find out how much money was spent if you paid with a dollar and received a specific amount as change. Explain how you found your answer.

Context: Jessica wants to order some food in a restaurant. The menu for the restaurant is as follows:

Edward's Excellent Eatery

ENTREES	PRICE
Pasta with sauce	$ 6.00
Baked fish	$ 9.00
Chicken	$ 7.00
Top sirloin	$ 8.00

DRINKS	
Small soda	$ 1.00
Large soda	$ 2.00
Iced tea	$ 2.00
Milk	$ 1.00

DESSERTS	
Jell-O	$ 1.00
Chocolate cake	$ 3.00
Pie	$ 2.00
Pie and ice cream	$ 4.00

Objectives: Children will be able to add, subtract and multiply money amounts.

Children will estimate a sum.

Children will justify the purchase of their items.

Grade-Level Expectations: 1.2.4, 1.3.5, 1.3.6, 2.2.12, 2.2.15, 2.2.16,

Time: One to two instructional periods

Materials: paper, pencil, menu, and calculator

Procedure:

1. Jessica must only order one entree, at least two drinks and no more than three desserts.

2. Jessica can spend no more than $20.00 for the food.

3. Use estimation to decide what items you could possibly use to create meals for under $20.00

4. List three different meals that Jessica could order for herself.

5. Determine the total cost for each meal using multiplication, addition and subtraction. Show all your work.

6. Were your estimates reasonable? Explain why.

7. If any of the meals cost more than $20.00, make other choices because the Edward's Excellent Eatery won't let Jessica buy things when she doesn't have enough money.

8. Figure out how much change you will get from the $20.00.

9. Recheck your work with a calculator. How accurate were you? What could you do to improve your work?

Interdisciplinary Framework Connections		
English/Language Arts	**Social Studies**	**Information and Technology**
• Use content vocabulary appropriately and accurately (math, music, science, social studies) • Use strategies to generate and develop ideas for speaking, writing and visual activities. • Publish and/or present final products in a myriad of ways, including the use of the arts and technology.	• Recognize that money is an exchange and that different countries use different currencies.	• Use content-specific technology tools and software

Vocabulary: arrays, grouping, place value, hundred more, hundred less, close to, closer to, about , almost, referent, shorter, longer, taller, visual organizer, unit, part-whole, whole, numerator, denominator, mixed number, measurement model, fractional parts, fractional value, product, partitioning, quotient, divisor, multiple, decimal, decimal notation, regroup, commutative property, associative property, compare, round, estimate, reasonable, approximate. See CMT Handbook on website: http://www.sde.ct.gov/sde/lib/sde/pdf/curriculum/math/cmtgrade3.pdf for additional vocabulary.

Resources:

Electronic Resources:

Making Connections with the Vedic square (ENC):

http://my.goenc.com/classroom/documents/?doc_type=doc&doc_id=2770&file_name=index.asp

Rectangle multiplication (Grades 3-5) (ENC): http://nlvm.usu.edu/en/nav/frames_asid_192_g_2_t_1.html

The Product Game (NCTM): http://illuminations.nctm.org/LessonDetail.aspx?id=U100

Visual Fractions: http://www.visualfractions.com/

Fun with Fractions: http://illuminations.nctm.org/LessonDetail.aspx?id=U113

Bear's Breakfast – Goals 2000

Estimate Needed – Goals 2000

Fraction Posters – Goals 2000

Hot Dog Buns – Goals 2000

Picturing 123 – Goals 2000

Picturing Multiplication – Goals 2000

Teacher References:

Recycle Integrated Learning Experience 2   http://www.mcps.k12.md.us/curriculum/socialstd/grade3/Recycle_3_2.html

A Deeper Look at Elementary Mathematics   http://my.goenc.com/classroom/documents/?doc_type=doc&doc_id=2868&file_name=index.asp

Teaching Student-Centered Mathematics, Grades 3 – 5 by J. A. Van de Walle and L. H. Lovin

