

**Virtual Learning Academy**  
**Jefferson County Educational Service Center**  
**Academic Content Standards**  
**Math 08**

**Lesson 1 - Review of Computations: Decimals and Integers**

Math 8 Lesson 1 - Review of Computations: Decimals and Integers

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)

**Lesson 2 - Adding and Subtracting Fractions**

Math 8 Lesson 2 - Adding and Subtracting Fractions

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)

**Lesson 3 - Multiplying and Dividing Fractions**

Math 8 Lesson 3 - Multiplying and Dividing Fractions

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)

**Lesson 4 - Percents and Changing Percents, Ratios, Transitions between Fractions, Decimals and Percents**

Math 8 Lesson 4 - Percents and Changing Percents, Ratios, Transitions between Fractions, Decimals and Percents

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)

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**Lesson 5 - Perfect Square, Numbers and Square Roots**

Math 8 Lesson 5 - Perfect Square, Numbers and Square Roots

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)

**Lesson 6 - Geometry Vocabulary, Angles, Angle Measure, Parallel Lines**

Math 8 Lesson 6 - Geometry Vocabulary, Angles, Angle Measure, Parallel Lines

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)

**Lesson 7 - Determining if an Estimate is Sufficient, Estimating Computing and Solving Problems, then Judging the Reasonableness of the Solution**

Math 8 Lesson 7 - Determining if an Estimate is Sufficient, Estimating Computing and Solving Problems, then Judging the Reasonableness of the Solution

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
05. Determine when an estimate is sufficient and when an exact answer is needed in problem situations, and evaluate estimates in relation to actual answers; e.g., very close, less than, greater than. (08)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)

**Lesson 8 - Using Scientific Notation**

Math 8 Lesson 8 - Using Scientific Notation

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
A. Use scientific notation to express large numbers and numbers less than one. (08-10)

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01. Use scientific notation to express large numbers and small numbers between 0 and 1. (08)
I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents. (08-10)
08. Add, subtract, multiply, divide and compare numbers written in scientific notation. (08)

### **Lesson 9 - The Real Number System**

Math 8 Lesson 9 - The Real Number System

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
B. Identify subsets of the real number system. (08-10)
02. Recognize that natural numbers, whole numbers, integers, rational numbers and irrational numbers are subsets of the real number system. (08)
C. Apply properties of operations and the real number system, and justify when they hold for a set of numbers. (08-10)
04. Explain and use the inverse and identity properties and use inverse relationships (addition/subtraction, multiplication/division, squaring/square roots) in problem solving situations. (08)

### **Lesson 10 - Order of Operations**

Math 8 Lesson 10 - Order of Operations

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents. (08-10)
03. Apply order of operations to simplify expressions and perform computations involving integer exponents and radicals. (08)

### **Lesson 11 - Square Roots of Perfect Squares and Approximating Non-Perfect Squares**

Math 8 Lesson 11 - Square Roots of Perfect Squares and Approximating Non-Perfect Squares

<b>Standard Benchmark and Indicator</b>
S01. Number, Number Sense and Operations
H. Find the square root of perfect squares, and approximate the square root of non-perfect squares. (08-10)
07. Find the square root of perfect squares, and approximate the square root of non-perfect squares as consecutive integers between which the root lies; e.g., (08)

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**Lesson 12 - Compare and Order the Relative Size of Customary and Metric Units**

Math 8 Lesson 12 - Compare and Order the Relative Size of Customary and Metric Units

Standard Benchmark and Indicator
S02. Measurement
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
01. Explain how a small error in measurement may lead to a large error in calculated results. (08)
D. Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates. (08-10)
01. Compare and order the relative size of common U.S. customary units and metric units; e.g., mile and kilometer, gallon and liter, pound and kilogram. (08)
02. Use proportional relationships and formulas to convert units from one measurement system to another; e.g., degrees Fahrenheit to degrees Celsius. (08)

**Lesson 13 - Find Sums of Interior and Exterior Angles of Regular Convex Polygons**

Math 8 Lesson 13 - Find Sums of Interior and Exterior Angles of Regular Convex Polygons

Standard Benchmark and Indicator
S02. Measurement
E. Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (08-10)
08. Find the sum of the interior and exterior angles of regular convex polygons with and without measuring the angles with a protractor. (08)

