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Office of School Improvement
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MICHIGAN Department of Education

v.7.05

A Parent's Guide to MATHEMATICS GRADE LEVEL CONTENT EXPECTATIONS

WHAT YOUR CHILD NEEDS TO KNOW BY THE END OF

FOURTH GRADE

MICHIGAN Department of Education
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Welcome to Our School!

This school year promises to be an exciting time for your child, filled with learning, discovery, and growth. It is also a time to share a new guide the Michigan Department of Education has developed for you. *A Parent's Guide to Grade Level Content Expectations* outlines the types of literacy and mathematics skills students should know and be able to do at the end of each grade.

Please feel free to share this guide with your family and friends. Use it when you talk with your child's teacher. Ask what *you* can do to support learning in the classroom and reinforce learning at home. You can find more ideas and tools to help you stay involved in your child's education at www.michigan.gov/mde.

We value and share your commitment to your child's education. We look forward to working together to help your child achieve and succeed.

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Michigan Department of Education: GLCE Parent's Guide – 4th Grade Math

A Parent's Guide to Grade Level Content Expectations

Michigan Sets High Academic Standards – for ALL

This booklet is a part of Michigan's Mathematics and English Language Arts Grade Level Content Expectations (GLCE). It is just one in a series of tools available for schools and families. The Michigan Department of Education (MDE) will provide similar booklets for families of children in kindergarten through eighth grade by June, 2005.

Teacher versions of the Grade Level Content Expectations are finished for grades Kindergarten through eight. They state in clear and measurable terms what students in each grade are expected to know and be able to do. They also guide the design of the state's grade level MEAP tests required in the No Child Left Behind (NCLB) legislation.

Educators and classroom teachers from Michigan school districts have been involved in the development and/or review of Michigan's GLCE. The expectations were designed to ensure that students receive seamless instruction, from one grade to the next, leaving no gaps in any child's education. More importantly, they set high expectations in literacy and mathematics so we can better prepare all K-12 students for the challenges they will face in a global 21st century.

To learn more about the Michigan Curriculum Framework, visit www.michigan.gov/mde and click on "K-12 Curriculum."

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Michigan Department of Education: GLCE Parent's Guide – 4th Grade Math

***Fourth 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 <u>five</u> strands:

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

By the end of fourth grade, students should have a good foundation in addition and subtraction of whole numbers and will have done much in multiplication and division of whole numbers. Work in number also extends to fractions and decimal fractions, using limited sets of fractions as the basis for building meaning for equivalent fractions, addition, subtraction, and fraction as part of a set of objects. Work in measurement becomes more complex with a focus on units and conversion within systems of units. In order to allow for the development of Number and Operations, there is a limited focus on Geometry, and Data and Probability.

Glossary Terms

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

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NUMBER AND OPERATIONS

Understand and Use Number Notation and Place Value

- ❑ Read and write numbers to 1,000,000; relate them to the quantities they represent.
  Compare (greater than > and less than <)
  Example:
  27 > 18
  Order (least → greatest or greatest→ least)
  231,551; 371,681; 421,791; 451,370;
- ❑ Compose and decompose numbers using place value to 1,000,000's.
  Example:
  425,068 is 4 one hundred thousands, 2 ten thousands, 5 thousands, 0 hundreds, 6 tens, and 8 ones
  400,000+20,000+5,000+0+60+8.
- ❑ Understand the magnitude of numbers up to 1,000,000; recognize the place values of numbers, and the relationship of each place value to the place to its right.
  Example: 800,000 is 800 thousands or 8000 hundreds.

Use Factors and Multiples

- ❑ Find all factors of a whole number up to 50, and list factor pairs.
  Example:
  24= 1x24, 2x12, 3x8, 4x6; factors of 24
  (1,2,3,4,6,8,12,24)
- ❑ Know that some numbers including 2, 3, 5, 7, and 11 have exactly two factors (1 and the number itself) and are called prime numbers.
- ❑ Solve problems about factors and multiples.
  Example:
  Since 100 = 4 x 25, and 200 = 2 x 100,
  then 200 = 2 x 4 x 25 = 8 x 25.

