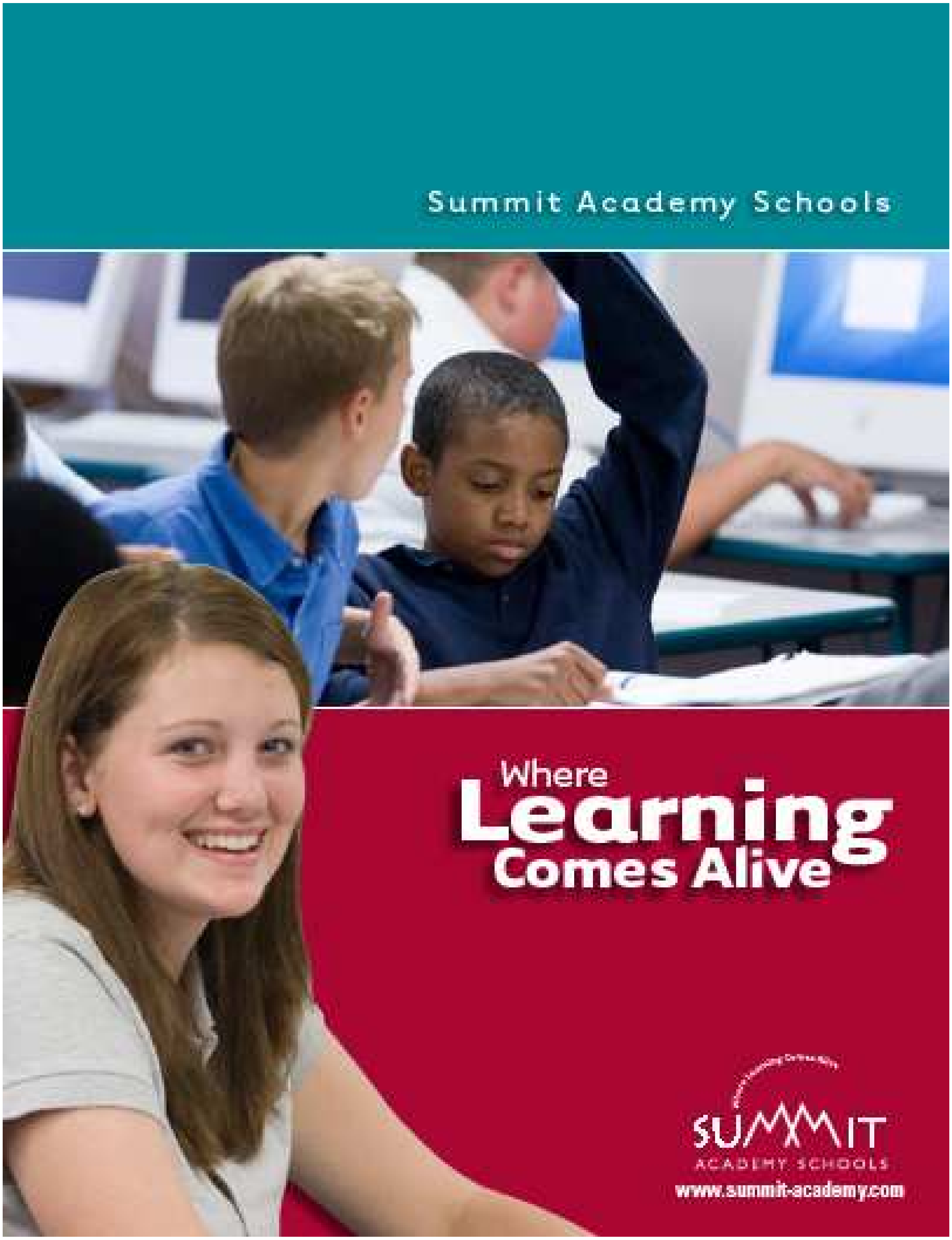
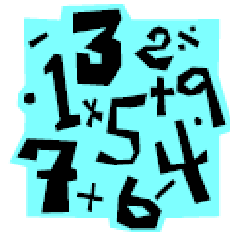
A Parent's Guide To
Fifth Grade Mathematics



