

# A Common Sense Approach to the Common Core

Math and Science

3 – 5

# Characteristics of the Common Core Standards...

- Fewer and more rigorous standards
- Aligned with college and career expectations – prepare all students for success after high school
- Internationally benchmarked so that all of our students are prepared to succeed globally
- Rigorous content and applications of higher order thinking skills
- Builds on strengths and lessons of current state standards
- Consistent from state to state
- Research based

# Math teaches us more than just content

## Standards for Mathematical Practice

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

# How has Math Instruction Changed...

Students will learn more about fewer topics

## ■ In Class...

- Student will focus on fewer topics.

## ■ At Home...

- Parents can become familiar with the main topics of instruction

Students will learn more about fewer topics...  
Grade 3

### **Operations and Algebraic Thinking**

- Understand the properties of multiplication and the relationship between multiplication and division.

### **Number and Operations in Base Ten**

- Memorize the multiplication tables
- Solve word problems involving all four operations

### **Number and Operations – Fractions**

- Develop understanding of fractions as numbers.

### **Measurement and Data**

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

Students will learn more about fewer topics...  
Grade 4

### **Operations and Algebraic Thinking**

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

### **Number and Operations in Base Ten**

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

### **Number and Operations – Fractions**

- Order and find equivalent fractions
- Add/subtract fractions with like denominators.
- Multiply fractions with whole numbers

### **Geometry**

- Measure Angles

Students will learn more about fewer topics...  
Grade 5

### **Number and Operations in Base Ten**

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

### **Number and Operations – Fractions**

- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

### **Measurement and Data**

- Convert like measurement units within a given measurement system.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

# How has Math Instruction Changed...

Skills are developed *across grades*

## ■ In Class...

- Student will build new ideas from earlier topics

## ■ At Home...

- Parents can understand how these skills are connected
- Be aware of topics of difficulty

# Skills are developed across grades...

(Operations)

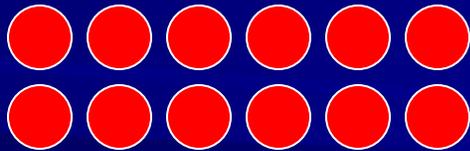
- Grade 2:
  - Add and subtract numbers to 1000
- Grade 3:
  - multiply and divide numbers up through 100
  - Multiply one-digit whole numbers by multiples of 10 between 10 and 90.
- Grade 4:
  - find the product of two two-digit numbers
- Grade 5:
  - Add and subtract decimals
- Grade 6:
  - Multiply and divide decimals

# Skills are developed across grades...

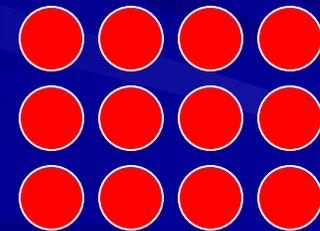
(Operations)

## ■ Grade 3:

- Arrays and Groups to represent the meaning of multiplication
- The multiplication chart 12 x 12



$$2 \times 6 = 12$$



$$3 \times 4 = 12$$

# Skills are developed across grades...

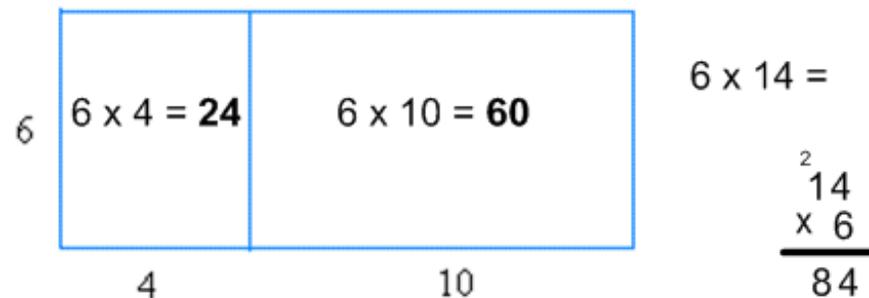
(Operations)