Add and Subtract Whole Numbers

- ❑ Add and subtract whole numbers fluently.

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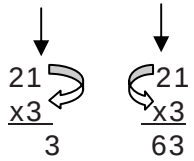
Multiply and Divide Whole Numbers

- Multiply two-digit numbers by a one digit number, using the distributive property* to develop meaning for the algorithm*.
  Example:
  21 x 3 = (1 + 20) x 3 = (1 x 3) + (20 x 3) = 3 + 60 = 63

  Algorithm:



- Multiply fluently any whole number by a one-digit number, and a three-digit number by a two-digit number.
- Divide numbers up to four digits by one-digit numbers and by 10.
  Example:
  6,035 5= 1,207 3,450 10= 345
- Find unknowns in equations.
  Example: *a* 10 = 25, a=125; 125 b = 25 b=10.
- Use the relationship between multiplication and division to simplify computations and check results.
  Example:
  280 20 = ?
  We know that 20 is 2x10 so we can divide 280 by 10 to get 28. Then we can divide 28 by 2 to get 14.
  We can check by multiplying 14x20 (14x10=140; 140x2=280).

- Solve applied problems involving whole number multiplication and division.
  Example:
  Six students each baked 3 dozen cookies for a school bake sale.
  How many cookies were made in all?
  [6 x (3 x 12)], 6 x 36 = 216 cookies.
  If the students sold the cookies 3 for $1.00, how much money would the students make?
  216 3= $ 72.00

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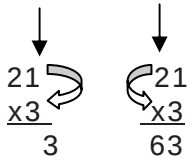

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Read, Interpret and Compare Decimal Fractions

- Read and interpret decimals up to two decimal places; relate to money and place value decomposition. 2.43 is read as "2 and 43 hundredths". This is the same as $ 2.43 where 2 represents whole dollars and 43 represents 43 cents.

- Know that terminating decimals represent fractions whose denominators are 10 (tenths), 10 x 10 (hundredths), etc.
  Example: Powers of 10
  Example: → .1 = $\frac{1}{10}$ .05 = $\frac{5}{100}$

- Locate tenths and hundredths on a number line.

- Read, write, interpret, and compare decimals up to two decimal places.
  Example: 0.43>0.4; 0.05<0.5

- Write tenths and hundredths in decimal and fraction forms, and know the decimal equivalents for halves and fourths.
  Example: .50 = $\frac{1}{2}$ or $\frac{2}{4}$ .25 = $\frac{1}{4}$ .75= $\frac{3}{4}$

Ways to Praise Your Child…
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This is correct!
You are catching on quickly!
I am very proud of you!
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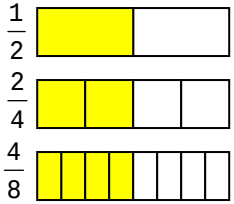
Understand Fractions

- Understand fractions as parts of a set of objects.
  Example:
  What fraction of these letters are vowels: W, **A**, L, Q, R, **U**?
  There are 6 letters and 2 of the letters are vowels so the fraction of the set that is vowels is $\frac{2}{6}$. 6 is the denominator* and represents the total amount in the set. 2 is the numerator* which indicates the part of the set that is vowels.
- Locate and compare fractions on the number line, including improper fractions* and mixed numbers with denominators* of 12 or less.
  Example: Find $\frac{3}{4}$ and $\frac{5}{4}$ on the number line.
  Which is closest to $\frac{1}{2}$? Which is closest to 1? to 2?
  Find $\frac{5}{4}$ on the number line. Is it greater than, less than or equal to $1\frac{3}{4}$?
- Understand the relationships among halves, fourths and eighths and among thirds, sixths and twelfths.
  $\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$; $\frac{8}{12} = \frac{4}{6} = \frac{2}{3}$
- Explain why these fractions are equivalent using fraction strips or the number line.