***Fifth* Grade Mathematics** is the science of patterns and relationships. It is the language and logic of our technological world. Mathematical power is the ability to explore, to imagine, to reason logically and to use a variety of mathematical methods to solve problems–all important tools for children's futures. A mathematically powerful person should be able to:

- reason mathematically
- communicate mathematically
- solve problems using mathematics
- make connections within mathematics and between mathematics and other fields



Michigan's **Mathematics Grade Level Content Expectations** (GLCE) are organized into five strands:

- Number and Operations
- Algebra
- Geometry
- Measurement
- Data and Probability

In the fifth grade, emphasis within the number area shifts to understanding of the addition and subtraction of fractions, with continued consolidation of multiplication and division concepts and skills with whole numbers. The idea of remainders in whole number division is addressed. Students learn the meaning of a fraction as the result of a division problem, and learn to work with decimals and percentages. In geometry and measurement, there is emphasis on the meaning and measurement of angles, and on solving problems involving areas and angles. Work in number using exponents and factors begin to lead to algebraic ideas that will be more visible in grade six.

Glossary Terms

Words that have asterisks **(*)** are defined in the Glossary located in the back of this booklet.

NUMBER AND OPERATIONS

Understand Division of Whole Numbers

- ❑ Understand the meaning of division of whole numbers, with and without remainders.
- ❑ Relate division to fractions.

  Example:

  $1 \div 2 = \frac{1}{2}$

  Relate division to repeated subtraction:

  Example:

  24÷8=3 means three 8's can be taken out of 24 with nothing left over: 24 – **8** – **8** – 8 = 0.

  Example:

  26÷8=3 r 2 means three 8's can be taken out of 26 with 2 left over: 26 – **8** -**8** – **8** = 2

  Relate division of whole numbers with remainders to the form $a = bq + r$

  Example:

  34÷ 5 = 6 r 4 so 5 x 6 + 4 = 34
- ❑ Write mathematical statements involving division for given situations.

  Example:

  How many photo pages would you need for 48 pictures if 6 pictures fit on a page?

  48 ÷ 6 = 8 photo pages

Multiply and Divide Whole Numbers

- ❑ Multiply a multi-digit number by a two-digit number; be able to see and explain common errors in computing the answer, like not accounting for place value.

  Example:

(correct)		(error)	
	536		536
	x12		x12
	1072		1072
	+536***0***		+536
	6432		1608

Multiply and Divide Whole Numbers, continued

- ❑ Solve applied problems involving multiplication and division of whole numbers.
- ❑ Divide fluently up to a 4 digit number by a 2 digit number.
  5th grade students are expected to have developed a 'toolkit' of strategies that they can use to divide efficiently and accurately, including mental math skills and algorithms*. 2000 50 can easily be solved using number sense, i.e. 20 5=4 so 2000 50=40. However more complex problems, for example, 4260÷12, require more sophisticated approaches, including the traditional algorithm or variations thereof, such as the partial products algorithm:

```
12 | 4260
     3600     300 (12 x 300 = 3600)
      660
      600      50 (12 x 50 = 600
       60
       60       5 (12 x 5 = 60)
        0     355
```

  Whatever method students use, it need to make sense to them so they are able to complete the computation quickly and accurately.

Find Prime Factorizations of Whole Numbers

- ❑ Find the prime factorization* of numbers between 1 and 50; represent using exponents*.
  Example:
  24 = 2 x 12=2x2x6=2x2x2x3. Since 2 and 3 are prime* numbers 24 is factored down as far as it can go. $2^3 \times 3^1$ represents 2x2x2x3 using exponents.

