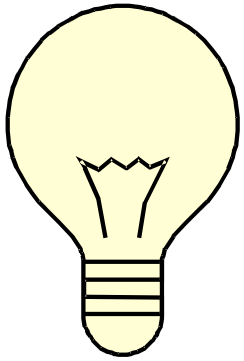


A ***Big Idea*** is a statement of an idea that is central to the learning of mathematics, and is an idea that links numerous mathematical understandings into a coherent whole.

(Charles, 2005)

HO#1
PR#1

Classifying Ideas

Big Ideas

Patterns grow in predictable ways

Objects can be sorted based on their common attributes

Data can be collected, recorded, and interpreted

Geometric figures have attributes that can be classified and described

Operations for numbers are related and can be represented in multiple ways using the base-10 number system

Numbers can be represented in many ways to show equivalence

Equations, expressions, and variables are mathematical models used to represent real situations

Numbers represent sets of items that can be composed and decomposed

Other (Topics, Objectives)

Students should be able to find fractions equivalent to a given fraction

Geometry

Numbers and Operations

Know algorithms for adding and subtracting

Create patterns

Quarterly Concept Organizer

Example of Big Idea, Concept, and Skill Relationship

Big Idea

A statement of an idea that is central to the learning of mathematics, and is an idea that links numerous mathematical understandings into a coherent whole

An over-arching, global idea that spans pre-school through adult uses of mathematics, i.e.-Operations are related.

Concept

A mathematical understanding specifically targeted to a grade level

Specific language to a particular grade level, i.e.-a Big Idea may talk about operations being related, where a Concept for a given grade level will talk specifically about the relationship of addition and

Skill

A specific ability that shows understanding of the targeted Big Idea and Concept

Specific things a student within a grade level will do in order to show their understanding of the over-arching Big Idea and grade-specific Concept, i.e.-a skill would be using addition to check the results of a subtraction problem, or knowing the addition facts to 20 and their corresponding subtraction facts.

HO#3

Kindergarten Quarterly Concept Organizer

QUARTER 3

Number Relationships and Equivalence

Numbers can be represented in multiple ways.

Whole numbers represent discrete objects that can be counted and ordered.

- Count numbers up to 20.
- Relate a numeral to a set of objects.
- Understand the magnitude of numbers.
- Compare two or more sets of objects up to 10 (e.g., equal to, less than, more than).

Addition and subtraction can be represented as joining, separating, part-part-whole, and comparison.

- Use concrete objects to determine the answers to addition and subtraction problems for two numbers that are each less than 5.
- Recognize when an estimate is reasonable.

Data Analysis and Measurement

Data can be collected, recorded, and interpreted and the process of measurement is the same for every attribute that is measurable.

Direct comparison is used to determine the measurement of objects.

- Compare length, volume, and weight.
- Relate time to the hour to everyday events.
- Identify time of everyday events to the nearest hour.

Questions guide the collection of data that is displayed through various pictorial representations.

- Pose information questions.
- Collect data.
- Record the results using objects, pictures, and picture graphs.

CA MATH STANDARDS	NS 1.0	NS 1.1	NS 1.2	NS 1.3	NS 2.1	NS 3.1	MG 1.0	MG 1.1	MG 1.4	SDAP 1.1
KEY STANDARDS	✓				✓		✓			•
CONCEPT LESSON								C		
QUARTERLY ASSESSED		3	3/CR		4			4	3	3

First Grade Quarterly Concept Organizer

QUARTER 3

Number Relationships, Equivalence, and Place Value

Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

Numbers beyond nine are composed of groups of tens and ones.

- Count, read, and write whole numbers to 100.
- Compare whole numbers up to 100.
- Make reasonable estimates when comparing larger or smaller numbers.

The same number can be represented in multiple ways.

- Represent equivalent forms of the same number through the use of diagrams and number expressions (to 20).
- Use the inverse relationship between addition and subtraction to solve problems.
- Make precise calculations and check validity of results from context of problem.
- Write and solve number sentences from problem situations that express relationships involving addition and subtraction.
- Identify and know the values of coins and show different combinations of coins that equal the same value.

Data Analysis

Data can be interpreted from organized visual representations.

Data can be sorted, classified, represented and compared.

- Use pictures/picture graphs.
- Use bar graphs.
- Use tally marks.

