

## General Eighth Grade Math (GM.8)

**Focus Statement:** Eighth grade students will perform operations on real numbers; solve and graph equations; apply concepts of ratios, proportions and percents; and will apply geometric concepts and formulas to solve problems. **This curriculum addresses the following college readiness standards and score ranges:**

### **College Readiness Skills**

**Basic Operation & Application: 16-19**

**Probability, Statistics, & Data Analysis: 16-19**

**Numbers: Concepts & Properties: 20-23**

**Expressions, Equations, & Inequalities: 16-19**

**Graphical Representations: 16-19**

**Properties of Plane Figures: 20-23**

**Measurement: 20-23**

### **Outcomes:**

GM.8:1 Students will use real number properties to solve one-step equations and inequalities including those that contain integers.

**Illinois Learning Standards: 6A, 6B, 6C**

GM.8:1-1 Use the commutative, associative, distributive, zero, multiplicative inverse and identity properties to evaluate expressions.

GM.8:1-2 Simplify expressions containing integers using order of operations.

GM.8:1-4 Analyze, extend, and create sequences to describe the  $n$ th term in a sequence.

GM.8:1-5 Use exponential and scientific notation to describe numbers.

GM.8:1-6 Relate absolute value to distance on the number line.

GM.8:2 Students will solve algebraic equations and inequalities including those that contain containing integers.

**Illinois Learning Standards: 8B, 8C, 8D**

GM.8:2-1 Solve one-step algebraic equations containing integers.

GM.8:2-2 Solve and graph one-step inequalities containing integers.

GM.8:2-3 Identify, and graph up to two inequalities with a single variable(including the intersection or union of these inequalities) on a number line.

- GM.8:2-4 Write and simplify an expressions to represent unknown quantities, and recognize equivalent forms of algebraic expressions.
- GM.8:2-5 Solve multi-step algebraic equations containing integers.

GM.8:3: Students will use operations to evaluate expressions and solve equations with rational numbers.

**Illinois Learning Standards: 6B, 6C**

- GM.8:3-1 Use greatest common factors between numbers to simplify fractions.
- GM.8:3-2 Define and describe rules for operating with rational numbers.
- GM.8:3-3 Order and compare rational numbers.
- GM.8:3-4 Identify and locate rational numbers on a number line.
- GM.8:3-5 Perform addition and subtraction with rational numbers
- GM.8:3-6 Perform multiplication and division with rational numbers.
- GM.8:3-7 Describe the effects of multiplying and dividing rational numbers by other various number (e.g. a number less than zero; zero; a number between zero and one; and a number greater than one)
- GM.8:3-8 Simplify algebraic expressions with one or more rational variable values.

GM.8:4: Students will solve one-step algebraic equations and inequalities including those that contain containing rational numbers.

**Illinois Learning Standards: 8B, 8C, 6B, 6C**

- GM.8:4-1 Solve one-step equations with rational numbers.
- GM.8:4-2 Solve one-step inequalities with rational numbers and graph on a number line.
- GM.8:4-3 Determine the square and cubic roots of given numbers.
- GM.8:4-4 Define real numbers and identify a number as rational or irrational.
- GM.8:4-5 Solve multi-step equations containing rational numbers.

GM.8:5: Students will analyze and apply geometric concepts to make conjectures on angle relationships.

**Illinois Learning Standards: 9A, 9C**

- GM.8:5-1 Determine the relationship among angles formed by intersecting lines.
- GM.8:5-2 Solve problems involving angle measurement.
- GM.8:5-3 Justify properties of angles formed by parallel lines cut by a transversal and define angles using appropriate terminology (Examples: corresponding angles, alternate interior, alternate exterior).
- GM.8:5-4 Determine unknown angle measures using angle relationships and properties of polygons.
- GM.8:5-5 Make and test conjectures about the relationships between side length and angle measurement in various triangles and quadrilaterals.
- GM.8:5-6 Represent and identify geometric figures using coordinate geometry, including those resulting from transformations.
- GM.8:5-7 Analyze the results of a combination of transformations, and determine a different transformation that could produce the same result.

GM.8:6: Students will apply formulas to determine the total surface area of three-dimensional figures.

**Illinois Learning Standards: 7A, 7B, 7C, 9A, 9C**

- GM.8:6-1 Solve problems involving perimeter of polygons and composite figures.
- GM.8:6-2 Identify, describe, and determine the radius, diameter, and circumference of a circle and their relationship to each other and to pi.
- GM.8:6-3 Identify the edges, faces, and vertices of three-dimensional shapes.
- GM.8:6-4 Create three-dimensional shapes from two-dimensional representations of the object, including multiple views.
- GM.8:6-5 Identify front, side, and top views of a three-dimensional solid built with cubes.
- GM.8:6-6 Select an appropriate formula or strategy to find the surface area of a cube, triangular, and rectangular prism.
- GM.8:6-7 Calculate the surface area of a cube, triangular and rectangular prism.
- GM.8:6-8 Select an appropriate formula or strategy to find the surface area of a pyramid and a cylinder.
- GM.8:6-9 Calculate the surface area of a pyramid and a cylinder.
- GM.8:6-10 Select and use appropriate units and tools to measure surface area accurately for a given situation.

