



# **Mathematics Benchmarks Middle School**

# GRADE 6

## MATHEMATICS

In grade six at the middle school there are two different course offerings. For those students who have demonstrated a high level of achievement in the elementary math program we offer an advanced mathematics course (Phase II). For most students the grade six mathematics program cover the following objectives:

- § Number Sense
- § Comparing and Order Whole Numbers
- § Mental Math: Division Patterns
- § Prime and Composite Numbers
- § Mental Math: Divisibility
- § Comparing and Ordering Integers
- § Factors and Greatest Common Factor
- § Multiples and Least common Multiple
- § Fractions and Equivalent Fractions
- § Fractions, Mixed Numbers, and Decimals
- § Decimals
- § Finding Needed Information

### **Whole Numbers: Number Sense, Estimation & Approximation & Operations**

- Use the number line to represent, locate, and compare whole numbers.
- Understand the relative magnitude and relationships among whole numbers.
- Develop and use strategies to estimate the results of whole number computation.
- Use estimation to predict reasonable outcomes.
- Delineate the strategies for using estimation in whole number problem solving
- Compute, use, and explain the process of adding and subtracting.
- Compute, use, and explain the process of multiplying and dividing.

### **Fractions: Number Sense, Estimation & Approximation & Operations**

- Build models, draw pictures, and use the number line to locate fractions.
- Recognize, compare, and generate equivalent forms of commonly used fractions.
- Develop and use strategies to estimate the results of fraction computation.
- Delineate the strategies for using estimation in problem situations involving fractions.
- Compute, use, and explain the process of adding and subtracting fractions.
- Compute, use, and explain the process of multiplying and dividing fractions.

### **Decimals: Number Sense, Estimation & Approximation & Operations**

- Use models, diagrams, and the number line to represent and locate decimals.
- Identify and describe the relationship between fractions and decimals.
- Compare and order fractions and decimals in equivalent forms
- Develop and use strategies to estimate the results of decimal computation.
- Delineate the strategies to solve estimation problems with decimals.
- Compute, use, and explain the process of adding and subtracting decimals.
- Compute, use, and explain the process of multiplying and dividing decimals.

### **Ratios, Proportions, and Percents**

- Understand, use, and explain ratios.

- Read, interpret, and create drawings and models to scale.
- Understand, use, and explain proportions.
- Understand, use, and explain percents.
- Understand, use, and explain the relationships among fractions, decimals, and percents.
- Provide a written explanation for the methods of solving problems involving ratios, proportions, and percents.
- Estimate and explain how to find ratios, proportions, and/or percents.

### **Statistics: Estimation, Approximation & Statistics**

- Collect and organize data using a variety of graphic representations
- Generate, collect, organize, display, and analyze data.
- Use data and statistical measures for a variety of purposes.
- Use, Compute, and explain mean, mode, median, and range of a set of data.
- Estimate and solve problems involving means, modes, medians, and ranges.
- Use a variety of technology techniques to analyze data and make predictions.

### **Probability**

- Manipulate concrete objects to determine possible outcomes.
- Recognizes events that are sure to happen, sure not to happen, and may or may not happen.
- Find the probability of a single event using simulations or experiments.
- Solve problems involving notions of probability and fairness.

### **Patterns**

- Identify, describe, extend, and construct numeric and geometric patterns.
- Construct a pattern generalization by stating the rule.
- Use patterns and relationships to represent and solve problems.

### **Measurement**

- Identify, choose, and use the appropriate units and measurement tools.
- Use metric and customary units to measure length, weight, capacity, and temperature.
- Change units within the metric system and the English system
- Use and explain specific strategies to estimate and round quantities and measurements.
- Understand and apply basic measures for finding perimeter, circumference, area, and volume.

### **Geometry and Spatial Relationships**

- Identify, classify, and compare real world one, two, and three -dimensional figures.
- Define, classify, and compare plane and solid figures using their distinctive properties.
- Identify, draw, and explain geometric transformations.
- Understand, describe, and apply the properties of lines and angles.
- Recognize and apply geometric ideas and relationships to solve problems involving geometric concepts.
- Locate, give coordinates of, and graph plane figures in all quadrants of a coordinate plane.
- Use models to create, draw, and explain front, side, and top views of 3-dimensional figures.

### **Algebra and Functions**

- Use an equation to show that two quantities are equal.
- Understand and use a variable as a symbol that stands for one or more numbers.
- Solve a simple equation using concrete, informal, and formal methods.