Understand the Meaning of Decimal Fractions and Percentages

- ❑ Understand the relative magnitude of ones, tenths, and hundredths and the relationship of each place value to the place to its right.
  Example:
  1 is 10 tenths, one tenth is 10 hundredths

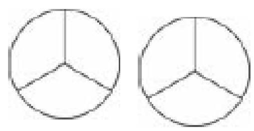
- ❑ Understand percentages as parts out of 100, use % notation, and express a part of a whole as a percentage.
  Example:
  40 out of 100 = 40%
  50 out of 100 = 50%
  $\frac{3}{4}$ of the whole is 75%

Understand Fractions as Division Statements; Find Equivalent Fractions

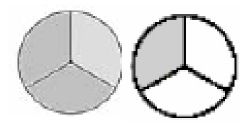
- ❑ Understand a fraction as a statement of division using simple fractions and pictures to represent.

  Example: $2 \div 3 = \frac{2}{3}$

  If these 2 cookies are divided among 3 people, what fraction of the cookie does each person get?



They each get $\frac{2}{3}$ of a cookie.



- ❑ Given two fractions, express them as equivalent fractions* with a common denominator*.

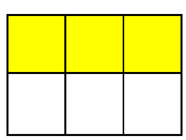
  Example:

  Does $\frac{2}{3} = \frac{8}{12}$? $\frac{2}{3} = \frac{4}{6}$ and $\frac{8}{12} = \frac{4}{6}$ so $\frac{2}{3} = \frac{8}{12}$.

Multiply and Divide Fractions

Find the product of two unit fractions with small denominators using area model.

Example: $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$



$\frac{1}{2}$ of the box is shaded yellow. $\frac{1}{3}$ of these 3 yellow squares is 1 square. 1 square is $\frac{1}{6}$ of the whole.

- ❑ Divide a unit fraction* by a whole number.

  Example:

  $\frac{1}{2} \div 4 \rightarrow$ If $\frac{1}{2}$ is divided into 4 pieces, each piece equals $\frac{1}{8}$;

  or what part of 4 goes into $\frac{1}{2}$? $\frac{1}{8}$ therefore $\frac{1}{2} \div 4 = \frac{1}{8}$.

- ❑ Divide a whole number by a unit fraction*.

  Example: $4 \div \frac{1}{2} \rightarrow$ How many $\frac{1}{2}$'s are in 4? 8; or 4 wholes divided into $\frac{1}{2}$'s results in 8 halves; therefore $4 \div \frac{1}{2} = 8$.

Add and Subtract Fractions Using Common Denominators

- ❑ Add and subtract fractions with unlike denominators using the common denominator that is the product of the denominators of the 2 fractions.

  Example: $\frac{3}{8}+\frac{7}{10}=\frac{30}{80}+\frac{56}{80}=\frac{86}{80}$

Multiply and divide by powers of ten

- ❑ Multiply a whole number by powers of 10: 0.01, 0.1, 1, 10, 100, 1,000; and identify patterns.

  Example:

  3 x 0.01 = 0.03
  3 x 0.1 = 0.3
  3 x 1 = 3
  3 x 10 = 30
  3 x 100 = 300
  3 x 1000 = 3000

  How does the decimal point in the product change in relation to the 3 as the power of ten* increases or decreases? How do the number of 0's in the product change as the number of 0's in the multiplier changes?

- ❑ Divide numbers by 10's, 100's, 1,000's, using mental strategies.

  Example:

  300 ÷ 10 = 30; 300 ÷ 100 = 3; 300 ÷ 1000 = 0.3

  Use the patterns observed from above. Can they be applied to division problems? When 300 is divided by 10 how do the number of zeroes change? What happened to the decimal point?

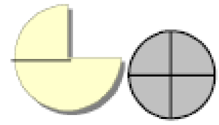
- ❑ Multiply one-digit whole numbers by decimals up to two decimal places.

  Example:

  4 x12=48; 4 x1.2=4.8; 4 x.12=.48

  This expectation builds on the previous 2 and enforces students' sense of place value. What happens to the product as the multiplier gets smaller by a power of 10? How does the decimal point change in the product as the decimal point in the multiplier changes?

