

Grade 7 Math

Solve problems involving operations with integers, including solving linear equations.

- Understand that 0 is an integer that is neither negative nor positive.
- Locate negative rational numbers (including integers) on the number line; know that numbers and their negatives add to 0 and are on opposite sides and at equal distance from 0 on a number line.
- Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.
- Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.
- Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition.
- Solve problems involving operations with integers.

Solve problems involving rates, ratios, and proportions using various methods.

- Express ratios in several ways given applied situations, e.g., 3 cups to 5 people, 3:5, $\frac{3}{5}$ (cups per person); recognize and find equivalent ratios.
- Find equivalent ratios by scaling up or scaling down.
- Solve applied problems involving rates including speed, e.g., if a car is going 50 mph, how far will it go in $3\frac{1}{2}$ hours?
- Solve problems involving derived quantities such as density, velocity, and weighted averages.
- Calculate rates of change including speed.
- Convert ratio quantities between different systems of units such as feet per second to miles per hour.
- Solve proportion problems using such methods as unit rate, scaling, finding equivalent fractions, and solving the proportion equation $\frac{a}{b} = \frac{c}{d}$; know how to see patterns about proportional situations in tables.
- Solve problems about similar figures and scale drawings.

From applied situations, generate and solve linear equations of the form $ax + b = c$ and $ax + b = cx + d$, and interpret solutions. (Equations may include integers and/or positive and negative decimals or fractions.)

- Relate simple linear equations with integer coefficients, e.g., $3x = 8$, $x + 5 = 10$, or $3x + 8 = 15$ to particular contexts and solve.
- Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property.
- Add, subtract, and multiply simple algebraic expressions of the first degree and justify using properties of real numbers. Be able to add, subtract, multiply, and divide positive and negative rational numbers fluently in algebraic expressions.

Represent directly proportional and linear relationships using verbal descriptions, tables, graphs, and formulas, and translate among these representations.

- Recognize when information given in a table, graph, or formula suggests a directly proportional or linear relationship.
- Represent directly proportional and linear relationships using verbal descriptions, tables, graphs, and formulas and translate among these representations.

- Given a directly proportional or other linear situation, graph and interpret the slope and intercept(s) in terms of the original situation; evaluate $y = mx + b$ for specific x values.
- For directly proportional or linear situations, solve applied problems using graphs and equations.
- Recognize and use directly proportional relationships of the form $y = mx$, and distinguish from linear relationships of the form $y = mx + b$, b non-zero; understand that in a directly proportional relationship between two quantities, one quantity is a constant multiple of the other quantity.
- Calculate the slope from the graph of a linear function as the ratio of “rise/run” for a pair of points on the graph, and express the answer as a fraction and a decimal; understand that linear functions have slope that is a constant rate of change.
- Represent linear functions in the form $y = x + b$, $y = mx$, and $y = mx + b$, and graph, interpreting slope and y -intercept.
- Find and interpret the x and/or y -intercepts of a linear equation or function. Know that the solution to a linear equation of the form $ax + b = 0$ corresponds to the point at which the graph of $y = ax + b$ crosses the x -axis.

Solve problems about similar figures and scale drawings (using concepts of proportionality).

- Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor.
- Show that two triangles are similar using the criteria: corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity); use these criteria to solve problems and to justify arguments.
- Understand and use the fact that when two triangles are similar with scale factor of r , their areas are related by a factor of r^2 .

Represent and interpret data using appropriate graphs.

- Represent and interpret data using circle graphs, stem and leaf plots, histograms, and box-and-whisker plots and select appropriate representation to address specific questions.
- Create and interpret scatter plots and use an estimated line of best fit to answer questions about the data.
- Calculate and interpret relative frequencies and cumulative frequencies for given data sets.
- Find and interpret the median, quartiles, and interquartile range of a given set of data.

Also in 7th grade:

- The concept of square root and cube root, and estimation with calculators. Square roots are used extensively in 8th grade with the Pythagorean Theorem.
- Estimate results of computations with rational numbers. This notion of number sense when using decimals and fractions is taught at all grades where decimals and fractions are studied, and emphasized in 6th grade. Students continue to work with decimals and fractions as coefficients of variable and unknowns in functions and equations. As you review decimals and fractions, make sure to emphasize estimation as a technique for knowing whether an answer is reasonable. **This GLCE is tested on the 8th grade MEAP.**
- Inversely proportional relationships. This is a nice extension of other relationships that students study in 7th grade. Inversely proportional relationships are not as central to continued study of algebra as directly proportional and linear relationships, which is why they were not included in the power standards.