- Understand, use, and explain functions as a means of showing quantitative change.

### **Integers: Number Sense & Operations**

- Locate integers on a number line.
- Can articulate the role of positive and negative integers in the number system.
- Use manipulatives to add and subtract integers.

### **Math Applications**

- Sort and classify data based on multiple attributes.
- Solve numerical, spatial, and statistical problems that arise in math and in other contexts by applying and adapting a variety of appropriate problem solving strategies.
- Organize and consolidate mathematical thinking through verbal and written communication.
- Create and use representations or models to organize, record, and communicate mathematical ideas to justify solutions to a problem.

# GRADE 6 - PHASE II

## MATHEMATICS

In grade six at the middle school there are two different course offerings. For those students who have demonstrated a high level of achievement in the elementary math program we offer an advanced mathematics course (Phase II).

### **Whole Numbers: Number Sense, Estimation, and Computation**

- Use the number line to represent, locate, and compare whole numbers.
- Understand the relative magnitude and relationships among whole numbers.
- Develop and use strategies to estimate the results of whole number computation.
- Delineate the estimation strategies to predict reasonable outcomes.
- Use number theory concepts of primes, factors, and multiples to explain number relationships.
- Compute, use, and explain the process of adding, subtracting, multiplying and dividing.

### **Decimals: Number Sense, Estimation, and Computation**

- Use models, diagrams, and the number line to represent and locate decimals.
- Compare and order decimals.
- Develop and use strategies to estimate problems with decimals.
- Select and use appropriate mental computation and estimation to determine reasonableness of answers.
- Compute, use, and explain the process of adding and subtracting decimals.
- Compute, use, and explain the process of multiplying and dividing decimals.

### **Rational Numbers: Number Sense, Estimation, and Computation**

- Build models, read, write, and use the number line to locate rational numbers.
- Identify, understand, and describe the relationship between rational numbers and decimals.
- Develop and use strategies to estimate results of rational number computation.
- Delineate the strategies to solve fraction estimation problems.
- Compute, use, model, and explain the process of adding and subtracting fractions.
- Compute, use, model, and explain the process of multiplying and dividing fractions.
- Interpret the multiple uses of decimals and fractions encountered in the real world.

### **Ratios, Proportions, and Percentages**

- Understand, use, and explain ratios in various real world scenarios (scale, unit rates, etc.)
- Understand, use, and explain proportions.
- Understand, use, model, and explain percents.
- Understand, use, model, and explain the relationships among fractions, decimals, and percents.
- Estimate and explain how to find proportions and percentages.
- Provide a written explanation for the methods of solving problems involving ratios, proportions, and percents.
- Explain the relationship between a real-world problem and a math concept.

### **Statistics**

- Generate, collect, organize, display, and analyze data orally and in written forms.
- Use data and statistical measures for a variety of purposes.

- Use, compute, and explain mean, mode, median, and range of a set of data.
- Make predictions, inferences, and decisions based on interpretation of data.
- Use a variety of technology techniques to analyze data and make sensible predictions.
- Design a real world statistical problem in order to formulate and evaluate hypotheses.

### **Geometry and Spatial Relationships**

- Identify, classify, compare, and define plane and solid figures and their distinctive properties.
- Identify, draw, use, and explain geometric transformations.
- Use, analyze, and describe geometric relationships in terms of lines and planes.
- Use, classify, compare, contrast, analyze, and describe geometric relationships to solve problems.
- Locate, give coordinates of, and graph plane figures in all quadrants of a coordinate plane.
- Use models and computer graphics to create and explain front, side, and top views of figures.

### **Measurement**

- Identify, choose, and accurately use the appropriate measurement units and tools.
- Use metric and customary units to measure length, weight, capacity, and temperature.
- Change units within the metric system and English system.
- Use and explain specific strategies to estimate and round quantities and measurements.
- Understand and apply basic measures for finding perimeter, circumference, area, and volume.
- Use technology and manipulatives to apply measurement strategies to solve real world problems.

### **Patterns, Algebra, and Function**

- Recognize, describe, analyze, extend, and create a wide variety of patterns.
- Use patterns and relationships to represent and solve problems.
- Read, write, model, understand, and use algebraic notations and terms,
- Represent, understand and explain algebraic concepts and relationships with manipulatives.
- Solve an equation using concrete, informal, and formal methods.
- Understand, use, and explain functions as a means of showing quantitative change.
- Use algebraic concepts to make and evaluate conjectures in order to defend solutions.