Solve applied problems with fractions



- ❑ Given an applied situation involving addition and subtraction of fractions, write mathematical statements describing the situation.
  Example:
  Joe ate $\frac{3}{8}$ of a pie and Mary ate $\frac{2}{8}$ of the pie. How much did they eat altogether?
  Statement: $\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$
  Example:
  How much more pie did Joe eat than Mary?
  Statement: $\frac{3}{8} - \frac{2}{8} = \frac{1}{8}$
- ❑ Solve word problems that involve finding sums and differences of fractions with unlike denominators using knowledge of equivalent fractions.
  Example:
  Joe ate $\frac{1}{2}$ of a pie and Mary ate $\frac{1}{4}$ of the pie. How much did they eat altogether?
  Since $\frac{1}{2}$ is equivalent to $\frac{2}{4}$ the answer is $\frac{3}{4}$.

- ❑ Solve applied problems involving fractions and decimals; include rounding of answers and checking reasonableness
  Example:
  Mary has $6.00. Does she have enough to by a can of pop for $0.75, a bag of chips for $1.25, and 1 large chocolate bar for $2.75?
  [round $0.75 to $1.00, $1.25 to $1.00, and $2.75 to$3.00]
  1 + 1 + 3 = 5
  Mary should have enough to buy the items.

- ❑ Solve for the unknown in a fraction equation.
  Example: $\frac{1}{4} + \mathbf{x} = \frac{7}{12}$; $\frac{1}{4} = \frac{3}{12}$ so the problem can be rewritten as $\frac{3}{12} + \mathbf{x} = \frac{7}{12}$. Now one can see that $\mathbf{x} = \frac{4}{12}$.

Express, interpret, and use ratios*; find equivalences

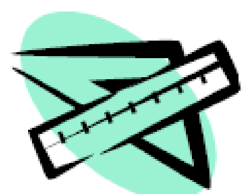
- ❑ Express fractions and decimals as percentages and vice versa.

  Example:
  $\frac{3}{4} = 0.75 = 75\%$

  $75\% = 0.75 = \frac{3}{4}$

- ❑ Express ratios* in several ways given applied situations
  Example:
  3 pizzas for 5 people, 3:5, 3/5;
- ❑ Recognize and find equivalent ratios.
  Example:
  If 5 people share 3 small pizzas, how many small pizzas are needed for 10 people?

MEASUREMENT



Know and convert among measurement units within a given system

- ❑ Recognize the equivalence that 1 liter = 1000 ml = 1000 cm^3 and be able to convert between liters, milliliters, and cubic centimeters (cc).

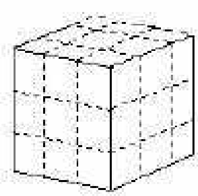
- ❑ Know the units of measure of volume: cubic centimeter, cubic meter, cubic inches, cubic feet, cubic yards, and use their abbreviations correctly (cm^3, m^3, in^3, ft^3, yd^3).

- ❑ Compare the relative sizes of one cubic inch to one cubic foot, and one cubic centimeter to one cubic meter.

- ❑ Convert measurements of length, weight, area, volume, and time within a given system using easily manipulated numbers.
  Example:
  36 inches = 3 feet = 1 yard

Understand the concept of volume

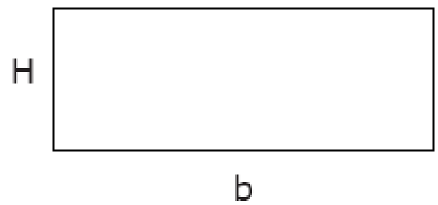
- ❑ Build solids with unit cubes and state their volumes.
- ❑ Use filling (unit cubes or liquid), and counting or measuring to find the volume of a cube and rectangular prism.
- ❑ Solve applied problems about the volumes of rectangular prisms using multiplication and division and using the appropriate units.
  Example:
  It takes 9 centimeter cubes to fill one layer of this box. There are 3 layers.
  How many cubes will it take to fill this box? 27.
  What is the volume of this box? 27 cm^3



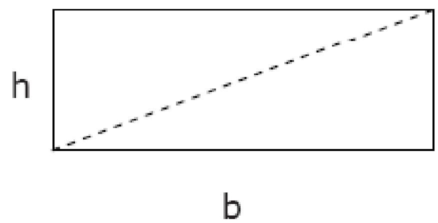
Brain Research says…
Students learn better when they have had a good night's rest. Make sure your child gets enough sleep every night so that s/he will be alert in class.

