Tips and Activities for Parents

- Play games with your child such as checkers, board games, chess and increasingly complex card games. All involve problem solving and logic, and all are based on mathematics.

- Calculate the amount of discount and sale price for an item using advertisements, coupons and other special offers. For example, find the final cost or total amount of savings when buying a jacket on sale for 40% off the regular price of $45. What would be the cost and savings using a coupon for an additional 20% off the sale price?

- Discuss the meaning of data and information presented in the media. For example, discuss the meaning of "median income." Identify different ways for selecting a sample for a survey and how each might influence the results (e.g., a survey about a favorite sport might be different for persons leaving a baseball game than for persons selected at random).

Internet Resources for Eighth Grade Math

Wiredmath.ca is a free website created for students and teachers.
www.cemc2.math.uwaterloo.ca/wired_math/english/grade8.shtml

Sorted by grade level, this site provides the grade 8 student with an opportunity to practice basic math skills through unlimited interactive practice explanations and examples. It also includes challenge games. www.aaamath.com/grade8.html

If you are interested in mathematics, check out these mathematics pages.
www.kidport.com/Grade8/Math/MathIndex.htm

This site provides games and puzzles that require mathematics to solve.
www.awesomelibrary.org/Classroom/Mathematics/Middle-High_School_Math/Middle-High_School_Math.html

AAA Math features a comprehensive set of interactive arithmetic lessons for Kindergarten through the Eighth grade level. www.aaamath.com/

Cool Math is a network of sites for teachers, students, and parents dedicated to the idea that math is FUN. Enter the KIDS portal for math games, fun lessons, and educational calculators.
http://www.coolmath.com/

Visit "Mathematics Counts & Science Matters" at
www.promse.msu.edu

MICHIGAN STATE
U N I V E R S I T Y

PROM/SE
Promoting
Rigorous
Outcomes
in Mathematics and Science Education

■ Math in 8th grade continues the study of geometry concepts and generalizes arithmetic processes to solve algebra problems, which may involve equations that are not straight lines. Based on Michigan Grade Level Content Expectations, the following describes some of the central mathematical skills and understandings that students should acquire by the end of eighth grade.

■ Number and Operations

Real Numbers

1. Connect square roots to area and cube roots to volume; estimate roots to the nearest integer (e.g., $\sqrt{34}$ is between 5 and 6, $5^2 = 25$, $6^2 = 36$, so it's closer to 6, so it's about 5.8)

2. Understand and solve problems using percent increase and percent decrease, compound interest, and multiple discounts (e.g., $70 jeans are marked down 25% and then marked down another 10%; what is the final selling price?)

3. Know what real numbers (e.g., $^7/_3$. 2.8, -1, $\sqrt{2}$) are and how they are used, including understanding that in decimal form, rational numbers either end (e.g., one-half is 0.5) or eventually repeat (e.g., $^1/_3$ is 0.3333...) and locate rational numbers on a number line

■ Algebra

Equations, Inequalities, Functions

4. Understand the characteristics of families of equations, including those whose graphs are straight lines (e.g., $y = 2x + 3$), parabolas (e.g., $y = x^2$), and those that involve cubes (e.g., $y = x^3$), roots (e.g., $y = \sqrt{x}$), exponents ($y = 2^x$), and of the form $y = \frac{k}{x}$

5. Represent equations with tables, graphs, and equations; be able to describe and interpret characteristics of functions from graphs, equations or information listed in tables

6. Find the factors of simple mathematical expressions and use factoring to solve equations (e.g., if $x^2 + 2x - 3 = (x+3)(x-1) = 0$, $x = -3$ and 1)

7. Graph parabolas and identify the characteristics of the graph (e.g., if $y = x^2 + 2x - 3$, the minimum point on the graph is at (-1, -4) and the graph crosses the horizontal axis at -3 and 1)
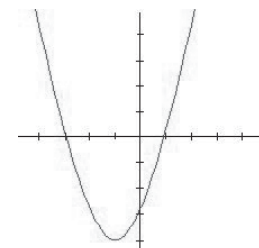
8. Find the points of intersection of two linear equations (e.g., the solution to both equations is the point (6, 4))

$x + y = 10$

$x - y = 2$

(6, 4)
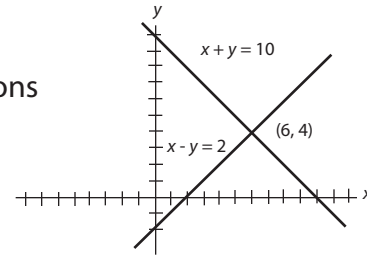
Example:

$$\begin{cases} x + y = 10 \\ x - y = 2 \end{cases}$$

add the equations
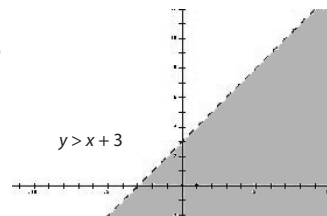
$2x = 12$
therefore
$x = 6$

substitute 6 in for x

$6 + y = 10$
therefore $y = 4$
and
$6 - y = 2$
therefore $y = 4$

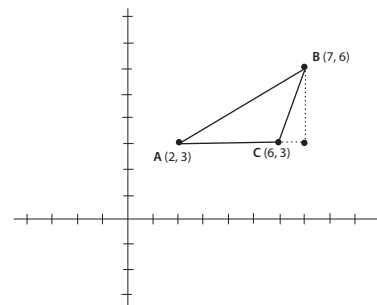9. Graph the solutions to linear inequalities

$y > x + 3$

■ Geometry

Pythagorean Theorem, Area, and Volume

10. Know and apply the Pythagorean Theorem to solve problems related to the perimeter, area, and volume of shapes and to find the distance between two points on the coordinate plane (e.g., the length of

B (7, 6)

A (2, 3)   C (6, 3)

$$\overline{AB} = \sqrt{(7-2)^2 + (6-3)^2} = \sqrt{25 + 9} = \sqrt{34} \approx 5.8\,)$$

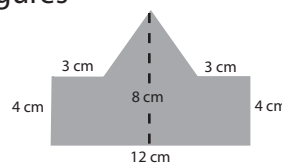11. Find the circumference and area of a circle and solve related problems

12. Find the area and perimeter of irregularly shaped figures

Example:
Area = $(4 \times 12) + \frac{1}{2}(6 \times 4) = 60$ cm^2
(area of rectangle) + (area of triangle)
Perimeter = $12 + 2(4) + 2(3) + 2(5) = 36$ cm

3 cm   3 cm
4 cm   8 cm   4 cm
12 cm

13. Find the volume and surface area of pyramids, cylinders, cones, and spheres

14. Solve problems involving flipping, turning, stretching or shrinking a figure

■ Data and Probability

Probability Concepts

15. Determine the consequences of using the mean or the median as an indicator for a list of numbers (e.g., the mean of 100, 100, 100, 200, and 1000 is 300, which is higher than all but one of the numbers)

16. Use theoretical and experimental probability to answer questions involving simple and compound events and identify common misconceptions related to probability

■ **Circumference** – distance around a circle

■ **Expression** – a sequence containing numbers, symbols, and operations representing a quantity (e.g., $3x + 5$)

■ **Factor** – an expression that divides into a given expression without a remainder (e.g., $x^2 - 1 = (x + 1)(x - 1)$, so $(x - 1)$ is a factor of $x^2 - 1$)

■ **Inequality** – a mathematical sentence that compares two unequal expressions using one of these symbols: < (less than), > (greater than), ≤ (less than or equal), ≥ (greater than or equal), or ≠ (not equal), (e.g., $6 > 3 + 2$)

■ **Mean** – the sum of the values in a list divided by the total number of entries in the list

■ **Median** – the value for an ordered list of numbers such that half of the numbers are above or equal to that value and half are below or equal to that the value

■ **Parabola** – the "U-shaped" curve that is the graph of the function

■ **Pyramid** – a three-dimensional figure whose base is a polygon and whose other faces (sides) are triangles that meet at a common point

■ **Pythagorean Theorem** – in any right triangle, the square of the longest side (the side opposite the right angle) is equal to the sum of the squares of the other two sides: in the figure, $a^2 + b^2 = c^2$

a   c
b

■ **Rational Numbers** – a number that can be expressed as a/b where a and b are integers and b is not zero (e.g., $3/8$, $7 = 7/1$, and $6.3 = 63/10$)

■ **Real Numbers** – all numbers that can be represented on the number line, including roots of numbers, positive and negative numbers, percents, and decimals

■ **Root: Square (Cube)** - a square or cube root of a number is a factor of the number whose square or cube equals the number (e.g., the cube root of 125 is five because $5^3 = 5 \times 5 \times 5$ or 125; the square root of 16 is 4 and -4 because $4^2 = 4 \times 4 = 16$ and $-4^2 = (-4) \times (-4) = 16$)

■ **Theoretical Probability** – the fraction between 0 and 1 obtained by dividing the number of possible outcomes for a specific event by the total number of possible outcomes (e.g., the theoretical probability of randomly drawing an ace from a well-shuffled deck of cards is 4 out of 52 or $4/52 = 1/13$)

■ **Experimental Probability** – the fraction obtained by dividing the number of actual outcomes of an experiment by the number of times the experiment was repeated (e.g., drawing an ace five times out of 90 draws gives an experimental probability of $5/90 = 1/14$)

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