### **Integers**

- Locate, compare, and order integers on a number line.
- Understand and apply the properties of integers.
- Understand and apply the basic concepts of negative numbers in real world scenarios.
- Use manipulatives to model addition, subtraction, and the inverses of integers.
- Compute with signed numbers using mental computation, estimation, calculators, or paper and pencil activities.
- Efficiently and accurately apply operations with integers and simple algebraic expressions to solve problems.

### **Probability**

- Understand and represent probabilities as ratios, decimals between 0 and 1 or percentages between 0 and 100.
- Verify and explain that probabilities computed were reasonable.

- Determine and describe probability using mathematical and theoretical models.(table or tree diagrams, listing counting procedures)
- Understands, applies, and describes the concept of dependent and independent events.
- Solve problems involving notions of fair or unfair outcomes.
- Apply probability strategies to make conjectures and decisions about real world situations.

## GRADE 7

### MATHEMATICS

The grade seven mathematics program has two course offerings. For those students who have demonstrated a very high level of mathematics achievement we offer Phase II mathematics. This course prepares students for the formal study of Algebra and Geometry. Most students will be enrolled in general mathematics, which includes the following objectives.

- § Number Sense
- § Equivalent Fractions
- § Mixed Numbers and Improper Fractions
- § Fractions, Mixed Numbers, and Decimals
- § Decimal Place Value
- § Terminating and Repeating Decimals
- § Ordering Mixed Numbers and Decimals
- § Using Exponents
- § Primes and Prime Factorization
- § Logical Reasoning
- § Greatest Common Factor
- § Least Common Multiple
- § Mental Math: Scaling Up and Down
- § Square Roots
- § Strategy: Using Number Sense
- § Checking for a Reasonable Answer

#### **Whole Numbers: Number Sense, Estimation, and Computation**

- Learning Outcomes
- Use the number line to represent, locate, and compare whole numbers
- Understand the relative magnitude of whole numbers
- Develop and use strategies to estimate the results of whole number computation
- Delineate estimation strategies to predict reasonable outcomes
- Use number theory concepts of primes, composites, factors, and multiples to explain number relationships.
- Understand, explain, and use the order of operations.
- Efficiently and accurately apply the 4 basic operations to solve problems.

#### **Decimals: Number Sense, Estimation, and Computation**

- Use models, diagrams, and the number line to represent and locate decimals.
- Strategies to compare and order decimals
- Develop and refine strategies for rounding and estimating decimal quantities.
- Recognize the advantages and used of exact and approximate solutions.

- Develop, apply, and explain the procedures for adding and subtracting decimals.
- Develop, apply, and explain the procedures for multiplying and dividing decimals.

### **Rational Numbers: Number Sense, Estimation, and Computation**

- Read, write, represent, and use rational numbers.
- Identify, understand, and describe the relationship between rational numbers and decimals.
- Develop, apply, and explain how fractions may be written as repeating and non-repeating decimals.
- Develop and use strategies of rounding/estimating results of rational number computations.
- Compute, use, model, and explain the process of adding and subtracting fractions.
- Compute, use, model, and explain the process of multiplying and dividing fractions.
- Interpret the multiple uses of fractions and decimals in our world.

### **Ratios, Proportions, and Percentages**

- Understand an apply ratios. (scale, unit rates, etc.)
- Write, solve, and apply proportions.
- Understand, use, model, and explain percentages.
- Understand, apply, model, and explain the relationships that exist between fractions, decimals, and percents.
- Solve problems involving finding a percent of a number, tips, tax, discounts, percent of change, and simple interest.
- Use technology to solve multi-step percentage problems.

### **Statistics**

- Learning Outcomes
- Collect and explore data through observation, measurement, surveys, and samples.
- Data investigation is the process of collecting, organizing, displaying and analyzing.
- Organizing and displaying data using tables, charts, graphs, spreadsheets, and databases.
- Use data and statistical measures for a variety of purposes.
- Draw, explain, and justify predictions and conclusions based on data.
- Understand, use, and explain statistical measures.
- Use, compute, and explain mean, mode, median, and range.
- Construct, use, and explain Frequency Tables and Histograms.
- Use a variety of technology techniques to analyze data.
- Design a statistical problem in order to formulate and evaluate hypotheses and make inferences and predictions to solve problems.