CA MATH STANDARDS	NS 1.1	NS 1.2	NS 1.3	NS 1.5	NS 2.2	NS 2.5	NS 3.1	AF 1.1	AF 1.3	SDAP 1.1	SDAP 1.2
KEY STANDARDS	🔑	🔑			🔑	🔑					
CONCEPT LESSON						C		C	C		
QUARTERLY ASSESSED	3	3	2	3	2/CR			3			4

Second Grade Quarterly Concept Organizer

QUARTER 2

Number Relationships, Equivalence, and Place Value
Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

Geometry
Plane and solid shapes are classified and analyzed by their attributes.

Numbers to 500 are composed of groups of hundreds, tens and ones.

- Count, read, and write numbers to 500 and identify place value.
- Use words, models, and expanded form to show numbers to 500.
- Order & compare numbers to 500.

Addition and subtraction of 2-digit numbers are related.

- Check results using the inverse relationship of addition and subtraction.
- Add and subtract two-digit numbers using multiple strategies.

Money and time can be measured in a variety of ways.

- Solve problems using combinations of coins.
- Tell time, know relationships of time and determine duration of intervals of time.

Shapes can be analyzed and manipulated using their attributes.

- Describe and classify plane and solid shapes.
- Put shapes together and take them apart from other shapes.

CA MATH STANDARDS	NS 1.1	NS 1.2	NS 1.3	NS 2.1	NS 2.2	NS 2.3	NS 5.1	MG 1.4	MG 1.5	MG 2.0	MG 2.1	MG 2.2
KEY STANDARDS	✓		✓	✓	✓		✓			✓	✓	✓
CONCEPT LESSON				C	C	C						
QUARTERLY ASSESSED	4	2	3	4/CR	4		3	2			4	4

Third Grade Quarterly Concept Organizer

QUARTER 4

<u>Number Relationships, Equivalence, and Place Value</u>
Numbers are represented in multiple ways and operations are related and are represented in multiple ways.

<u>Probability</u>
Events can be measured based on analysis of possible outcomes.

A comparison of a part to a whole can be represented using fractions.

- Compare and order fractions to show equivalency by representing them in drawings or with concrete materials.
- Add and subtract simple fractions.
- Use fractional pieces to represent fractional amounts.
- Know meaning of numerator and denominator.

Fractions and decimals can be used to represent equivalent quantities.

- Know that fractions and decimals are two different representations of the same value.
- Know common decimal and fraction equivalents.

Events can be visually represented and can be used for predictions.

- Determine likelihood of an event.
- Systematically record outcomes of events.
- Visually represent the results of the outcomes.
- Predict future events based on results of probability experiments.

CA MATH STANDARDS	NS 3.1	NS 3.2	NS 3.3	NS 3.4	SDAP 1.1	SDAP 1.2	SDAP 1.3	SDAP 1.4
KEY STANDARDS		🔑	🔑			🔑	🔑	
CONCEPT LESSON	C							
QUARTERLY ASSESSED	3/CR	5	5	3	2	5	5	2

Fourth Grade Quarterly Concept Organizer

QUARTER 1

<u>Number Relationships, Equivalence, and Place Value</u>
Numerical values can be represented in multiple ways.

Equivalent values can have different numerical representations.

- Read and write whole numbers in the millions.
- Represent fractions, decimals, and mixed numbers in multiple ways.
- Round whole numbers to the millions and decimals to two decimal places.

Numbers have a unique point on the number line. Two numbers are equal when they represent the same point on the number line.

- Order and compare numbers.
- Place numbers (including positive and negative integers) on the number line.
- Show equivalence of fractions and decimals.

Numbers can be classified as prime or composite and can be expressed as a product of factors.

- Decompose whole numbers down to their factors.
- Identify prime and composite numbers.

CA MATH STANDARDS	NS 1.1	NS 1.2	NS 1.3	NS 1.4	NS 1.5	NS 1.6	NS 1.7	NS 1.8	NS 1.9	NS 2.2	NS 4.1	NS 4.2
KEY STANDARDS	✓	✓	✓	✓				✓	✓			✓
CONCEPT LESSON					C				C			
QUARTERLY ASSESSED	3	3	3	2	2	2	2	3	3/CR	2	2	3

Fifth Grade Quarterly Concept Organizer

QUARTER 1

<u>Number Relationships and Equivalence</u>
Numerical values can be represented in multiple ways.

Arithmetic operations are represented by both models and algorithms for fractions, decimals, and integers.