Adding it up: Helping Children Learn Mathematics, by National Research Council

Children's Literature:

Welcome To Garbage Can, by Sandy Grimsley

Trash, by Charlotte Wilcox

Math Potatoes, by Greg Tang

Each Orange Had 8 Slices, by Paul Giganti

More than One, by Tana Hoban

Moira's Birthday, by Robert Munsch

Counting On Frank, by Rod Clement

Six Dinner Sid, by Inga Moore

The Best of Times, by Greg Tang

Roman Numerals I to MM, by Arthur Geisert

Fraction Action, by Loreen Leedy

Amanda Bean's Amazing Dream, by Cindy Neuschwander

The Doorbell Rang, by Pat Hutchins

How Much Is A Million? by David Schwartz

The 329th Friend, by Marjorie Sharmat

Bunches and Bunches of Bunnies, by Louise Matthews

Notes:

GEOMETRY AND MEASUREMENT. Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies.

∼ *COMPONENT STATEMENT: 3.1. USE PROPERTIES AND CHARACTERISTICS OF TWO- AND THREE-DIMENSIONAL SHAPES AND GEOMETRIC THEOREMS TO DESCRIBE RELATIONSHIPS, COMMUNICATE IDEAS AND SOLVE PROBLEMS.*

Grade-Level Expectations *(Italics indicate links not evident in 2005 framework)*

1. **Identify, describe, construct and draw two-dimensional shapes such as quadrilaterals (including parallelograms), pentagons and hexagons.**

   - Select a shape of the day and have the children find that shape throughout the school and record where they located the shape and describe the object that included or actually was the shape of the day.

   - Have the children use flexible straws to make regular polygons by placing the short end of the flexible straw into the long end. (This will ensure that all sides will be of equal length and each interior angle the same approximate measure). Discuss the attributes of the shapes.

   - Prepare "Who Am I" riddles for the children to solve, such as: "I am a polygon; I have four sides of equal length, but the four angles are not of equal measure. Who am I?" Have students make up riddles and share them with each other.

2. **Identify, describe, construct and represent three-dimensional figures such as cubes, spheres, cylinders, cones, pyramids, prisms.**

   - Have children use 10 cubes to build a three-dimensional shape and draw the shape on graph paper showing how it would look from the front, back, side, top, and bottom. Have students try to match each other's drawings with the appropriate structures.

3. **Compare and classify polygons and solids and determine congruence by using attributes such as the number and length**

of sides, faces, and edges, and the number and kinds of angles (acute, right and obtuse).

- The children can look around their homes for objects that have the different types of angles-acute, obtuse and right-within the object and record and describe their observations. Have the children classify the objects by angles on a graphic organizer.

   ❖ **Possible Assessment Opportunities**

   ❖ Classify polygons according to attributes. Polygons are two-dimensional objects, not solids. Polygons are classified and described by the number of sides, the kind of angles, and the length of the sides.

   Intervention: Begin with triangles and quadrilaterals that can be manipulated. Have children classify by the number of sides, types of angles (right or not right), and congruence.

   Challenge: Use a variety of polygons, including those with irregular and concave shapes. Identify and classify the polygons, then write definitions for each group based on the similarities of the attributes.

4. *Create two-dimensional figures with one or more lines of reflective symmetry.*

   - Have the children create symmetrical patterns using grid paper, geoboards and computer programs.

∿ *COMPONENT STATEMENT: 3.2. USE SPATIAL REASONING, LOCATION AND GEOMETRIC RELATIONSHIPS TO SOLVE PROBLEMS.*

Grade-Level Expectations

5. **Draw and interpret simple maps using shapes or pictures on a coordinate grid.**

   - Place various objects in different locations on a large grid (marked by masking tape) on the floor or playground. Have the children describe how to move from one object to another based on location, position and direction, using appropriate terminology.