- Write improper fractions* as mixed numbers, and understand that a mixed number represents the number of "wholes" and the part of a whole remaining.
  Example:
  $\frac{5}{3} = \frac{3}{3} + \frac{2}{3} \rightarrow \frac{3}{3} = 1$ therefore 5/3= 1 + 2/3 = 1 2/3

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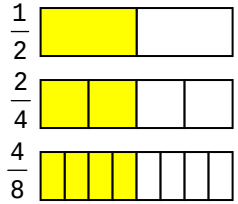

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Understand Fractions, continued

- ❑ Compare and order up to three fractions with denominators 2, 4, and 8, and 3, 6, and 12, including improper fractions and mixed numbers.
  Example: Put these numbers in order: $\frac{5}{3}, \frac{2}{6}, 1\frac{3}{6}$.

Add and Subtract Fractions

- ❑ Add and subtract fractions less than 1 with denominators 12 or less and including 100, in cases where the denominators are equal or when one denominator is a multiple of the other.
  Example:

  $\frac{1}{12} + \frac{5}{12} = \frac{6}{12}$; $\frac{1}{6} + \frac{5}{12} = \frac{7}{12}$; $\frac{3}{10} - \frac{23}{100} = \frac{7}{100}$

- ❑ Solve for the unknown in equations such as:
  $\frac{2}{5} + x = \frac{3}{5}$, $x = \frac{1}{5}$ or $\frac{4}{5} - y = \frac{1}{5}$, $y = \frac{3}{5}$

Multiply Fractions by Whole Numbers

- ❑ Multiply fractions by whole numbers, using repeated addition, and area or array models.
  $(\frac{3}{1}) \times \frac{1}{4} = \frac{3}{4} \rightarrow \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$

Add and Subtract Decimal Fractions

- ❑ Use mathematical statements to represent problems that use addition and subtraction of decimals with up to two digits; solve. Add and subtract decimals up to two decimal places.
  Example: Write a statement that represents the following problem: Jane had $15.75. She spent $7.70. How much money does she have left?
  Money left=15.75-7.70=8.05

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Multiply and divide decimal fractions

- Multiply and divide decimals up to two decimal places by a one-digit whole number where the result is a terminating decimal.
  Example:

0.42	3 = 0.14
.14	.27
x 3	x 5
.42	1.35

Estimate

- Estimate the answers to calculations involving addition, subtraction, or multiplication of whole numbers using mental math strategies.

- Know when approximation is appropriate and use it to check the reasonableness of answers; be familiar with common place-value errors in calculations.

Problem-solving

- Solve applied problems using the four basic arithmetic operations for appropriate fractions, decimals, and whole numbers.

Study Tip…
Following directions is very important in school and at home. Make sure your child develops the habit of carefully reading the directions for their homework.

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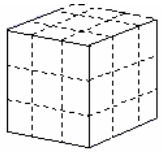
MEASUREMENT

Measure using common tools and appropriate units

- ❑ Measure using common tools and select appropriate units of measure.
  Example:
  To measure the classroom which tool would you use? Which unit would be used? A meter or yard stick would be used, using meters, feet or yards as units of measure. To determine the length of a book a ruler would be used and the unit would be inches or centimeters.

- ❑ Measure and compare integer* temperatures in degrees.

- ❑ Measure surface area of cubes and rectangular prisms by covering and counting area of the faces.
  Example: The surface area of one face of this cube is 9 square units. There are 6 faces that are all the same side so the surface area of the cube is 54 square units (9x6.)



Convert measurement units

- ❑ Carry out the following conversions from one unit of measure to a larger or smaller unit of measure:
  - meters(m) to centimeters(cm) 1 m = 100 cm,
  - kilograms(kg) to grams (g), liters (l) to milliliters (ml),
  - hours to minutes, 1 minutes to seconds,
  - years to months; 1 year=12 months
  - weeks to days; 1 week=7 days
  - feet to inches; 1 foot=12 inches
  - ounces to pounds; 1 pound=16 ounces

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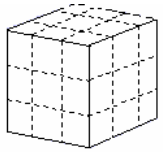

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8

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Use Perimeter and Area Formulas

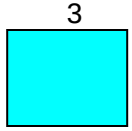
- Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.