- Use mental math when computing with decimals.
- Compute a given percent of a whole number.
- Find decimal and percent equivalents for common fractions.
- Add, subtract, multiply, and divide whole numbers and decimals accurately.

Fractions, decimals, and percents are identified and represented on a number line.

- Estimate and round numbers.
- Interpret percents as part of 100.
- Represent numbers smaller than one on the number line.

Numbers are expressed as the product of prime factors and can be written with exponential notation.

- Understand and compute positive integer powers of nonnegative integers.
- Determine prime factors and write in exponential form.
- Identify Greatest Common Factor (GCF) and Least Common Multiple (LCM).

CA MATH STANDARDS	NS 1.1	NS 1.2	NS 1.3	NS 1.4	NS 1.5	NS 2.1	NS 2.2
KEY STANDARDS							
CONCEPT LESSON		C			C		
QUARTERLY ASSESSED	3	6	3	5	4/CR	5	4

Expert Group Guiding Questions for Grade level:_____

Use these questions to guide your group's discussion. Each group member needs to record the group's responses on his/her own sheet. Take your completed sheet back to your home group when you return.

How is the topic of EQUIVALENCY developed at your grade level through the Big Idea?
How is the topic of EQUIVALENCY developed at your grade level through the grade level Concept?
How is the topic of EQUIVALENCY developed at your grade level through the grade level Skills?
What should a student completing this grade level quarter understand about EQUIVALENCY?

Visual Display for
"Walk Through the MIG"

Your group will have 40 minutes to complete a visual display of your assigned section of the Mathematic Instructional Guide. This display must include, but is not limited to:

- Title of the section from the MIG (i.e.-Introduction, parts A, B, and C; Appendix E, part I-III; etc.)

- A clear display of the highlights or important features of your section, so that others who did not read this part, would understand about this part from your display, without someone explaining it to them.

- Is motivating
- Promotes more understanding
- Influences beliefs

- Promotes memory
- Promotes the development of autonomous learners

- Enhances transfer
- Reduces the amount that must be remembered

Patterns grow in predictable ways.

Objects can be sorted based on their common attributes

Data can be collected, recorded, and interpreted.

Geometric figures have attributes that can be classified and described.

Operations for numbers are related and can be represented in multiple ways using the base-10 number system.

Numbers can be represented in many ways to show equivalence.

Equations, expressions, and variables are mathematical models used to represent real situations.

Numbers represent sets of items that can be composed and decomposed.

Students should be able to find fractions equivalent to a given fraction.

Geometry

Numbers and Operations

Know algorithms for adding and subtracting.

Create patterns.

Plane and Solid Shapes

A shape is defined by its attributes, and some attributes can be quantified using measuring tools.

Plane and solid shapes can be classified and analyzed.

- Identify, describe, and classify plane and solid shapes (polygons and polyhedra).
- Know types of triangles (scalene, obtuse, equilateral, isosceles, right).
- Know attributes of quadrilaterals.
- Identify angles as being right angles or greater than or less than 90° (right, obtuse, or acute).
- Construct and deconstruct solid objects.

An object's attributes can be measured.