GM.8:7 Students will apply geometric concepts and formulas to solve problems involving the volume of three-dimensional objects. Student will apply the Pythagorean Theorem to justify a triangle as a right triangle and to determine the measure of a missing side.

**Illinois Learning Standards: 7A, 7B, 7C, 9A**

- GM.8:7-1 Solve pictorial and word problems that involve geometric relationships including the Pythagorean Theorem.
- GM.8:7-2 Analyze the relationship between sides of right triangles and apply the Pythagorean Theorem to solve for a missing side in a triangle.
- GM.8:7-3 Determine if a triangle is a right triangle using the Pythagorean Theorem.
- GM.8:7-4 Recognize Pythagorean triples.
- GM.8:7-5 Select an appropriate formula or strategy to find the volume of a cube, triangular, and rectangular prism.
- GM.8:7-6 Calculate the volume of a cube, triangular and rectangular prism.
- GM.8:7-7 Select an appropriate formula or strategy to find the volume of a pyramid and a cylinder.
- GM.8:7-8 Calculate the volume of a pyramid and a cylinder.
- GM.8:7-9 Select and use appropriate units and tools to measure volume accurately for a given situation.

GM.8:8 Students will apply ratios and proportions to solve a variety of problems.

**Illinois Learning Standards: 6D, 7A, 7B, 7C, 9A, 9B**

- GM.8:8-1 Solve equations using ratios and proportions.
- GM.8:8-2 Create a variety of equivalent ratios to represent a given situation.
- GM.8:8-3 Solve simple problems involving rate, time and distance.
- GM.8:8-4 Solve number sentences and word problems involving proportions and explain methods for solving such problems.
- GM.8:8-5 Solve problems involving mixed units of the same attribute including time, money, length, and area (Examples: feet and inches; minutes and seconds).
- GM.8:8-6 Use proportions to solve problems involving similar figures.
- GM.8:8-7 Use the Pythagorean Theorem and proportions to find missing side(s) in similar polygons.
- GM.8:8-8 Solve problems involving scale drawings, models, maps, or blueprints.
- GM.8:8-9 Create and analyze scale models using proportional reasoning.

GM.8:8-10 Solve simple scale conversions as on maps and diagrams.

GM.8:9 Students will represent parts of a whole in the form of a percent and apply percents to solve a variety of real life situations.

**Illinois Learning Standards: 6A, 6D, 10A, 10B**

GM.8:9-1 Represent parts of a whole as a fraction, decimal, or percent and use interchangeably to solve number sentences and word problems.

GM.8:9-2 Solve number sentences and word problems using percents.

GM.8:9-3 Create a circle graph given a set of data.

GM.8:9-4 Use proportions and equations to solve word problems that include interest, percent of increase and decrease, and other real life situations.

GM. 8:10 Students will solve linear equations and graph their solutions.

**Illinois Learning Standards: 8A, 8B, 8C, 8D**

GM.8:10-1 Graph a set of points and describe the relationship as linear or nonlinear.

GM.8:10-2 Create a table of values for simple linear equations and graph the ordered pairs on a coordinate plane.

GM.8:10-3 Analyze the results of transformations (reflections, translations, dilations and rotations).

GM.8:10-4 Calculate the slope of a line given two points.

GM.8:10-5 Describe patterns using rate of change.

GM.8:10-6 Identify the slope and the y-intercept of a given line on a graph.

GM.8:10-7 Identify slope and y-intercept of a linear equation when given slope-intercept form.

GM.8:10-8 Identify and graph direct variation equations.

GM.8:10-9 Solve word problems that involve linear equations or inequalities using algebraic or graphical representations.

GM.8:10-10 Solve systems of equations by graphing on a coordinate plane.

GM. 8:11 Students will use principles of probability to predict events in real-world situations.

**Illinois Learning Standards: 10C**

GM.8:11-1 Solve problems involving the probability of an event composed of repeated trials, compound events (including independent events), or future events with or without replacement.

- GM.8:11-2 Represent all possible outcomes (sample space) for simple or compound events (e.g., tables, grids, tree diagrams).
- GM.8:11-3 Solve simple problems involving the number of ways objects can be arranged (permutations and combinations).

GM. 8:12 Students will read, interpret, and display data using a variety of methods.  
**Illinois Learning Standards: 10A, 10B**

- GM.8:12-1 Read, interpret (including possible misleading characteristics), and make predictions from data represented in a bar graph, line (dot) plot, Venn diagram (with two or three circles), chart/table, line graph, scatter plot, circle graph, stem-and-leaf plot, or histogram.
- GM.8:12-2 Compare and contrast the effectiveness of different representations of the same data.
- GM.8:12-3 Create a bar graph, chart/table, line graph, or circle graph and solve a problem using the data in the graph for a given set of data.
- GM.8:12-4 Identify or draw a reasonable approximation of the line of best fit from a set of data or a scatter plot, and use the line to make predictions.
- GM.8:12-5 Analyze and apply measures of central tendency (mode, range, median, and mean) in problem-solving situations.