**Lesson 14 - Perimeter, Circumference, and Area with Established Formulas**

Math 8 Lesson 14 - Perimeter, Circumference, and Area with Established Formulas

Standard Benchmark and Indicator
S02. Measurement

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C. Apply indirect measurement techniques, tools and formulas, as appropriate, to find perimeter, circumference and area of circles, triangles, quadrilaterals and composite shapes, and to find volume of prisms, cylinders, and pyramids. (08-10)
09. Demonstrate understanding of the concepts of perimeter, circumference and area by using established formulas for triangles, quadrilaterals, and circles to determine the surface area and volume of prisms, pyramids, cylinders, spheres and cones. (Note: Only volume should be calculated for spheres and cones.) (08)

**Lesson 15 - Two Dimensional Figures and Three Dimensional Shapes**

Math 8 Lesson 15 - Two Dimensional Figures and Three Dimensional Shapes

Standard Benchmark and Indicator
S03. Geometry and Spatial Sense
B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence. (08-10)
01. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects. (08)
D. Use coordinate geometry to represent and examine the properties of geometric figures. (08-10)
01. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects. (08)
H. Establish the validity of conjectures about geometric objects, their properties and relationships by counter-example, inductive and deductive reasoning, and critiquing arguments made by others. (08-10)
01. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects. (08)

**Lesson 16 - Formulas to Find Volumes of Many Shapes**

Math 8 Lesson 16 - Formulas to Find Volumes of Many Shapes

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03. Use appropriate levels of precision when calculating with measurements. (08)
<b>S03. Geometry and Spatial Sense</b>
B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence. (08-10)
01. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects. (08)
D. Use coordinate geometry to represent and examine the properties of geometric figures. (08-10)
01. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects. (08)
H. Establish the validity of conjectures about geometric objects, their properties and relationships by counter-example, inductive and deductive reasoning, and critiquing arguments made by others. (08-10)
01. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects. (08)

**Lesson 17 - Formulas to Find Volumes and Surface Areas of Many Shapes**

**Math 8 Lesson 17 - Formulas to Find Volumes and Surface Areas of Many Shapes**

<b>Standard Benchmark and Indicator</b>
<b>S02. Measurement</b>
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
04. Derive formulas for surface area and volume and justify them using geometric models and common materials. For example, find: (08)
04. the surface area of a cylinder as a function of its height and radius; (08)
04. that the volume of a pyramid (or cone) is one-third of the volume of a prism (or cylinder) with the same base area and height. (08)
C. Apply indirect measurement techniques, tools and formulas, as appropriate, to find perimeter, circumference and area of circles, triangles, quadrilaterals and composite shapes, and to find volume of prisms, cylinders, and pyramids. (08-10)
05. Determine surface area for pyramids by analyzing their parts. (08)

**Lesson 18 - Mid-Term Examination**

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**Lesson 19 - Solve and Determine Reasonableness for Problems Involving Rates and Derived Formulas**

Math 8 Lesson 19 - Solve and Determine Reasonableness for Problems Involving Rates and Derived Formulas

Standard Benchmark and Indicator
S02. Measurement
A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. (08-10)
06. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs. (08)
D. Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates. (08-10)
07. Apply proportional reasoning to solve problems involving indirect measurements or rates. (08)
F. Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions. (08-10)
06. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs. (08)

**Lesson 20 - Recognize the Angles Formed and the Relationship Between the Angles when Two Parallel Lines are Cut by a Transversal**

Math 8 Lesson 20 - Recognize the Angles Formed and the Relationship Between the Angles when Two Parallel Lines are Cut by a Transversal

Standard Benchmark and Indicator
S03. Geometry and Spatial Sense
C. Recognize and apply angle relationships in situations involving intersecting lines, perpendicular lines and parallel lines. (08-10)
02. Recognize the angles formed and the relationship between the angles when two lines intersect and when parallel lines are cut by a transversal. (08)

**Lesson 21 - Use Proportions in Several Forms to Solve Problems with Similar Figures**

Math 8 Lesson 21 - Use Proportions in Several Forms to Solve Problems with Similar Figures

Standard Benchmark and Indicator
S03. Geometry and Spatial Sense
B. Describe and apply the properties of similar and congruent figures; and justify

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conjectures involving similarity and congruence. (08-10)
03. Use proportions in several forms to solve problems involving similar figures (part-to-part, part-to-whole, corresponding sides between figures). (08)