Rectangle:

Perimeter= 2x length + 2x width
=(2x3)+(2x4)
=6+8=14 units

Area = length x width in square units
=3x4=12 square units

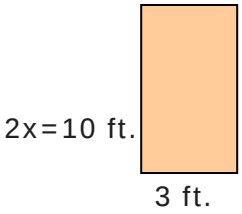
Square



Perimeter = 4 multiplied by a side length
4x3=12 units

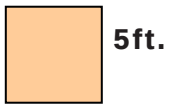
Area = side x side in square units
3x3=9 square units

- Find one dimension of a rectangle given the other dimension and its perimeter or area.



length = x; width = 3ft
Perimeter = x+ x + 3 + 3 = 16ft.
2x + 6 = 16 ft.
x=5 ft=length

- Find the side of a square given its perimeter or area.



Each side=5ft.
Area= s x s
Area= 25 sq. ft. s= 5 ft.

Use Perimeter and Area Formulas

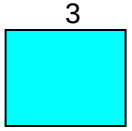
- Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.

Rectangle:

Perimeter= 2x length + 2x width
=(2x3)+(2x4)
=6+8=14 units

Area = length x width in square units
=3x4=12 square units

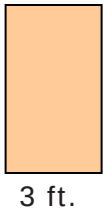
Square



Perimeter = 4 multiplied by a side length
4x3=12 units

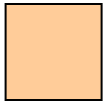
Area = side x side in square units
3x3=9 square units

- Find one dimension of a rectangle given the other dimension and its perimeter or area.



length = x; width = 3ft
Perimeter = x+ x + 3 + 3 = 16ft.
2x + 6 = 16 ft.
x=5 ft=length

- Find the side of a square given its perimeter or area.



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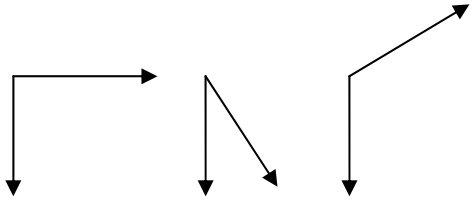
Understand Right Angles

- ❑ Identify right angles and compare angles to right angles.

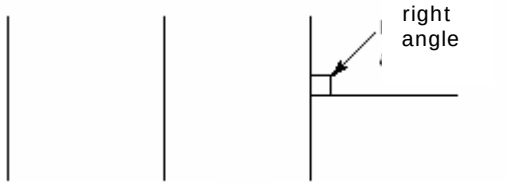


Which angle is smaller than a right angle?
Which angle is larger than a right angle?

GEOMETRY

Understand Perpendicular, Parallel, and Intersecting Lines

- ❑ Identify and draw perpendicular*, parallel*, and intersecting lines using a ruler and a tool or object with a square (90º) corner.



parallel lines perpendicular lines

Identify basic geometric shapes and their components, and solve problems

- ❑ Identify basic geometric shapes including isosceles*, equilateral* and right* triangles, and use their properties to solve problems.
- ❑ Identify and count the faces*, edges, and vertices* of basic three-dimensional geometric solids including cubes, rectangular prisms, and pyramids*; describe the shape of their faces.

cube rectangular prism

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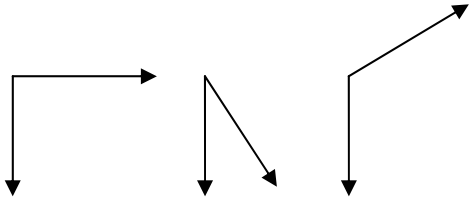

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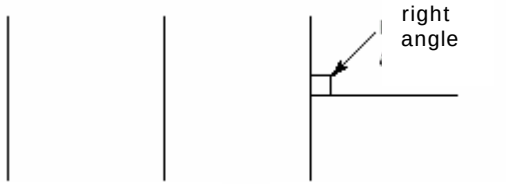