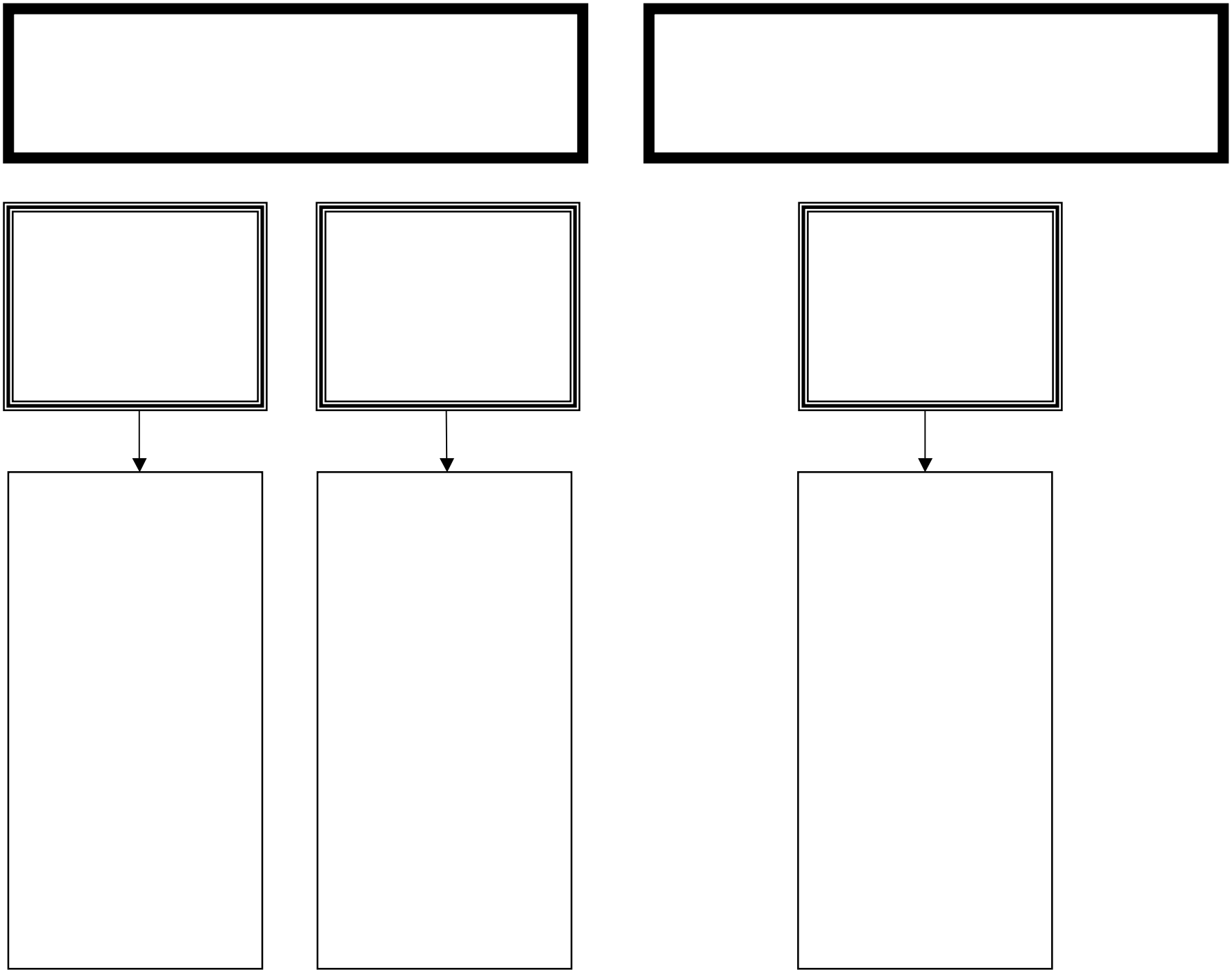
- Use different tools and units of measurement.
- Find area by using tiles (square units) and volume by using cubes.
- Determine perimeter of polygons.
- Carry out simple unit conversions within a system of measurement.
- Know and use customary and metric unit measurements.

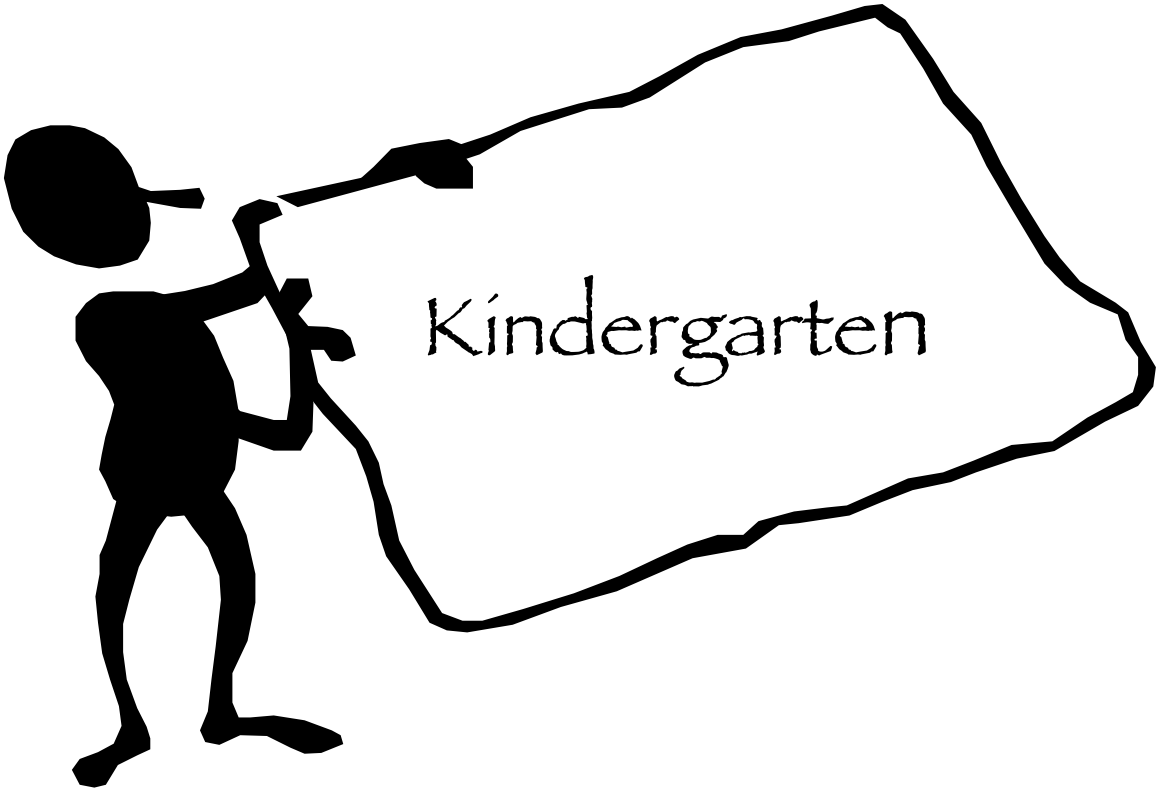
Place Value, Operations, and Equivalence

