

# Grade 8

Adopted 2023

## Grade 8

### Number Concepts & Computations

#### Rational & Irrational Numbers

A. Understand relationships among numbers and the real number system. **8.NCC.A**

1. Describe relationships in the real number system (rational and irrational).  
Numbers relationships to include: decimal expansion for rational and irrational numbers, square roots of nonperfect squares, and cube roots of nonperfect cubes **8.NCC.1**
2. Compare the size of irrational numbers and locate them on a number line by finding the rational approximations. **8.NCC.2**
3. Know and apply the properties of integer exponents to generate equivalent numerical expressions. **8.NCC.3**
4. Write very large and very small numbers in scientific notation using positive and negative exponents. **8.NCC.4**
5. Compare numbers written in scientific notation to determine how many times larger or smaller one number is than the other, using real-world and mathematical problems. **8.NCC.5**
6. Solve real-world and mathematical problems by performing operations with numbers written in standard and scientific notation. **8.NCC.6**

#### Rational Number Operations

B. Work with square and cube roots. **8.NCC.B**

7. Solve equations in the form of  $x^2 = p$  or  $x^3 = p$  where  $p$  is a positive rational number. **8.NCC.7**
8. Evaluate square roots of perfect squares and cube roots of perfect cubes. **8.NCC.8**

---

## Functions

### Proportional & Linear Relationships

- A. Understand slope using previous learning of proportional relationships. **8.FN.A**
1. Graph proportional relationships, interpreting the unit rate as the slope of the graph. **8.FN.1**
  2. Explain, using similar right triangles, how the slope of a line is the same between two points on a non-vertical line or non-horizontal line. Slope includes: positive, negative, horizontal (zero), and vertical (undefined) **8.FN.2**

### Functions

- B. Understand that a function is a rule that assigns each input exactly one output. **8.FN.B**
3. Determine whether a relation is a function or not when given a function map, table, graph, equation, or set of ordered pairs. **8.FN.3**
  4. Compare the rate of change (slope) and y-intercept (initial value) of two linear functions each represented in different forms. Functions are represented algebraically, graphically, numerically in tables, or by verbal descriptions. **8.FN.4**
  5. Distinguish between linear and nonlinear functions by comparing graphs and equations. **8.FN.5**
  6. Determine the rate of change (slope) and y-intercept (initial value) from tables, graphs, equations, and verbal descriptions of linear relationships. **8.FN.6**
  7. Interpret and explain the meaning of the rate of change (slope) and y-intercept (initial value) of a linear relationship in a real-world context. **8.FN.7**
  8. Analyze a graph by describing the functional relationships between two quantities. **8.FN.8**
  9. Sketch a graph that exhibits qualitative features of a function described verbally. **8.FN.9**

---

## Algebra

### Equations & Inequalities

- A. Solve linear equations and inequalities. **8.ALG.A**
  - 1. Analyze and solve one-variable linear equations with rational coefficients containing solutions with one, zero, or infinitely many solutions. **8.ALG.1**
  - 2. Analyze and solve one-variable linear inequalities with rational coefficients. **8.ALG.2**

### Systems of Equations

- B. Solve systems of equations. **8.ALG.B**
  - 3. Analyze and solve systems of linear equations in the form  $y = mx + b$  in real-world or mathematical contexts, graphically and algebraically. **8.ALG.3**

---

## Geometry & Measurement

### Area, Volume, & Surface Area

- A. Solve problems involving area, volume, and surface area. **8.GM.A**
1. Apply the formulas for the volume and surface area of cylinders, cones, and spheres to solve real-world and mathematical problems. **8.GM.1**

### Cross Sections

- B. Describe cross sections of three-dimensional figures. **8.GM.B**
2. Describe the two-dimensional figure that results from slicing a three-dimensional figure parallel and perpendicular to the base. **Three-dimensional figures include: pyramids, cones, and spheres** **8.GM.2**

### Pythagorean Theorem

- C. Explore right triangles and apply the Pythagorean Theorem. **8.GM.C**
3. Model or explain an informal proof of the Pythagorean Theorem and its converse. **8.GM.3**
  4. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles. **8.GM.4**
  5. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **8.GM.5**

### Transformations & Congruence on a Coordinate Plane

- D. Use concrete models, diagrams, or geometry to understand congruence and similarity. **8.GM.D**
6. Given a figure, draw a congruent figure on a coordinate plane resulting from a rotation, reflection, or translation. **8.GM.6**
  7. Identify a single transformation used to transform one figure onto another on a coordinate plane. **Rotations include:  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$**  **8.GM.7**
  8. Given two congruent figures, describe a sequence of transformations that maps one figure to another. **8.GM.8**
  9. Perform a given sequence of transformations of a figure on the coordinate plane, including rotations, reflections, translations, and dilations. **Rotations include:  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$**  **8.GM.9**
  10. Describe the effects of rotations, reflections, translations, and dilations on two-dimensional figures using coordinates. **Rotations include:  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$**  **8.GM.10**
  11. Given two similar two-dimensional figures, describe a sequence of transformations that exhibits similarity, including rotations, reflections, translations, and dilations. **8.GM.11**

---

## Statistics & Probability

### Bivariate Data

- A. Investigate patterns of association to bivariate data. **8.SP.A**
  - 1. Construct scatter plots using bivariate data; determine if the data displays a linear or nonlinear pattern and positive, negative, or no association. **8.SP.1**
  - 2. Construct straight lines to approximately fit data displaying a linear association when presented in scatter plots. **8.SP.2**
  - 3. Construct and interpret a relative frequency table, using data from two categorical variables collected from the same subject. **8.SP.3**

### Probability

- B. Understand theoretical and experimental probability for compound experiments using organized lists, tables, or tree diagrams. **8.SP.B**
  - 4. Determine the sample space and use the sample space to determine the theoretical probability of a given set of outcomes for compound experiments, using organized lists, tables, or tree diagrams.
    - Compound experiments include a combination of two different experiments.**8.SP.4**
  - 5. Determine theoretical and experimental probabilities of compound experiments. **8.SP.5**
  - 6. Use theoretical probability of an event in a compound experiment to predict the number of times that event will occur for a large number of experiments. **8.SP.6**