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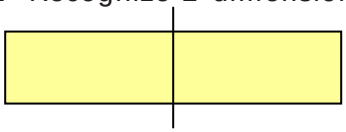
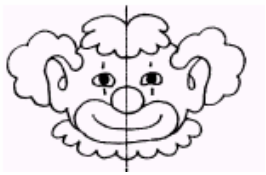
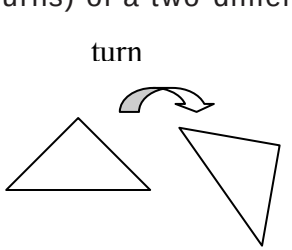
Recognize symmetry and transformations

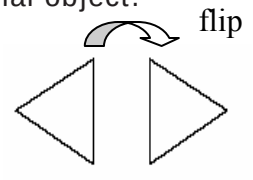
- Recognize 2-dimensional figures that have line symmetry.





- Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object.



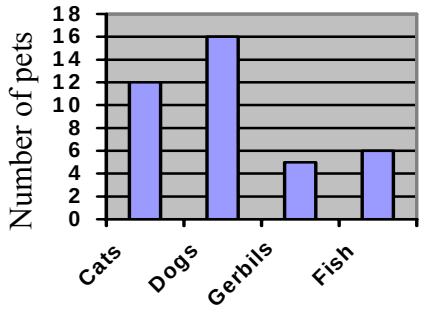


DATA AND PROBABILITY

Represent and Solve Problems for Given Data

- Construct tables and bar graphs from given data.
  Example:
  The students in Class A made a list of their pets: 16 dogs, 5 gerbils, 6 fish and12 cats. Make a bar graph that displays the students list of pets.

Title: Students' Pets of Class A



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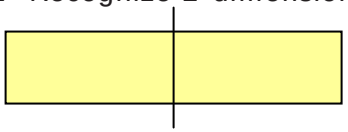

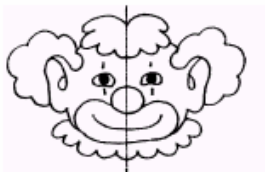

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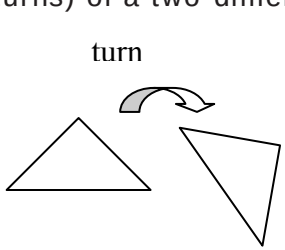

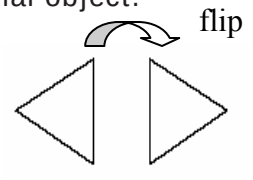

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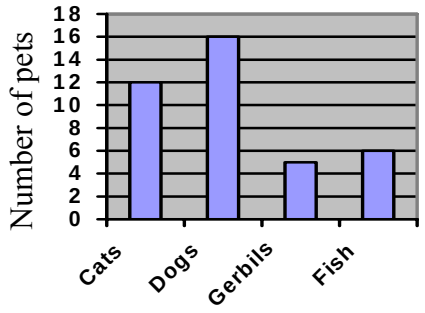


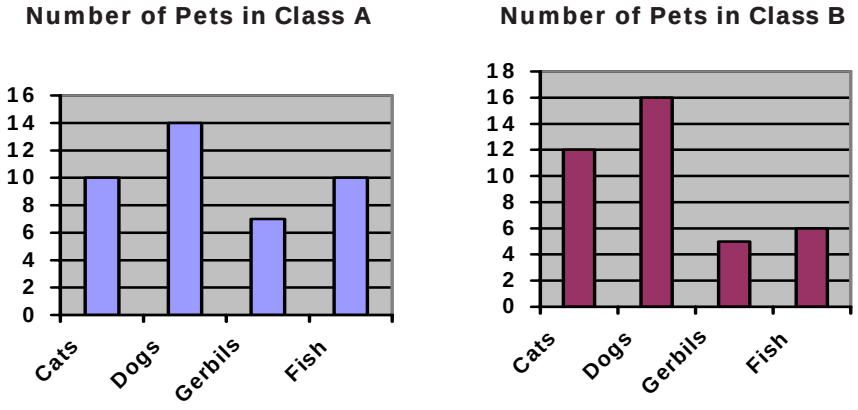
11

Michigan Department of Education: GLCE Parent's Guide – 4th Grade Math

DATA AND PROBABILITY, continued.