Numbers are represented in multiple ways and operations are related and are represented in multiple ways.

A comparison of a part to a whole can be represented using fractions.

- Compare and order fractions by representing them in drawings or with concrete materials.
- Add and subtract simple fractions.
- Use fractional pieces to represent fractional amounts.
- Know meaning of numerator and denominator.




Kindergarten

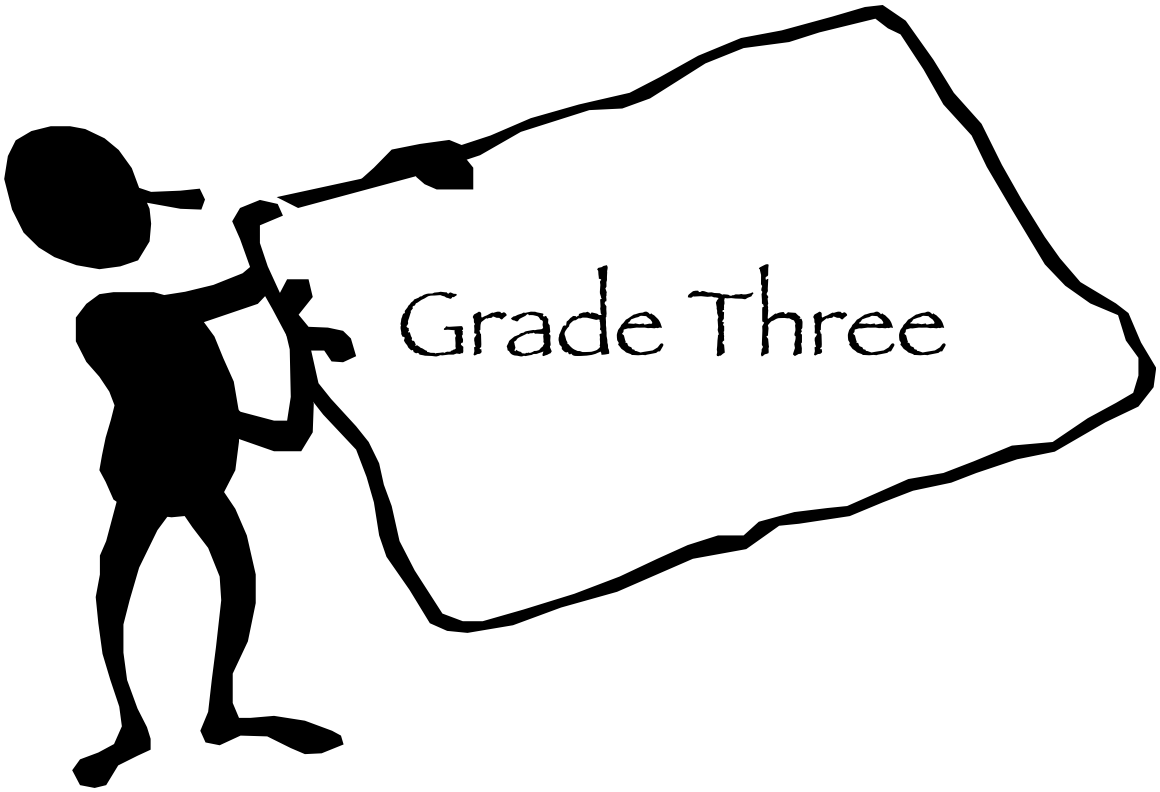

Kindergarten

Grade One

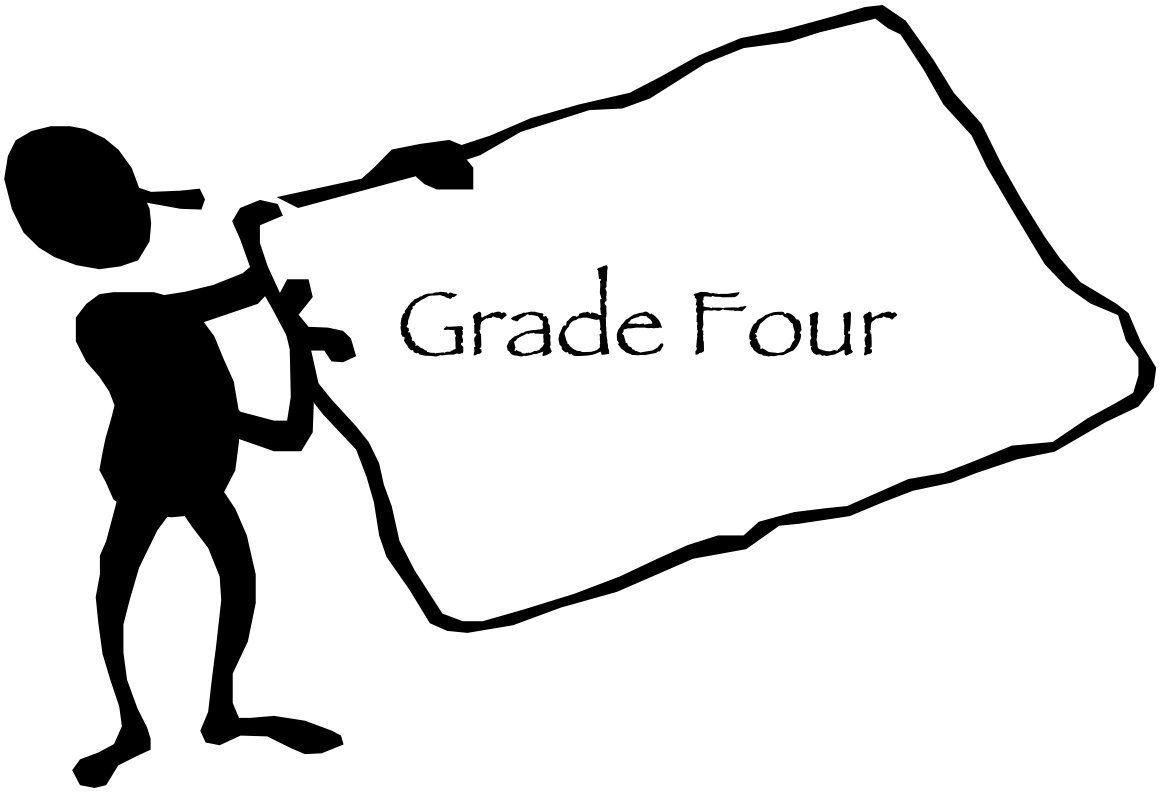
Grade One

Grade Two

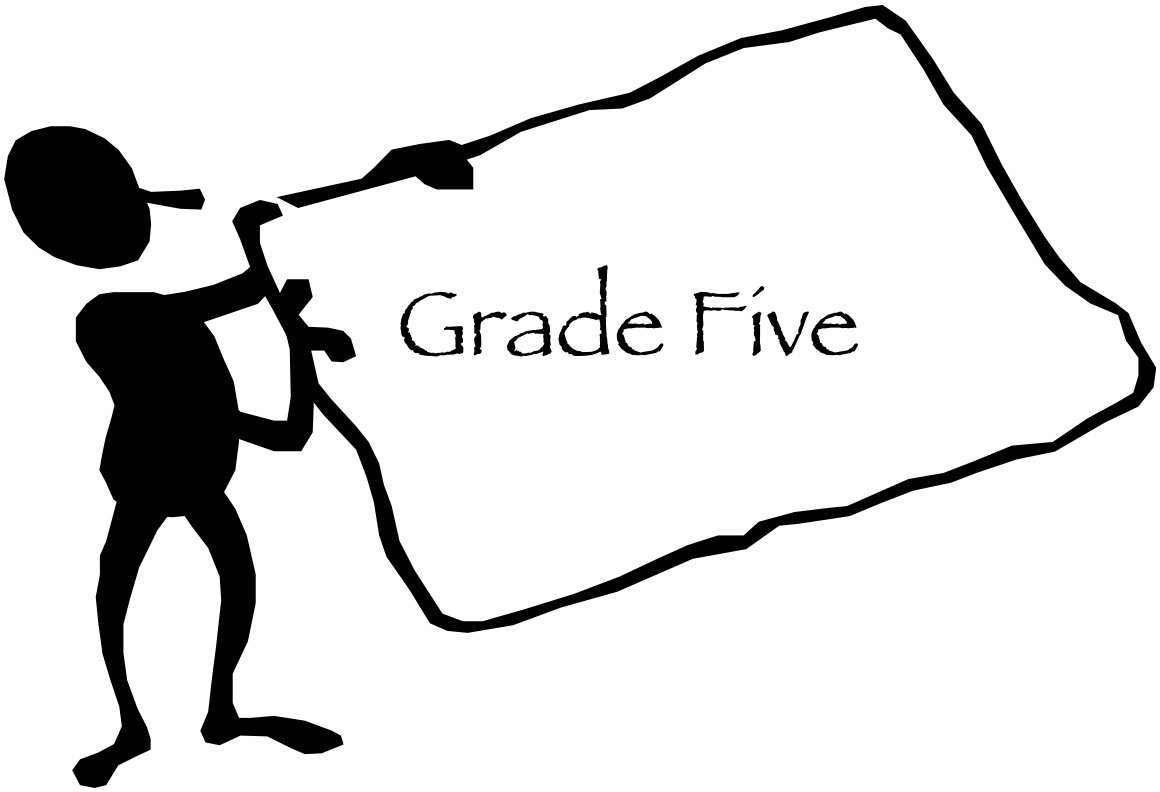
Grade Two


Grade Three


Grade Three


Grade Four


Grade Four


Grade Five


Grade Five

Paint the Building

- On Monday, a painter had to paint a building that was shaped like a cube. When she read the label on the can of paint, she realized one can of paint would cover one face of the building. She had to paint all four sides **and** the roof of the building.
- On Tuesday, she had to paint the building next door. It was the size of two of the first buildings put together.
- On Wednesday, she had to paint the third building on the block. It was the size of three of the cubic buildings put together.