- Provide a collection of pictures or stickers that the children will arrange on an x,y (quadrant 1 only) according to directions such as, place the picture of the flower next to the picture of the clown. The picture of the cat will be 2 places to the right of the clown. Stamps can also be used for this activity.

- Share with the children symbols and shapes from other cultures that are used in bead work, fabric, or clothing. Have children create a design on a coordinate grid that could be used on clothing or fabric.

6. **Investigate ways to tile or tessellate a shape or region using a variety of polygons.**

    - Have children work to cover a design using pattern blocks. Begin with students covering a square with square tiles, cover a pattern block hexagon; create a pattern block design and attempt to tessellate

    - Have children create a design using 2 or more pattern blocks that can cover a piece of paper or a pre-drawn design by tessellating (repeating the design completely covering the region without open space or overlaps.

～ *COMPONENT STATEMENT: 3.3. DEVELOP AND APPLY UNITS, SYSTEMS, FORMULAS AND APPROPRIATE TOOLS TO ESTIMATE AND MEASURE.*

Grade-Level Expectations *(Italics indicate links not evident in 2005 framework)*

7. **Use calendar and clocks to plan and sequence events and identify events and times as occurring in the a.m. and p.m.**

8. **Solve problems involving telling time to the nearest quarter hour, five minutes and minute using analog and digital clocks.**

    - Construct analog clocks together while discussing the parts, beginning with the numbers and the marks in between each.

    - Have children count by fives as they move around the clock (and practice the multiplication facts 1-12).

    - Children can make picture timelines (full hour marks) describing a typical day.

    - As direct instruction, provide each child with a demonstration clock with both analog and digital representations to identify time by the hour; quarter hour and minute.

9. ***Develop an understanding and describe the relationships between appropriate units of measure through concrete experiences. (ounces and pounds; gram and kilograms; inches, feet and yards; meters and kilometers; cups, pints and quarts; and milliliters and liters.)***

- Students investigate how many cups in a pint, how many pints in a quart, and how many quarts in a gallon by filling various sizes of containers with water (e.g. use cups to fill pint containers, cups to fill pints, pints to fill quarts, etc).

- Balance scale/ two-pan balance to determine grams and kilograms

- Platform Scale to investigate and determine ounces in a pound

10. **Estimate and measure using nonstandard units and appropriate customary and metric tools and units:**

- **length to the nearest ¼ inch or ½ centimeter**

  - Give students different measuring tools, such as a 12-inch ruler, 10-centimeter strip or centimeter ruler, measuring tape, yardstick, and meter stick. Have students measure various objects around the classroom, including tables, windows, and the width of the room. Discuss with the students which tools and units are easier to use for measuring the different objects.

- **area in square inches or square centimeters**

  - Using square units (color tiles) create one rectangle of 36 square units. Have the children create other rectangles that will have an area of 36 square units.

  - Hold up various pentomino shapes and ask the children for estimates of the area. Give the children the pentominoes and one square unit. Have the children measure the area and record the results on grid paper.

  - Provide a collection of rectangular and square shapes and have the children measure to find the area.

- **capacity in cups, pints, quarts, milliliters or liters**

  - Make comparisons of the units by filling measuring tools with water and transferring the water to another size tool and see what happens.

  - The children should place the units in order from smallest to largest.

- Have the children measure out water or ingredients for an activity.

- **weight in ounces, pounds, and grams** *[mass is weighed in grams]*

  - Have the children estimate the weight of various objects in grams and then use a balance scale to check the accuracy of their measurements.

- **temperature to the nearest degree**

  - The children estimate the temperature in various parts of the school, on various days over an extended period of the school year. Using thermometers record temperatures from different locations in the school, for example the cafeteria and the gym. Have the children create a bar graph from the data and analyze and describe the results for the principal who needs information on whether these parts of the school are properly heated or cooled.

- **volume using inch cubes and centimeter cubes**

  - Have children use cubes to fill rectangular boxes of various sizes as they explore the concept of volume.

