COLLEGE tutors®

Mathematics Curriculum: 8th Grade

Based on Indiana Department of Education Academic Standards

Week 1

+ Number Sense

- Give examples of rational and irrational numbers and explain the difference between them
    - Understand that every number has a decimal expansion; for rational numbers, show that the decimal expansion terminates or repeats, and convert a decimal expansion that repeats into a rational number
- Use rational approximations of irrational numbers to compare the size of irrational numbers, plot them approximately on a number line, and estimate the value of expressions involving irrational numbers
- Given a numeric expression with common rational number bases and integer exponents, apply the properties of exponents to generate equivalent expressions
- Use square root symbols to represent solutions to equations of the form x^2 = p, where p is a positive rational number

Week 2

+ Computation

- Solve real-world problems with rational numbers by using multiple operations
- Solve real-world and other mathematical problems involving numbers expressed in scientific notation, including problems where decimal and scientific notation are both used
- Write an estimation of a large quantity by expressing it as the product of a single-digit number and a positive power of ten
- Write an estimation of a very small quantity by expressing it as the product of a single-digit number and a negative power of ten
- Compare and compute quantities written in scientific notation

Week 3

+ Algebra and Functions

- Solve linear equations with rational number coefficients fluently, including equations whose solutions require expanding expressions using the distributive property and collecting like terms
    - Represent real-world problems using linear equations and inequalities in one variable and solve such problems
- Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions
    - Show which of these possibilities is the case by transforming a given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers)
- Understand that a function assigns to each x-value (independent variable) exactly one y-value (dependent variable), and that the graph of a function is the set of ordered pairs (x,y)
- Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value)

Week 4

+ Algebra and Functions (Continued)

- Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear
    - Recognize in y = mx + b that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem
    - Describe similarities and differences between linear and nonlinear functions from tables, graphs, verbal descriptions, and equations
- Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph
- Compare properties of two linear functions given in different forms, such as a table of values, equation, verbal description, and graph
- Understand that solutions to a system of two linear equations correspond to points of intersection of their graphs because points of intersection satisfy both equations simultaneously
    - Approximate the solution of a system of equations by graphing and interpreting the reasonableness of the approximation

Week 5

+ Geometry and Measurement

- Identify, define and describe attributes of three-dimensional geometric objects (right rectangular prisms, cylinders, cones, spheres, and pyramids)
    - Explore the effects of slicing these objects using appropriate technology and describe the two-dimensional figure that results
- Solve real-world and other mathematical problems involving volume of cones, spheres, and pyramids and surface area of spheres
- Verify experimentally the properties of rotations, reflections, and translations, including: lines are mapped to lines, and line segments to line segments of the same length; angles are mapped to angles of the same measure; and parallel lines are mapped to parallel lines

Week 6

+ Geometry and Measurement (Continued)

- Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations
- Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates
- Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions
- Apply the Pythagorean Theorem to find the distance between two points in a coordinate plane

Week 7

+ Data Analysis, Statistics, and Probability

- Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables
    - Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association
- Know that straight lines are widely used to model relationships between two quantitative variables

- For scatter plots that suggest a linear association, informally fit a straight line, and describe the model fit by judging the closeness of the data points to the line

- Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data; interpret the slope and y-intercept

Week 8

+ Data Analysis, Statistics, and Probability (Continued)

- Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs
  - Understand and use appropriate terminology to describe independent, dependent, complementary, and mutually exclusive events
- Represent sample spaces and find probabilities of compound events (independent and dependent) using methods, such as organized lists, tables, and tree diagrams
- For events with a large number of outcomes, understand the use of the multiplication counting principle
  - Develop the multiplication counting principle and apply it to situations with a large number of outcomes