- Order a given set of data, find the median, and specify the range of values.
  Example:
  9,6,13,7,10,11,7 order numbers→ 6,7,7,**9**,10,11,13
  9 is the median (middle number)
  13-6= 7
  The range is the greatest number minus the least.
  The range is 7.

- Solve problems using data presented in tables and bar graphs.
  Example:
  Compare data represented in two bar graphs and read bar graphs showing two data sets.



Which class has more dogs as pets?
How much more?

Which class has the most pets altogether?

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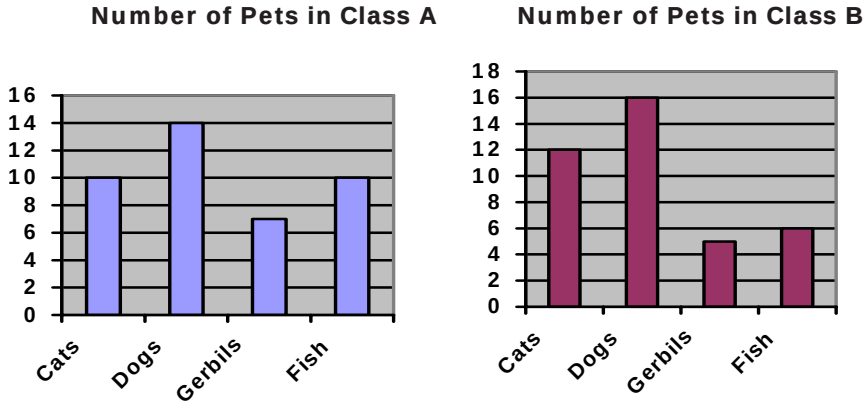

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GLOSSARY TERMS

algorithm – a specific step-by-step procedure for any mathematical operation
area – the number of square units needed to cover the inside of a shape; rectangle, square, triangle, etc.
bar graph – uses bars to show data
decimal – a number that uses a decimal point to show tenths and hundredths Example: 2.43
denominator – the bottom number of a fraction that shows the number of equal parts in a whole (In ¼, 4 is the denominator)
distributive property – when multiplying any two numbers, the job can often be made easier by breaking (decomposing) the numbers into smaller pieces. The multiplication can then be *distributed* over those numbers. [ax(c+d)=ac+ad]
equilateral triangle – a triangle whose sides are equal length and whose angles are equal measure
face – the 2-dimensional side of a 3-dimensional figure
hundredth – one out of 100 equal parts of a whole
integer – positive and negative whole numbers
isosceles triangle – a triangle with 2 sides of equal length and 2 angles of equal measure
numerator – the top number of a fraction that shows the number of equal parts compared to the number of parts in a whole, (In ⅔, 2 is the numerator)
parallel lines – straight lines that are an equal distance from each other and never cross
perimeter – the distance around the outside of a shape
perpendicular lines – two lines which form right angles where they intersect
prime number – a whole number greater than 1 that has only two factors, itself and 1
pyramid – a 3-dimensional geometric figure whose base is a polygon (triangle, rectangle, etc.) and whose faces are triangular and meet at a common vertex
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symmetry – a shape or figure has symmetry if it can be folded along a line so that both parts match exactly
tenth – one out of 10 equal parts of a whole
terminating decimal – a decimal that has a denominator that is a multiple of 10
vertex (*pl. vertices*) – the point where 2 lines, 2 sides of a polygon or 3 faces of 3-dimensional geometric figure come together

Questions to ask your child's teacher

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14
Michigan Department of Education: GLCE Parent's Guide – 4th Grade Math

Additional Questions

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(Insert school contact information here or delete.)

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