  - Read *The Hundred Penny Box*. Have the children explore the concept of volume by building a paper box that will hold 100 pennies. Provide the children with inch cubes to use to estimate the volume of the box. Have the children discuss the strategies that they used to build their boxes.

11. **Describe and use estimation strategies that can identify a reasonable answer to a measurement problem when an estimate is appropriate.**

    - Make stations with a variety of everyday objects for the students to measure within the same measurement system. Allow students to rotate between and among the stations, then discuss how the units within the systems compare with each another.

    - Ask the students to bring in an assortment of "junk" to school (clean and safe throwaway objects: cardboard paper towel tube, empty jug, food box, old mitten, etc.). Gather measuring tools for finding length and weight and make the tools available to the students. Discuss various techniques for estimating and measuring standard items with unusual shapes and then estimate the measurement of the item. Have the students record the estimates and measurements in chart form. Be sure to use both the standard and metric systems.

    - Weigh one item and then estimate the weights and masses of other items. Have the children describe how they used the "benchmark reference" to estimate the weight of the other objects.

SAMPLE INTEGRATED LESSON – PAINTING WALLS

Context: The kindergarten teacher has asked you to help her by painting some of the walls in the classroom dollhouse. The walls are different sizes and you first need to figure out the area of the wall you will be painting so that you can plan you time because the larger wall will take that person longer than the smaller wall. The dimensions of the walls are 10 x 4 cm, 8 x 5 cm, 9 x 3 cm, and 8 x 4 cm.

Objective: The children will be able to use a variety of strategies to determine and compare area.

Grade Level Expectations: 3.3.9, 3.3.10, 3.3.11, 2.2.10, 2.2.11

Time: One to two instructional periods

Materials: centimeter cubes, centimeter grid paper, rulers

Procedure:

1. Estimate the area for each wall.

2. Describe how you will find the area of the walls using the provided materials.

3. Use the materials and determine the area of each wall. Explain how your estimate compares with the actual area that you determined.

4. The art teacher can help you decide how to use the principles of color to paint the walls so that they coordinate with the existing colors in the house.

5. Choose the colors for the walls.

❖ **Possible Assessment Opportunities**

❖ Write to your teacher and explain which walls it will take you longer to paint and why. Include the reasons for the paint color choices.

Intervention: Provide an advance organizer of key questions as prompts to be answered in the writing about the mathematics.

Challenge: Determine how much paint will be needed to cover the walls.

Interdisciplinary Framework Connections			
Science	**English/Lang. Arts**	**Social Studies**	**Visual & Performing Arts**
B.INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses. **B.INQ.5** Use data to construct reasonable explanations. **B.INQ.8** Analyze, critique and communicate investigations using words, graphs and drawings.	• Generate and respond to questions. • Use content vocabulary appropriately and accurately (math, music, science, social studies, etc.). • Use oral language with clarity, voice and fluency to communicate a message. • Determine purpose, point of view and audience and choose an appropriate written, oral or visual format. • Publish and/or present final products in a myriad of ways, including the use of the arts and technology.	• Create timelines that sequence events and peoples, using days, weeks, months, years, decades and centuries. • Locate the events, people and places they have studied in time and place (e.g., on a timeline and map) relative to their own location. • Exhibit curiosity and pose questions about the past when presented with artifacts, records or other evidence of the past.	• Use different media techniques and processes to communicate ideas, feelings, experiences and stories. • Use elements of art and principles of design to communicate ideas. • Select and use subject matter symbols and ideas to communicate meaning. • Identify connections between the visual arts and other disciplines.

Vocabulary: measure, minutes, hours, days, week, month, calendar, clock, digital, analog, data, length, area, capacity, volume, mass, graph, chart, table, pictograph, bar graph, estimate, ruler, thermometer, scale, inches, centimeters, foot, tally marks, polygon, survey, line graph, axis, horizontal, vertical, diagonal, key, range, mode, temperature, parallel, perpendicular, angle, acute angle, obtuse angle, right angle, reasonable, collect, analyze, organize, lists, diagrams, line plot. Also see page 44 of the Grade 3 CMT Math Handbook: http://www.sde.ct.gov/sde/lib/sde/pdf/curriculum/math/cmtgrade3.pdf.