## ■ Grade 3:

- Arrays and Groups to represent the meaning of multiplication
- The multiplication chart  $12 \times 12$

## ■ Grade 4:

- The area model for multiplication of two digit numbers



$$\text{Area} = 6 * (4 + 10) = 6 * 4 + 6 * 10$$
$$24 + 60 = 84$$

Distributive property

# Skills are developed *across grades...* (Operations)

## ■ Grade 3:

- Arrays and Groups to represent the meaning of multiplication
- The multiplication chart 12 x 12

## ■ Grade 4:

- The area model for multiplication of two digit numbers

## ■ Grade 5:

- The standard algorithm for multiplication
- Models for division

# Skills are developed across grades...

## (Fractions)

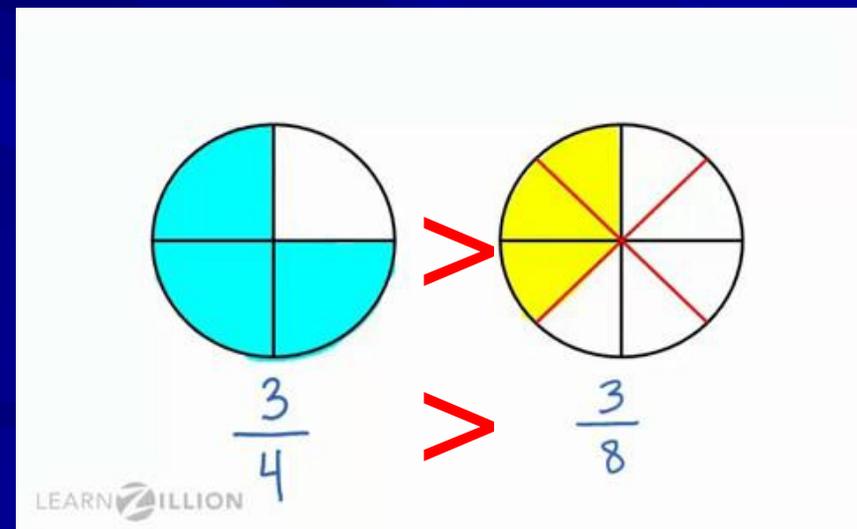
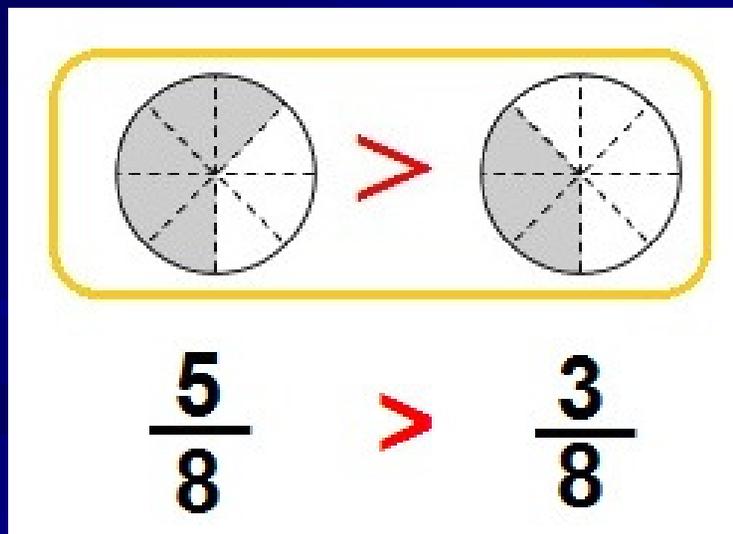
- Grade 2:
  - Break circles and rectangles into two, three, or four equal parts
- Grade 3:
  - Compare the size of two different fractions of the same size object (with the same numerator or the same denominator)
- Grade 4:
  - Work with factors and multiples to find equivalent fractions
  - Add and subtract fractions with the same denominators
  - Multiply fractions by whole numbers
- Grade 5:
  - Add and subtract fractions with different denominators
  - Multiply fractions
  - Divide unit fractions (fractions with a 1 as the numerator)
- Grade 6:
  - Divide fractions