**Lesson 22 - Draw the Result of Translations, Reflections, Rotations and Dilations of Objects in the Coordinate Plane, and Determine which Properties Remain Fixed**

Math 8 Lesson 22 - Draw the Result of Translations, Reflections, Rotations and Dilations of Objects in the Coordinate Plane, and Determine which Properties Remain Fixed

<b>Standard Benchmark and Indicator</b>
S03. Geometry and Spatial Sense
F. Represent and model transformations in a coordinate plane and describe the results. (08-10)
05. Draw the results of translations, reflections, rotations and dilations of objects in the coordinate plane, and determine properties that remain fixed; e.g., lengths of sides remain the same under translations. (08)

**Lesson 23 - Nets for a Variety of Prisms, Pyramids, Cylinders, and Cones**

Math 8 Lesson 23 - Nets for a Variety of Prisms, Pyramids, Cylinders, and Cones

<b>Standard Benchmark and Indicator</b>
S03. Geometry and Spatial Sense
E. Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology. (08-10)
06. Draw nets for a variety of prisms, pyramids, cylinders and cones. (08)

**Lesson 24 - Various Representations of a Relationship; Use of Variables to Include Co-Variants where Y Depends on X; Solution of a 2 X 2 System of Equations**

Math 8 Lesson 24 - Various Representations of a Relationship; Use of Variables to Include Co-Variants where Y Depends on X; Solution of a 2 X 2 System of Equations

<b>Standard Benchmark and Indicator</b>
01. Relate the various representations of a relationship; i.e., relate a table to
D. Use algebraic representations, such as tables, graphs, expressions, functions
04. Extend the uses of variables to include covariants where (08)
H. Solve systems of linear equations involving two variables graphically and
10. Solve 2 by 2 systems of linear equations graphically and by simple

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substitution. (08)
11. Interpret the meaning of the solution of a 2 by 2 system of equations; i.e., point, line, no solution. (08)

**Lesson 25 - Between the Set of Ordered Pairs**

Math 8 Lesson 25 - Between the Set of Ordered Pairs

<b>Standard Benchmark and Indicator</b>
S04. Patterns, Functions and Algebra
J. Describe and interpret rates of change from graphical and numerical data. (08-10)
13. Compute and interpret slope, midpoint and distance given a set of ordered pairs. (08)

**Lesson 26 - Solve Simple Quadratic Equations Graphically**

Math 8 Lesson 26 - Solve Simple Quadratic Equations Graphically

<b>Standard Benchmark and Indicator</b>
S04. Patterns, Functions and Algebra
G. Solve quadratic equations with real roots by graphing, formula and factoring. (08-10)
12. Solve simple quadratic equations graphically; e.g., (08)

**Lesson 27 - Linear Equations and Inequalities; Types of Changes in Mathematical Relationships**

Math 8 Lesson 27 - Linear Equations and Inequalities; Types of Changes in Mathematical Relationships

<b>Standard Benchmark and Indicator</b>
09. Solve linear equations and inequalities graphically, symbolically and using technology. (08)
I. Model and solve problem situations involving direct and inverse variation. (08-10)
14. Differentiate and explain types of changes in mathematical relationships, such as linear vs. nonlinear, continuous vs. noncontinuous, direct variation vs.
J. Describe and interpret rates of change from graphical and numerical data. (08-10)

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J. Describe and interpret rates of change from graphical and numerical data. (08-10)
15. Describe and compare how changes in an equation affects the related graphs; e.g., for a linear equation changing the coefficient of (08)
16. Use graphing calculators or computers to analyze change; e.g., interest compounded over time as a nonlinear growth pattern. (08)

**Lesson 28 - Functions as Linear or Nonlinear Based on Information Given in a Table, Graph or Equation**

Math 8 Lesson 28 - Functions as Linear or Nonlinear Based on Information Given in a Table, Graph or Equation

<b>Standard Benchmark and Indicator</b>
S04. Patterns, Functions and Algebra
B. Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations. (08-10)
03. Identify functions as linear or nonlinear based on information given in a table, graph or equation. (08)

**Lesson 29 - Shapes Using Coordinate Geometry**

Math 8 Lesson 29 - Shapes Using Coordinate Geometry

<b>Standard Benchmark and Indicator</b>
S03. Geometry and Spatial Sense
D. Use coordinate geometry to represent and examine the properties of geometric figures. (08-10)
04. Represent and analyze shapes using coordinate geometry; e.g., given three vertices and the type of quadrilateral, find the coordinates of the fourth vertex. (08)