Resources:

Electronic Resources:

Math Steps, Identifying and Classifying Polygons: http://www.eduplace.com/math/mathsteps/3/a/3.polygons.ideas.html

Inch by Inch: http://mathforum.org/paths/measurement/inchbyinch.html

Shapes at Work: http://www.sciencenetlinks.com/Lessons.cfm?DocID=130

Using Standard and Nonstandard Units – Goals 2000

Making Shapes – Goals 2000

Science Fair – Goals 2000

Teacher References:

NCTM Data Analysis Standards 3 - 5   *Adding It Up,* by National Research Council

Elementary and Middle School Mathematics, by John Van De Walle   *Family Math II*, by Lawrence Hall of Science

Graphing and Computers in Grades 3-5: http://www.venturaes.com/graphing/   *Developing Graphing Comprehension, NCTM*

Children's Literature:

People, by Peter Spier   *Everybody Needs a Rock,* by Byrd Baylor

A Drop of Water, by Walter Wick   *Farmer Mack Measures His Pig*, by Tony Johnston

The Wing on a Flea, by Ed Emberley   *Inch by Inch,* by Leo Lionni

So You Want To Be President? by Judith St. George   *Measuring Penny,* by Loreen Leedy

Mapping Penny's World, by Loreen Leedy   *My Map Book,* by Sara Fanelli

The Greedy Triangle, by Marilyn Burns

Nine O'Clock Lullaby, by Marilyn Singer

Tiger Math, by Ann Whitehead Nagda

A Cloak for a Dreamer, by Aileen Friedman

Shape Up, by David Adler

Chimp Math, by Ann Whitehead Nagda

Sam Johnson and the Blue Ribbon Quilt, by Lisa Campbell Ernst

How Tall, How Short, How Far Away, by David Adler

Notes:

WORKING WITH DATA: PROBABILITY AND STATISTICS. Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

∾ *COMPONENT STATEMENT: 4.1. COLLECT, ORGANIZE AND DISPLAY DATA USING APPROPRIATE STATISTI-CAL AND GRAPHICAL METHODS.*

Grade-Level Expectations

1. **Pose questions that can be used to guide data collection, organization, and representation.**

2. **Collect and organize the data that answers the questions using diagrams, charts, tables, lists, pictographs, bar graphs and line plots.**

   • Draw and interpret picture graphs in which a symbol or picture represents more than one object, such as graphing the number of books each child reads using a star to represent two or three books each.

   • Design an investigation from a student generated question and focus on how data collection methods could affect the type of data collected, e.g., polling the school community to determine favorite animal, measuring the amount of time spent on homework, or how much money is spent on lunch in the cafeteria each day.

   • Following a survey of favorite TV shows of students in the entire third grade, groups of students develop their own picto-graphs using symbols of their choosing to represent multiple children.

   • Our Favorite Colors – Ask the children, "What is your favorite color?" and write their answers scattered on the board or chart paper. Ask questions such as:

     1. Can we interpret anything about the favorite color from the way the information is organized? Why or why not?

     2. Is this the best way to organize information?

3. How would you organize the information differently?

4. Have the children create their own methods, including a graph, for organizing the information.

- Collect and organize data from an experiment, such as recording and classifying observations or measurements, in response to a question posed. Observations could be of the characteristics of a collection of rocks.

- Read, interpret and construct bar graphs with consistent intervals greater than one. Graphs can be created that are representative of multiples as well as other equal intervals appropriate to the range of data being displayed. An extension of this activity is for the groups to work in pairs on the computer to enter the group's data, construct a graph, and explore how the graph changes as different scales and alternative forms are used. These children should report the results of their exploration to the class.