- On Thursday, she had to paint yet another building that was, of course, like four of the cubic buildings put together.

Your job is to figure out how many gallons of paint she would need each day. Continue this pattern up to ten cubic units put together? Use the T chart to help you. Create a formula to help you figure out how many gallons of paint it would take to paint a building 23 cubic units long.

The formula is_____. It would take _____ gallons of paint to cover a building 23 cubic units long.

Memorization

- involve either reproducing previously learned facts, rules, formulae, or definitions OR committing facts, rules, formulae or definitions to memory.

- cannot be solved using procedures because a procedure does not exist or because the time frame in which the task is being completed is too short to use a procedure.

- are not ambiguous. Such tasks involve exact reproduction of previously seen material and what is to be reproduced is clearly and directly stated.

- have no connection to the concepts or meaning that underlie the facts, rules, formulae or definitions being learned or reproduced.

Procedures Without Connections

- are algorithmic. Use of the procedure is either specifically called for or its use is evident based on prior instruction, experience, or placement of the task.

- require limited cognitive demand for successful completion. There is little ambiguity about what needs to be done and how to do it.

- have no connection to the concepts or meaning that underlie the procedure being used.

- are focused on producing correct answers rather than developing mathematical understanding.

- require no explanations or explanations that focus solely on describing the procedure that was used.

Procedures With Connections

- focus students'attention on the use of procedures for the purpose of developing deeper levels of understanding of mathematical concepts and ideas.

- suggest pathways to follow (explicitly or implicitly) that are broad general procedures that have close connections to underlying conceptual ideas as opposed to narrow algorithms that are opaque with respect to underlying concepts.

- usually are represented in multiple ways (e.g., visual diagrams, manipulatives, symbols, problem situations). Making connections among multiple representations helps to develop meaning.