# Skills are developed across grades...

(Fractions)

## ■ Grade 3:

- Pictures to represent and compare fractions



# Skills are developed across grades...

(Fractions)

## ■ Grade 3:

- Pictures to represent and compare fractions

## ■ Grade 4:

- Pictures to show why two fractions are equivalent.

$$\frac{2}{3} = \frac{10}{15}$$

1	2	3	4	5
6	7	8	9	10

# Skills are developed *across grades...* (Fractions)

## ■ Grade 3:

- Pictures to represent and compare fractions

## ■ Grade 4:

- Pictures to show why we use the standard algorithms to add/subtract fractions with like denominators.

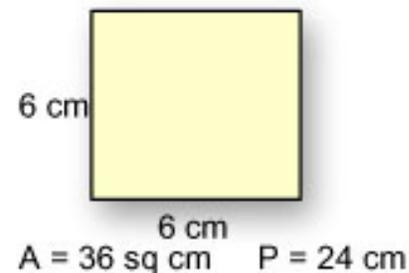
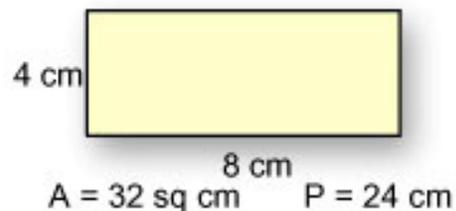
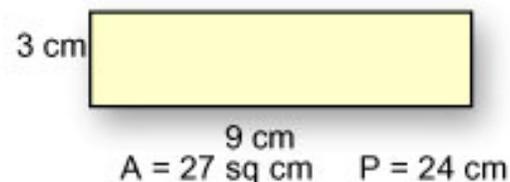
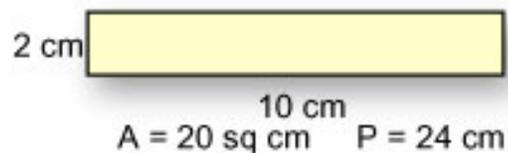
## ■ Grade 5:

- The standard algorithm to add and subtract fractions
- Models for multiplication and division of fractions

# Skills are developed across grades... (Geometry)

## ■ Grade 3:

- Distinguish between perimeter and area as ways to measure two dimensional figures.



Find shape with a perimeter of 24 cm that has the largest area.

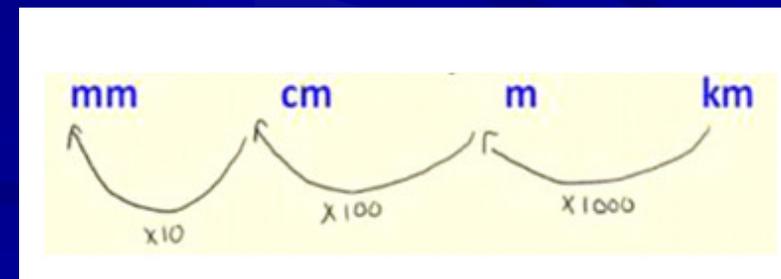
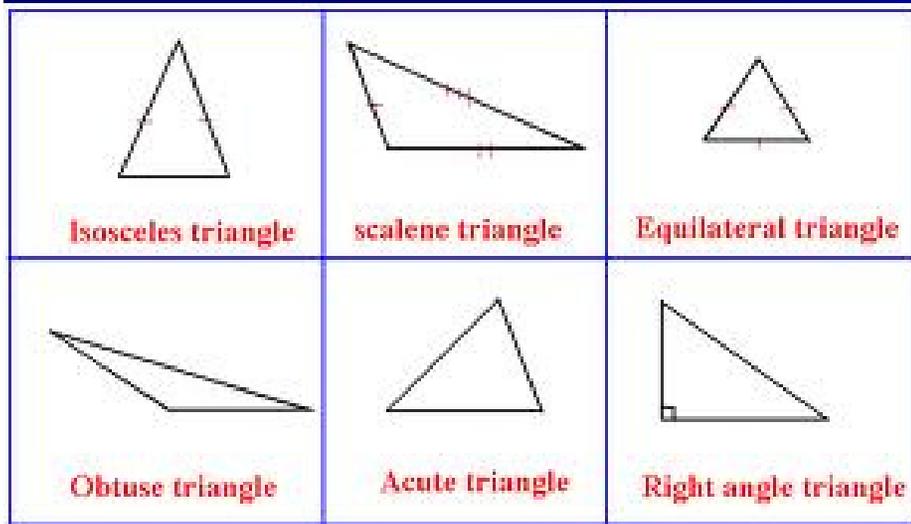
# Skills are developed across grades... (Geometry)

## ■ Grade 3:

- Distinguish between perimeter and area as ways to measure two dimensional figures.

## ■ Grade 4:

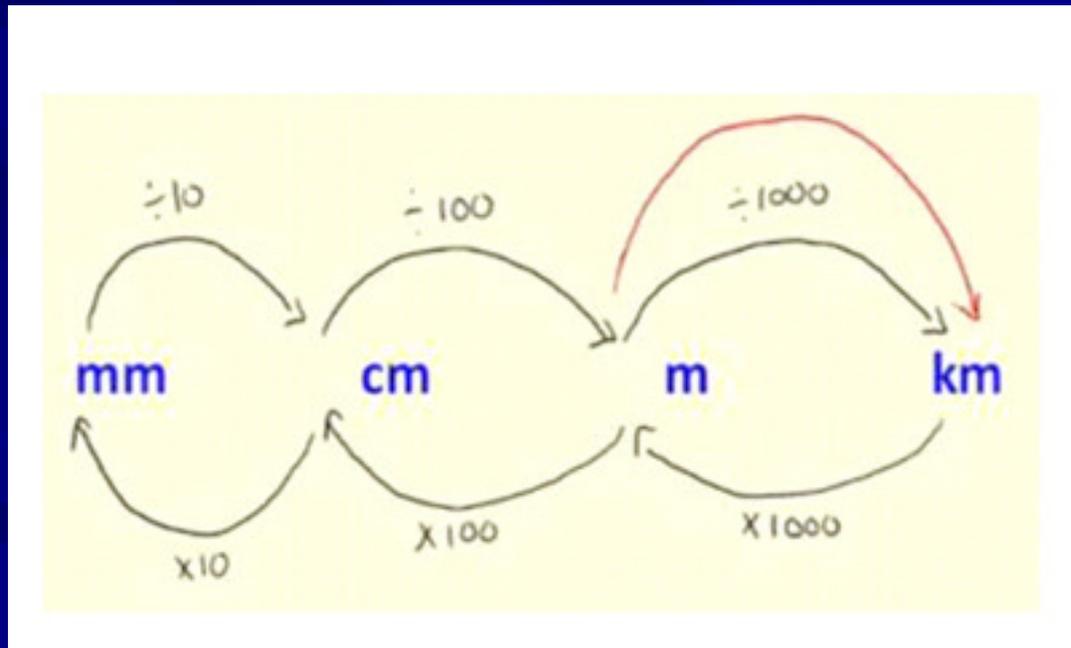
- Recognize angles as a way to classify triangles.
- Convert measurement form larger units to smaller units.