- Children can keep charts and graphs recording their improvements in health and fitness standards in preparation for the physical fitness assessment.

- Express the same information using charts, tables, line plots, picture graphs and bar graphs, e.g., create a bar graph from the information in a chart.

∽ COMPONENT STATEMENT: 4.2. ANALYZE DATA SETS TO FORM HYPOTHESES AND MAKE PREDICTIONS

Grade-Level Expectations

3. **Analyze data that have been collected and organized, to draw and defend conclusions based on the data.**

❖ **Possible Assessment Opportunities**

❖ Using the information from the favorite color investigation, create a package of four colored pencils for the class. Write a journal entry telling what your colors would be in your package and why.

Intervention: Discuss how companies decide what color pencils to make and guide the child to look at the graph to determine the four favorite colors. Sentence starters can be provided for the journal entry.

Challenge: Develop a survey question on a favorite sport, candy, food, etc. Collect data from your classroom or students in your grade. Organize the data into a display and write a letter that could be sent to the company describing and interpreting your results.

❖ **Possible Assessment Opportunities**

   ❖ Support a conclusion or prediction orally and in writing, using information in a table or graph. Use the embedded science task "Soggy Paper" data collection and analysis.

Intervention: Provide the graph with all the component parts labeled.

Challenge: Provide graph without its component parts requiring the children to label the axes correctly, identify appropriate scale and create a title.

4. **Describe an event or element as typical based upon the range, median and mode of a set of data.**

- Before counting the number of raisins contained in individual boxes of raisins (use at least 2 different brands), ask the children to estimate the number of raisins in each box. Have the children count and record the raisins and compare the actual numbers to their estimates. Construct a class line plot to record the actual number of raisins and use the concepts of range, mean, median, and mode to discuss the situation.

∼ *COMPONENT STATEMENT: 4.3. UNDERSTAND AND APPLY BASIC CONCEPTS OF PROBABILITY*

Grade-Level Expectations

5. **Experiment to test predictions and determine probability in practical situations such as investigating the fairness of games using a variety of spinners and dice.**

- Conduct simple probability experiments, record the results in a chart, table or graph, and use the results to draw conclusions about the likelihood of possible outcomes (e.g., the possible sums from tossing two dice or number cubes).

- Place 4 red and 6 blue color tiles in a bag. Have the children work in pairs to attempt to determine the total number and color of tiles in the bag. Each child should take one tile out of the bag, record the color by coloring one square of the graph paper with the appropriate color, and then replace the tile in the bag (repeat 10 times each). Once the pair has determined the tiles in their bag, have them make predictions about the probability of drawing a red tile out of the bag and test the prediction by pulling 10 more tiles each. The entire class can display their results on a classroom wall or board by making lines using their colored squares. Discuss the visual representation of the whole class results and how different pairs' results compare to the whole class.

6. **Describe the probability of an outcome as ____ out of ____ (e.g., 3 out of 5). See also GLE 3.2.5.**

- Use appropriate language when discussing the experiments and activities in the previous GLE.

7. **Investigate combinations using models.**

- Read to the children *A Three Hat Day* by Laura Geringer. Have the children use concrete objects (different colored beans, paper hats, or pattern blocks) to show different possible orders for wearing three different hats. The children can also investigate how many different ways there are to wear four different hats.

SAMPLE INTEGRATED LESSON – SEASONING OF THE PRESIDENTS (DATA ANALYSIS)

Context: The Smithsonian Institution is creating a new U.S. presidents display. Workers at the Smithsonian are looking for research about what season the presidents were born in and whether it makes them more likely to become president. Your task is to find out when all the presidents were born and to create a graph that will show whether the season a person is born will make the person more or less likely to be elected president.

Grade-Level Expectations:

Time: Multiple instructional periods

Objective: Children will create graphs based on historical events.

Materials: birth dates of U.S. presidents, colored pencils, graph paper, or computers with graphing programs or software installed

Procedure:

1. Review the seasons of the year and the dates when they start and end.

2. Cooperative groups should look at the list of all the birth dates of the presidents and place each president's name and birth date on a separate index card.