### **Probability**

- Compare the likelihood of events in terms of certain, more likely, less likely, or impossible.
- Verify and explain that calculated or estimated probabilities are reasonable and justifiable.
- Conduct experiments and give examples to illustrate the difference between dependent and independent events.
- Solve problems involving notions of fair or unfair outcomes.
- Apply probability strategies to make conjectures and decisions about real world situations.
- Use manipulatives and diagrams to illustrate and explain the counting principle and number combinations.

### **Geometry and Spatial Relationships**

- Identify, classify, compare, define, plane and solid figures and their distinctive properties.

- Identify, draw, use, and explain geometric transformations.
- Generalize about the properties of parallelism and perpendicularity.
- Use a variety of geometric shapes to draw conclusions about the angle measures and relationships.
- Differentiate between examples and non-examples of solid figures and circles.
- Locate; give coordinates o. and graph plane figures in all quadrants of a coordinate plane.
- Use models and computer graphics to create and explain front, side, and top views.

### **Measurement**

- Identify, choose, and accurately use appropriate measurement units and tools.
- Identify the attribute to be measured and select the appropriate unit of Metric or English measurement.
- Use proportional reasoning and estimation to measure.
- Understand and apply perimeter, area, circumference, volume, and surface area formulas.
- Use technology and manipulatives to apply measurement concepts to describe and solve real world problems.

### **Patterns, Algebra, and Functions**

- Recognize, describe, analyze, extend, and create patterns.
- Use patterns and relationships between numbers to represent and solve problems.
- Read, write, and understand algebraic expressions and notations.
- Represent and use algebraic relationships with and without manipulatives.
- Solve linear equations using manipulatives or formal methods.
- Understand, use, and explain functions as a means of showing quantitative change.
- Use algebraic concepts to make and evaluate conjectures in order to justify and defend a solution in a problem.

### **Integers**

- Locate, describe, and use integers on a number line.
- Understand and use the integer properties of absolute value, comparing, and ordering.
- Understand and apply signed number concepts to real world situations.
- Compute with signed numbers using estimation, manipulatives, calculators, or paper and pencil activities.
- Compute with signed numbers using estimation, manipulatives, calculators, or paper and pencil activities.
- Efficiently and accurately apply operations with integers and algebraic concepts to solve problems.

# GRADE 7 – PHASE II

## MATHEMATICS

The grade seven mathematics program has two course offerings. For those students who have demonstrated a very high level of mathematics achievement we offer Phase II mathematics. This course prepares students for the formal study of Algebra and Geometry.

### Number Theory and Whole Number Estimation and Computation

- Explain what a number is, describe how numbers are used, and explain what numbers represent.
- Represent numbers using standard form, exponential, and scientific notation.
- Calculate and use exponents to solve real world problems.
- Develop and use strategies to compare, order, and round numbers.
- Delineate estimation strategies to predict reasonable outcomes.
- Explain, use, and model the basic properties of real numbers.
- Use number theory concepts to explain number relationships.
- Identify, understand, and describe the equivalency relationship between fractions and decimals.
- Compute with whole numbers using appropriate computational strategies.
- Use and apply computational tools and strategies fluently in order to solve multi-step problems.

### Rational Numbers

- Understand, use, apply, and model the decimal and percent equivalents of a specific rational number.
- Delineate and use strategies to estimate results of rational number computation.
- Use prime factorization to find the LCM of two numbers.
- Compute, use, model, and explain the process of adding and subtracting rational numbers.
- Compute, use, model, and explain the process of multiplying and dividing rational numbers.
- Use and explain the Distributive Property to simplify expressions.
- Apply and explain a variety of math concepts, skills, and processes to solve problems.

### Ratios and Proportions

- Understand, use, and explain ratios and how to determine equivalent ratios.
- Understand and explain how unit rates show proportional relationships.
- Understand, apply, and explain proportions.
- Be able to solve proportions by a variety of methods.
- Understand and use ratios and proportions in real world math settings.
- Provide a written explanation for application problems involving proportional relationships such as scaling, unit costs, similarity, and related measurement units.

### Decimals and Percents

- Identify, understand, and describe the relationships between fractions, decimals, and percents.
- Convert between fractions, decimals, and percents mentally, on paper, or with a calculator.
- Develop and apply strategies to round and estimate decimals, fractions, and percents.
- Find a percent of a number using the percent equation model.
- Understand, apply, and explain how to find a percent of increase and decrease.