# Skills are developed across grades... (Geometry)

## ■ Grade 5:

- Convert like measurements within the same system
- Understand concepts of volume and relate volume to multiplication

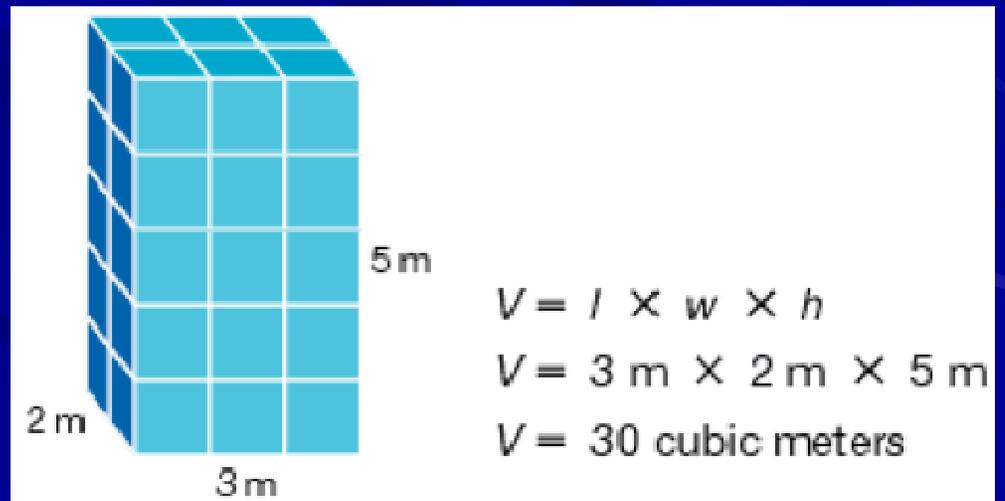
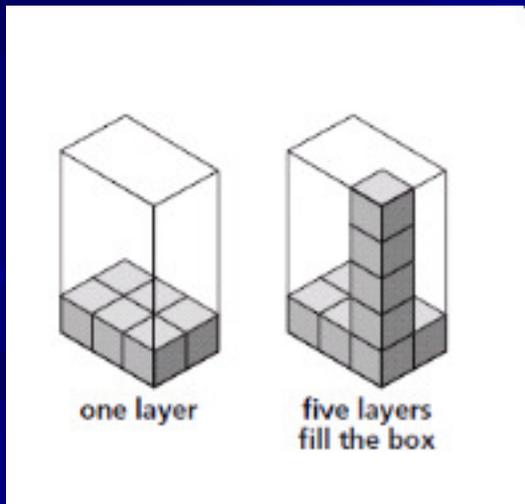


# Skills are developed across grades...

(Geometry)

## ■ Grade 5:

- Convert like measurements within the same system
- Understand concepts of volume and relate volume to multiplication



# Skills are developed across grades...

(Ratios and Rates)

- Grade 5:
  - Recognize patterns in tables
- Grade 6:
  - Understand the concept of rates and unit rates

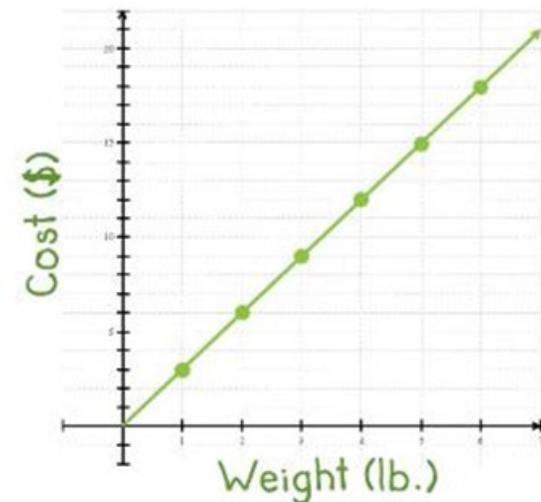
Weight (lb.)	Cost (\$)
1	3
2	6
3	9
4	12
5	15
6	18

# Skills are developed across grades...

(Ratios and Rates)