3. Each group sorts the index cards by season the birth date falls in.

4. Each group creates a graph that shows how many presidents were born in each season.

5. Each group must write a statement explaining how the data are displayed and what the graph shows about the seasons when U.S. presidents were born.

6. Based upon the findings, have a class discussion about whether classmates who were born in certain seasons are more likely than others to become president.

Interdisciplinary Framework Connections			
Science	**English/Lang. Arts**	**Social Studies**	**Visual & Performing Arts**
B.INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses. **B.INQ.5** Use data to construct reasonable explanations. **B.INQ.8** Analyze, critique and communicate investigations using words, graphs and drawings. **B.INQ.10** Use mathematics to analyze, interpret and present data. **B.1** Sort and classify materials based on properties such as dissolving in water, sinking and floating, conducting heat, and attracting to magnets. **B.2** Describe the physical properties of rocks and relate them to their potential uses.	• Generate and respond to questions. • Use content vocabulary appropriately and accurately (math, music, science, social studies, etc.). • Use oral language with clarity, voice and fluency to communicate a message. • Determine purpose, point of view and audience and choose an appropriate written, oral or visual format. • Use strategies to generate and develop ideas for speaking, writing and visual activities. • Research information from multiple sources for a specific purpose. • Examine sources of information and determine validity. • Publish and/or present final products in a myriad of ways, including the use of the arts and technology.	• Locate the events, peoples and places they have studied in time and place (e.g., on a time line and map) relative to their own location; • Place the history of their own families in the con-text of local, state, national and world history. • Exhibit curiosity and pose questions about the past when presented with artifacts, records or other evidence of the past; • Seek historical back-ground when confronted with problems and issues of the past, as well as of today's world and their own lives;	• Use different media techniques and processes to communicate ideas, feelings, experiences and stories. • Use elements of art and principles of design to communicate ideas. • Select and use subject matter symbols and ideas to communicate meaning.

Vocabulary: measure, minutes, hours, days, week, month, calendar, clock, digital, analog, data, length, area, capacity, volume, mass, graph, chart, table, pictograph, bar graph, estimate, ruler, thermometer, scale, inches, centimeters, foot, tally marks, polygon, survey, line graph, axis, horizontal, vertical, , key, range, mode, reasonable, collect, analyze, organize, lists, diagrams, line plot, probability, trends, fairness. Also see p. 44 of the Grade 3 CMT Math Handbook: http://www.sde.ct.gov/sde/lib/sde/pdf/curriculum/math/cmtgrade3.pdf.

Resources:

Electronic Resources:

Categorical and Numerical Data: http://illuminations.nctm.org/LessonDetail.aspx?ID=U116

Exploring Data: http://mathforum.org/workshops/usi/dataproject/

Dealing with Data: http://illuminations.nctm.org/LessonDetail.aspx?ID=L1297

Making Shapes – Goals 2000   Science Fair – Goals 2000

Color Combinations – Goals 2000   Hot Dog Buns – Goals 2000

Teacher References:

NCTM Data Analysis Standards 3 - 5

Adding It Up, by National Research Council

Elementary and Middle School Mathematics, by John Van De Walle

Family Math II, by Lawrence Hall of Science

Graphing and Computers in Grades 3-5: http://www.venturaes.com/graphing/

Developing Graphing Comprehension, NCTM

Children's Literature:

So You Want To Be President? by Judith St. George

People, by Peter Spier

My Map Book, by Sara Fanelli

Pigs at Odds: Fun with Math and Games, by Amy Axelrod

Tiger Math, by Ann Whitehead Nagda

No Fair, by Carol Holtsmen

Everybody Needs a Rock, by Byrd Baylor

Great Graph Contest, by Loreen Leedy

Chimp Math, by Ann Whitehead Nagda

A Three Hat Day by Laura Geringer.

Notes: