# Middle School Core Concepts (6-8)

1) Geometry
   - (6) Solve real-world and mathematical problems involving area, surface area, and volume.
   - (7) Draw, construct, and describe geometrical figures and describe the relationships between them. Solve real-world and mathematical problems involving angle measure, area, surface area, and volume.
   - (8) Understand congruence and similarity using physical models, transparencies, or geometry software. Analyze angle relationships. Understand and apply the Pythagorean Theorem. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Ex. (6+): What is the area of the equilateral triangle shown below?

6cm

11cm
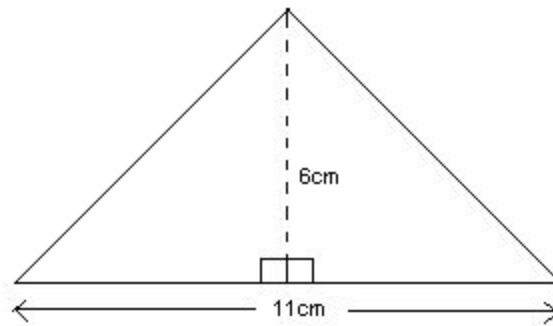
   a) 66cm   b) 17cm   c) 33cm   d) 47cm

Ex. (8+): What is the length of the hypotenuse of the right triangle below?

a = 5

c

b = 12
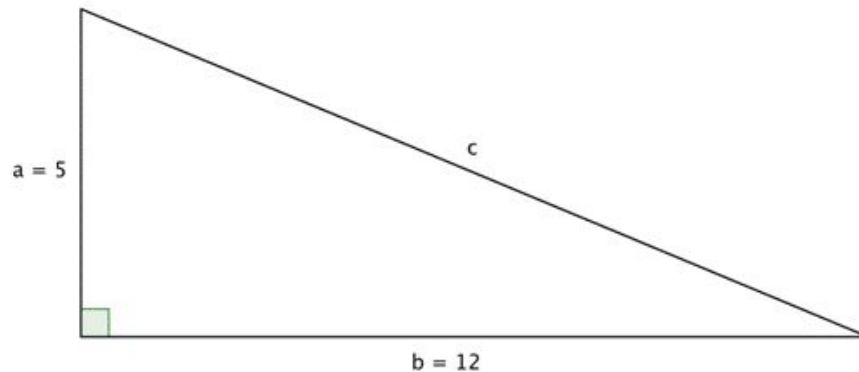
   a) 13cm   b) 60cm   c) 169cm   d) 30cm

2) Expressions & Equations
  - (6) Apply and extend previous understandings of arithmetic to algebraic expressions. Reason about and solve one-variable equations. Reason about one variable inequalities. Represent and analyze quantitative relationships between dependent and independent variables.
  - (7) Use properties of operations to generate equivalent expressions. Solve real-world and mathematical problems using numerical and algebraic expressions, equations, and inequalities.
  - (8) Work with radicals and integer exponents. Analyze and solve linear equations and inequalities. Analyze and solve pairs of simultaneous linear equations.

Ex. (6+): Considering the equation 30=5x, what is the value of x?
  a) 12   b) 150   c) 6.0   d) 0.6

Ex. (7+):

1. Simplify the expression below: $$2(4x + 5y)$$	2. Simplify the expression below: $$3(6y - 2x)$$
3. Combine like terms: $$x + x + x + y + y - z + z - z$$	4. Match the equivalent expressions below: $x + x + x + y + y$ $2y + 3x$ $2(x + 2y)$ $2x + 2y$ $x + x + y + y$ $2x + 4y$

3) Ratio & Proportional Relationships
- (6) Understand ratio concepts and use ratio reasoning to solve problems.
- (7) Analyze proportional relationships and use them to solve real-world and mathematical problems.

Ex. (6+): If the Math Club has 25 members total, of which 10 are male and the rest are female, what is the ratio of females to all club members?
a) 3:5   b) 2:5   c) 5:3   d) 5:2

4) The Number System
- (6) Apply and extend previous understandings of multiplication and division to divide fractions by fractions. Compute fluently with multi-digit numbers and find common factors and multiples. Apply and extend previous understandings of numbers to the system of rational numbers.
- (7) Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
- (8) Know that there are numbers that are not rational and approximate them by rational numbers.

Ex. (6+): What is the sum of $(\frac{1}{4})+(\frac{1}{6})$?
a) 1/10   b) 1/24   c) 2/24   d) 5/12

Ex. (7+): What is the product of $(\frac{1}{3})*(\frac{4}{5})$?
a) 4/15   b) 5/12   c) 12/5   d) 4/15

5) Statistics & Probability
- (6) Develop understanding of statistical variability. Summarize and describe distributions.
- (7) Use random sampling to draw inferences about a population. Make informal inferences to compare two populations. Investigate chance processes and develop, use, and evaluate probability models.
- (8) Investigate patterns of association in bivariate data.

Ex. (7+): What is the probability of rolling a prime number with a single die?
a) 1/6   b) 1/3   c) 1/2   d) 2/3

6) Functions
   - (8) Define, evaluate, and compare functions. Use functions to model relationships between quantities.

     Ex. (8+): What is the slope of the function $8=2x+16$?
       a) 8   b) 2   c) -4   d) 16