- Grade 7:
  - Use unit rates and proportional reasoning
- Grade 8:
  - Recognize the slope of a function as the rate of change (unit rate)

Weight (lb.)	Cost (\$)
1	3
2	6
3	9
4	12
5	15
6	18



# Next Generation Science Standards Connections to Common Core Mathematics

The CCSSM **content standards** most directly connected to NGSS include:

Numbers and Operations	Grade First Introduced
Multiplication and division of whole numbers	3
Fractions	3
Adding fractions	4
Coordinate Plane	5

# Next Generation Science Standards Connections to Common Core Mathematics

The CCSSM **content standards** most directly connected to NGSS also include:

Measurement	Grade First introduced
Standard length units (inch, centimeter, etc.)	2
Area	3
Convert from a larger unit to a smaller unit in the same system	4
Convert units within a given measurement system	5
Volume	5

# Next Generation Science Standards Connections to Common Core Mathematics

The three CCSSM **practice standards** most directly connected to NGSS are:

- Reason abstractly and quantitatively; for example, understanding and manipulating symbols used in formulas
- Model with mathematics; for example, representing and solving a one-step or multi-step word problem
- Use appropriate tools strategically; for example, using different formats to represent data including drawings/diagrams and graphs

## Grade 3-Physical Science: Forces and Interactions

**Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.**

### *Science Content*

- Objects in contact exert forces on each other.
- Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.

### *Math Content*

- Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms & liters.
- Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

### *Science Practice*

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

### *Math Practice*

- Reason abstractly and quantitatively.
- Use appropriate tools strategically.

### *Example*

Estimate, then measure, the masses of two objects being used in an investigation of the effect of forces; observe that the change of motion due to an unbalanced force is larger for the smaller mass.



## Grade 4- Life Science-From Molecules to Organisms

**Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.**

### *Science Content*

Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

### *Science Practice*

Construct an argument with evidence, data, and/or a model.

### *Math Content*

Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

### *Example*

Recognize symmetry, or lack of symmetry, in the internal and external structures of plants and animals. Does the symmetry or lack thereof contribute to the function?

Does the symmetry contribute to the function?



<http://www.telegraph.co.uk/earth/wildlife/8082739/Butterflies-and-moths-mimic-snakes-and-foxes-to-fool-predators-claims-researcher.html>



## Grade 5- Earth and Space Science – Earth's Systems

**Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.**

### Science Content

Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

### Math Content

- Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

### Science Practice

Develop a model using an example to describe a scientific principle.

### Math Practice

- Reason abstractly and quantitatively.
- Model with mathematics.

### Example

Plot monthly data for high and low temperatures in two locations, one coastal and one inland (e.g., San Francisco County vs. Sacramento). What patterns do you see? How can the influence of the ocean be seen in the observed patterns?



# How has Math Instruction Changed...

To appreciate math, you must understand it...

## ■ In Class...

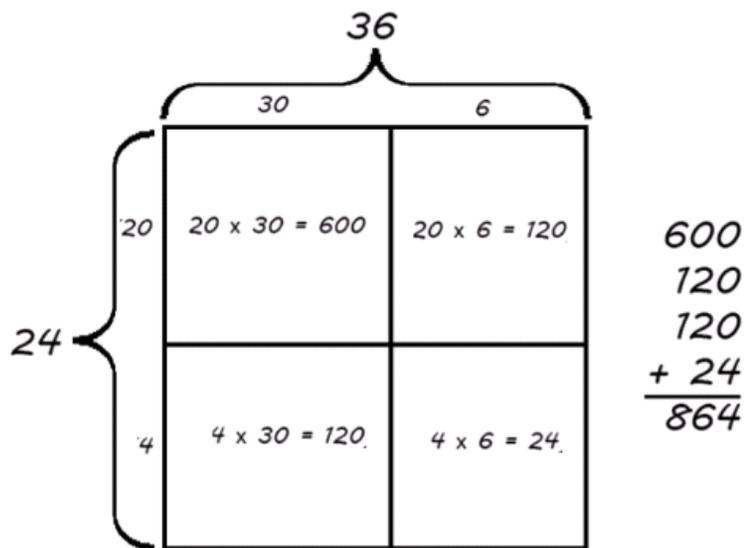
- Student will talk about math and prove why and how math works

## ■ At Home...

- Parents can be open to different strategies

To appreciate math, you must understand it...