- require some degree of cognitive effort. Although general procedures may be followed, they cannot be followed mindlessly. Students need to engage with the conceptual ideas that underlie the procedures in order to successfully complete the task and develop understanding.

Doing Mathematics

- require complex and non-algorithmic thinking (i.e., there is not a predictable, well-rehearsed approach or pathway explicitly suggested by the task, task instructions, or a worked-out example).

- require students to explore and understand the nature of mathematical concepts, processes, or relationships.

- demand self-monitoring or self-regulation of one's own cognitive processes.

- require students to access relevant knowledge and experiences and make appropriate use of them in working through the task.

- require students to analyze the task and actively examine task constraints that may limit possible solution strategies and solutions.

- require considerable cognitive effort and may involve some level of anxiety for the student due to the unpredictable nature of the solution process required.

Characterizing MathematicalTasks in Terms of Cognitive Demands

Task	Low Level	High Level
A		
B		
C		
D		
E		

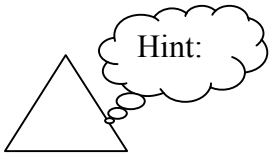
MIG Dig

Components of the Guide	**Which parts of this section are the most supportive for your work? Please be specific.**	**What questions/comments do you have?**
Introduction		
Quarterly Concepts Organizer		
Quarterly Instructional Roadmap		
Mathematics Reasoning Standards		
Quarterly Assessment Blueprint		
Appendices		

HO#3
OT#2

SCAVENGER HUNT

DIRECTIONS:
Locate each topic listed below, citing the page number and section.

4th & 5th Grade Periodic Assessment Blueprints _____	4th grade Standards for Quarter 2 _____	5th grade Standards for Quarter 2 _____
Online resources for parents _____	Hints for combination classes _____	Differentiated Instruction _____
Thinking Through a Lesson Protocol _____	Assessment calendar _____	Balanced Mathematics Program 

A _____ is a statement of an idea that is central to the learning of mathematics, and is an idea that links numerous mathematical understandings into a coherent whole.

The _____ is organized around big ideas, concepts and skills.

The only one who truly likes change is a _____.

When Big Ideas of Mathematics are understood, mathematics is no longer seen as a set of _____ concepts, skills, and facts. Mathematics becomes a _____ set of ideas.

_____ is the learning that students take away with them after they solve problems.

For something to be a problem for a student, he or she must see it as a _____ and must want to know the _____.

Not all _____ are created equal, and different _____ will provoke different levels and kinds of student thinking.

_____ tasks involve either reproducing previously learned facts, rules, formulae or definitions OR committing facts, rules, formulae or definitions to memory.

Procedures _____ connections tasks require some degree of cognitive effort.

_____ will be incorporated throughout the mathematics instructional roadmap, one per quarter, and will be used to help students develop understanding around key concepts and big ideas.

The concept lesson includes a set up phase, a(n) _____ phase and a share, discuss and analyze phase.

The four kinds of tasks as categorized by the Task Analysis Guide are memorization, procedures without connections, procedures with connections and _____.

A ***big idea*** is a statement of an idea that is central to the learning of mathematics, and is an idea that links numerous mathematical understandings into a coherent whole.

The ***Math Instructional Guide*** is organized around big ideas, concepts and skills.

The only one who truly likes change is a ***wet baby***.

When Big Ideas of Mathematics are understood, mathematics is no longer seen as a set of ***separate/ isolated*** concepts, skills, and facts. Mathematics becomes a ***coherent*** set of ideas.

Residue is the learning that students take away with them after they solve problems.

For something to be a problem for a student, he or she must see it as a ***challenge/problem*** and must want to know the ***solution/answer***.

Not all ***tasks*** are created equal, and different tasks will provoke different levels and kinds of student thinking.

Memorization/ Low-level tasks involve either reproducing previously learned facts, rules, formulae or definitions OR committing facts, rules, formulae or definitions to memory.

Procedures ***with*** connections require some degree of cognitive effort.

Concept lessons will be incorporated throughout the mathematics instructional roadmap, one per quarter, and will be used to help students develop understanding around key concepts and big ideas.

The concept lesson includes a set up phase, a(n) ***explore*** phase and a share, discuss and analyze phase.

The four kinds of tasks as categorized by the Task Analysis Guide are memorization, procedures without connections, procedures with connections and ***Doing Mathematics***.