Find areas of geometric shapes using formulas

- ❑ Show the relationships between areas of rectangles, triangles, and parallelograms using models.



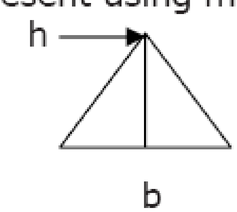
The area of a rectangle is b x h.
(b=base, h=height)



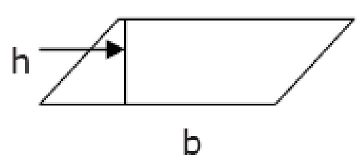
The area of each triangle is half the area of the rectangle.

The area of a parallelogram with the same b & h as a rectangle will have the same area as that rectangle.

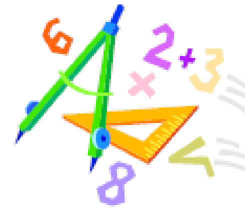
- ❑ Understand and know how to use the area formula of a triangle: $A = \frac{1}{2}bh$ (where b is length of the base and h is the height), and represent using models and manipulatives.



- ❑ Understand and know how to use the area formula for a parallelogram: $A = bh$, and represent using models and manipulatives.



GEOMETRY



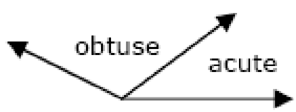
Know the meaning of angles, and solve problems

- ❑ Associate an angle with a certain amount of turning; know that angles are measured in degrees. Understand that 90° = 1/4 of a turn, 180° = ½ of a turn, 270° = 3/4 of a turn, and 360° = a full turn.
- ❑ Measure angles with a protractor*, and classify them as **acute** (less than 90°), **right** (equal to 90°), **obtuse** (greater than 90° but less than 180°), or **straight** (equal to 180°).

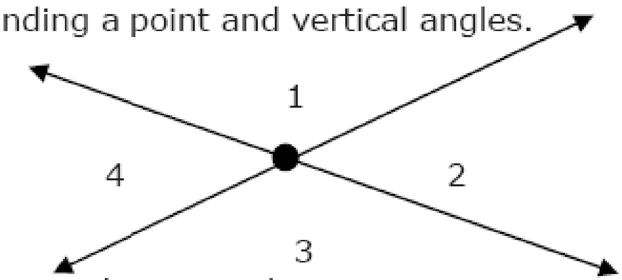
straight (180°)

right (90°) acute (less than 90°) obtuse (greater than 90°)

- ❑ Identify and name angles on a straight line and vertical angles.



- ❑ Find unknown angles in problems involving angles on a straight line, angles surrounding a point and vertical angles.



Example: angle 1 = angle 3 = 140°
angle 4 = angle 2 = 40°
angles 1 + 2 = 180°
angles 1+2+3+4 = 360°

- ❑ Know that angles on a straight line add up to 180° and angles surrounding a point add up to 360°.

Know the meaning of angles, and solve problems, Continued

- ☐ Understand why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°, and use these properties to solve problems.
  Example:
  Cut out a triangle. Tear (do not cut) the three corners. Take the three corners that you tore off, and put the vertices* together, but do not over lap. You will see that the three angles together form a straight line or 180°. The same can be done with a quadrilateral to form 360°.