- You can arrive at the same solution in different ways...



$$\begin{array}{r} 36 \\ \times 24 \\ \hline 600 \quad (20 \times 30 = 600) \\ 120 \quad (20 \times 6 = 120) \\ 120 \quad (4 \times 30 = 120) \\ + 24 \quad (4 \times 6 = 24) \\ \hline 864 \end{array}$$

$$\begin{array}{r} 36 \\ \times 24 \\ \hline 144 \quad (4 \times 36 = 144) \\ + 720 \quad (2 \times 36 = 72, \\ \text{with a } 0 \text{ added in} \\ \text{the ones' position}) \\ \hline 864 \end{array}$$

# How has Math Instruction Changed...

Math is all around us...

## ■ In Class...

- Student will know and apply the correct math in real world situations.

## ■ At Home...

- Parents can ask children to do the math that comes up in your daily life.

# Math is all around us...

## ■ Grade 3:

### – In the Kitchen...

- Use everyday objects to allow your child to explore the concept of fractions. For example, use measuring cups to have students demonstrate how many  $\frac{1}{3}$ 's are in a whole, how many  $\frac{1}{4}$  cups you need to make  $1\frac{1}{4}$  cups, and how many times you have to refill a  $\frac{1}{2}$  cup measure to make  $1\frac{1}{2}$  cups.

### – At the restaurant...

- Much of the math we use everyday is not exact. We estimate how much money we need for an evening out. For example, estimate the bill... before it arrives.

### – Take a trip...

- Discuss the idea of elapsed time. For example, the train left Bethpage at 2:44 and arrived in Penn Station at 3:32, how long was the ride?

# Math is all around us...

## ■ Grade 4:

– At snack time...

- Use everyday objects to allow your child to explore the concept of fractions. For example, have your child divide a candy bar between three people. Ask, “*How much does each person receive?*” Suppose there are three candy bars that you plan to share with two friends. Have your child describe the amount that each person will receive.

– When cutting wood...

- Have your child write or describe fractions in different ways. For example, what are some different ways to make  $\frac{3}{4}$ ? Answers could include  $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$  or  $3 \times \frac{1}{4}$ ?

– While doing work around the house...

- Have your child find the area of a rug needed to carpet a room or determine the cost molding to go around the room.

# Math is all around us...

## ■ Grade 5:

- At the grocery store...
  - Ask your child to find the total cost for a few items. If you give the cashier ten dollars, how much change will you get?
- On a hot summer day...
  - Think about volume when taking a drink of water. For example, which container can hold more? If I share some of my water, how much of your container will be filled?
- Flash Cards...
  - Make addition/subtraction/multiplication/division flashcards to reinforce prior grade level fluencies...

# What else can we do at home?

## ■ Be Positive!

- Avoid statements like *“I wasn’t good at math”* or *“Math is too hard.”*

## ■ Play Games!

- *Board Games help children develop number sense, foundation of probability and are fun*

## ■ Use Math Vocabulary

## ■ Ask Why?

- *How did you figure it out?*

# Resources

- [www.engageny.org](http://www.engageny.org)
  - New York's Common cores website
- <http://learnzillion.com/>
  - Great videos that explain common core concepts
- <http://www.azed.gov/azcommoncore>
  - Detailed explanation of each standard
- [www.commoncoreconversation.com](http://www.commoncoreconversation.com)
  - “One stop shopping for the common core”
- [www.nextgenscience.org/](http://www.nextgenscience.org/)
  - next-generation-science-standards