**Lesson 30 - Use Physical Models to Add and Subtract Monomials and Polynomials, and to Multiply a Polynomial by a monomial; Simplify and Evaluate Algebraic Expressions**

Math 8 Lesson 30 - Use Physical Models to Add and Subtract Monomials and Polynomials, and to Multiply a Polynomial by a monomial; Simplify and Evaluate Algebraic Expressions

<b>Standard Benchmark and Indicator</b>
S04. Patterns, Functions and Algebra
D. Use algebraic representations, such as tables, graphs, expressions, functions
05. Use physical models to add and subtract monomials and polynomials, and to
08. Write, simplify and evaluate algebraic expressions (including formulas) to

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generalize situations and solve problems. (08)

**Lesson 31 - Relationship Between Graph of a Line and its Equation;  
Symbolic Algebra Graphs and Tables**

Math 8 Lesson 31 - Relationship Between Graph of a Line and its Equation; Symbolic Algebra  
Graphs and Tables

<b>Standard Benchmark and Indicator</b>
S04. Patterns, Functions and Algebra
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
07. Use symbolic algebra (equations and inequalities), graphs and tables to represent situations and solve problems. (08)
E. Analyze and compare functions and their graphs using attributes, such as rates of change, intercepts and zeros. (08-10)
06. Describe the relationship between the graph of a line and its equation, including being able to explain the meaning of slope as a constant rate of change and y-intercept in real-world problems. (08)
F. Solve and graph linear equations and inequalities. (08-10)
07. Use symbolic algebra (equations and inequalities), graphs and tables to represent situations and solve problems. (08)

**Lesson 32 - Effectiveness of Graphs as they Represent Data**

Math 8 Lesson 32 - Effectiveness of Graphs as they Represent Data

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appropriate. (08)
B. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose. (08-10)
02. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose; e.g., line graph for change over time, circle graph for part-to-whole comparison, scatterplot for relationship between two variants. (08)
F. Construct convincing arguments based on analysis of data and interpretation of graphs. (08-10)
06. Make conjectures about possible relationship in a scatterplot and approximate line of best fit. (08)
09. Construct convincing arguments based on analysis of data and interpretation of graphs. (08)

**Lesson 33 - Discrete and Continuous Data; 2 Sets of Data using Measures; Different Ways of Selecting Samples**

Math 8 Lesson 33 - Discrete and Continuous Data; 2 Sets of Data using Measures; Different Ways of Selecting Samples

<b>Standard Benchmark and Indicator</b>
S05. Data Analysis and Probability
B. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose. (08-10)
03. Differentiate between discrete and continuous data and appropriate ways to represent each. (08)
D. Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data. (08-10)
04. Compare two sets of data using measures of center (mean, mode, median) and measures of spread (range, quartiles, interquartile range, percentiles). (08)
E. Evaluate the validity of claims and predictions that are based on data by examining the appropriateness of the data collection and analysis. (08-10)
08. Describe how the relative size of a sample compared to the target population affects the validity of predictions. (08)
G. Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population. (08-10)
07. Identify different ways of selecting samples, such as survey response, random sample, representative sample and convenience sample. (08)

**Lesson 34 - Means Sensitivity to Extremes**

Math 8 Lesson 34 - Means Sensitivity to Extremes

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C. Compare the characteristics of the mean, median and mode for a given set of data, and explain which measure of center best represents the data. (08-10)
05. Explain the mean's sensitivity to extremes and its use in comparison with the median and mode. (08)

**Lesson 35 - Calculate Number of Possible Outcomes**

Math 8 Lesson 35 - Calculate Number of Possible Outcomes

<b>Standard Benchmark and Indicator</b>
S05. Data Analysis and Probability
H. Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes. (08-10)
10. Calculate the number of possible outcomes for a situation, recognizing and accounting for when items may occur more than once or when order is important. (08)
J. Compute probabilities of compound events, independent events, and simple dependent events. (08-10)
11. Demonstrate an understanding that the probability of either of two disjoint events occurring can be found by adding the probabilities for each and that the probability of one independent event following another can be found by multiplying the probabilities. (08)

**Lesson 36 - Final Examination**

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