Solve problems about geometric shapes

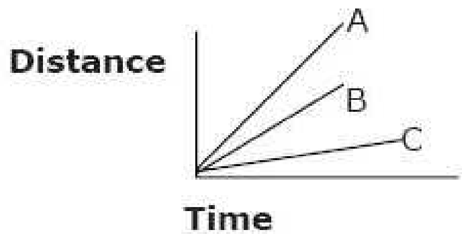
- ☐ Find unknown angles using the properties of: triangles, including right, isosceles, and equilateral triangles; parallelograms, including rectangles and rhombuses; and trapezoids.
  Example:
  If one angle of a triangle = 60° and the second angle equals 90°, what is the third angle? 60° + 90° = 150°
  Then: 180° - 150° = 30°
  The third angle equals 30°.

> **Study Tip...**
> **Keep all homework supplies in one place, ready to be used. Place them in a box to help keep them organized.**

DATA AND PROBABILITY

Construct and interpret line graphs

- ❑ Read and interpret line graphs, and solve problems, such as distance-time graphs, and problems with two or three line graphs on same axes*, comparing different data.



The above graph represents 3 bike rides by 3 different riders. Which rider rode the fastest? Who rode more miles B or C? Which biker spent more time riding their bike?

- ❑ Construct line graphs from tables of data; include axis labels and scale*.

Find and interpret mean and mode for a given set of data

- ❑ Given a set of data, find and interpret the mean* (using the concept of fair share) and mode*.
  Example:
  5 people each have a handful of candy. These numbers represent the amount of candies they each have:
  5, 8, 10, 5, & 7. If they put these candies into a bowl and then divided them evenly among all 5 people, what is the mean number of candies? # of candies in bowl = 35 so each person would receive 7 candies (mean = 7).

- ❑ Solve multi-step problems involving mean.

Ways to praise your child...
You are doing a great job!
This is correct!
You can do this well!

GLOSSARY TERMS

algorithm – A specific step-by-step procedure for any mathematical operation

axes (of a graph) – the two zero lines of a graph that give the coordinates of points (the horizontal axis is the x-axis, and the vertical axis is the y-axis)

common denominator – a common multiple of two or more denominators

composite number – a number greater than 0 that has more than two different factors – not a prime number

denominator – the bottom number of a fraction

divisor – the number a number is divided by, example: 12 4=3 – the divisor of 12 is 4.

equivalent fractions – fractions that name the same value

exponent – a superscript that tells how many times another number is used as a factor, example: 2^3 – the 3 means 2x2x2

factor – numbers multiplied together to produce another number (a) are said to be factors of (a). 2 factors of 12 are 3 and 4. Other factors of 12 are 1, 12, 2 and 6.

least common denominator – the smallest nonzero whole number that is a multiple of each denominator in a group of fractions, example: the lowest common denominator of $\frac{1}{2}$ and $\frac{7}{12}$ is 12.

mean – a number found by adding a set of numbers and dividing the sum of these numbers by the how many numbers were added (often referred to as average)

mode – the number that occurs most often in a set of numbers

multiple – A number that may be divided by another number with no remainder: *4, 6, and 12 are multiples of 2.*

multiplier – the number a number is multiplied by, example: 3x4 – the multiplier of 3 is 4.

GLOSSARY, continued

numerator – the top number of a fraction

power of 10 – how many times 10 is multiplied and indicated with exponents. Example: 10 to the 3rd power is written as 10^3 and means 10x10x10=1000 – note there are *3* zeroes.

prime factorization – a composite number written as a product of its prime factors. The prime factorization of 12 is 2x2x3 or 2^2 x3.

prime number – a whole number greater than 0 that has exactly 2 different factors, 1 and itself

protractor – instrument for measuring angles

ratios – a comparison of 2 numbers

relative magnitude – value of numbers with respect to some starting point, zero, or another number

scale (on a graph) – the numbers along the axes of a graph

unit fraction – a fraction with 1 in the numerator

vertex (*pl. vertices)* – the point at which two line segments, lines, or rays meet to form an angle

Questions to ask my child's teacher