- Compute, use, and explain the 4 basic decimal operations.
- Understand the multiple uses of decimals and percents encountered in the real world.

### **Data Analysis and Statistics**

- Collect and explore data through observation, measurement, surveys, and sampling techniques.
- Data investigation is the process of collecting, organizing, displaying, and analyzing.
- Collect, organize, and display data using frequency tables, histograms, line plots, box and whisker plots, stem and leaf plots, scatter plots, bar and circle graphs.
- Describe the shape of a data distribution and determine measures of central tendency.
- Compare two sets of data using measures of center and measures of spread.
- Use a variety of technology techniques to analyze and make sensible predictions.
- Design a statistical problem in order to formulate and evaluate hypotheses and make inferences and predictions to solve problems.

### **Geometry and Measurement**

- Make and test conjectures about characteristics and properties of 2 and 3 dimensional figures.
- Identify, draw, use, and explain geometric transformations.
- Locate, give coordinates and graph plane figures in all quadrants of a coordinate plane.
- Identify the attribute to be measured and select the appropriate unit of measurement.
- Understand and apply basic measures for finding perimeter, area, circumference, volume, and surface area.
- Understand, apply, and explain the use of the Pythagorean Theorem.
- Use geometric and measurement concepts to solve and explain real world problems.

### **Integers**

- Locate, describe, and use integers on a number line.
- Understand and use order of operations, absolute value, and comparing with integers.
- Understand the meaning of negative integers by using them to describe real world situations.
- Compute with signed numbers using manipulatives, mental computation, calculators, estimation, and paper and pencil activities.
- Efficiently and accurately apply operations with integers and simple algebraic expressions to solve problems.

### **Patterns, Algebra, and Functions**

- Use rules and variables to describe patterns, functions, and other relationships.
- Read, write, and understand algebraic expressions and notations.
- Use symbolic algebra to represent and explain problem situations.
- Use manipulatives, models, and inverse operations to solve one and two step equations.
- Understand, use, and explain functions as a means of showing quantitative change.
- Use algebraic concepts to make and evaluate conjectures in order to solve real world problems and defend solutions.

### **Probability**

- Describe the probability of an event using words, ratios, and fractional notation.
- Understand, use, and explain the process of finding the probabilities of compound events.

- Use theoretical probabilities and experimental results to make predictions and decisions about events.
- Solve problems involving notions of fairness.
- Understand, use, and explain tree diagrams, the Counting Principle, and permutations.
- Use Venn diagrams to represent data.
- Use the laws of probability to solve problems.

# GRADE 8 – INTEGRATED MATH

## MATHEMATICS

In grade eight at the middle school there are two different mathematics courses. For those students who have successfully completed our Seventh Grade General Mathematics program.

### Number Theory and Whole Number, Fraction, and Decimal Concept

- Understand numbers, number systems, and ways of representing numbers.
- Demonstrate an understanding and use of order, magnitude, and equivalent forms of numbers.
- Select and use estimation strategies in problem solving situations.
- Represent numbers, fractions, and decimals in exponential and scientific notation.
- Explain, use, and model the properties of the real number system.
- Use number theory concepts to explain number relationships and solve problems.
- Understand and use procedures for evaluating algebraic expressions.

### Operations with Integers, Fractions, and Decimals

- Apply basic operations efficiently and accurately using estimation to check for reasonableness of results.
- Select, convert, and apply an equivalent representation of a number for a specific situation.
- Define, use, apply, and use integers to solve real world problems.
- Compute and estimate with signed numbers using mental math, paper-and-pencil, and calculator methods.
- Find the square root of perfect squares and approximate the square root of non-perfect squares.
- Discrete Math

### Ratios, Proportions, and Percents

- Understand, apply and use ratios and proportions.
- Be able to solve proportions by a variety of methods.
- Apply and explain the use of ratios and proportional reasoning to determine rates, dimensional analysis, and direct and indirect variation.
- Find a percent of a number.
- Understand, apply, and explain how to find a percent of increase/decrease.
- Understand the multiple uses of percents.

### Patterns and Algebra Concepts

- Develop an understanding for basic algebraic terms and concepts.
- Use the language of algebra to describe, represent, and analyze real world situations.
- Use manipulatives, models, and inverse operations to solve 1 & 2 step equations.
- Understand and apply formulas to solve problems.
- Identify, explain, and apply numeric and geometric patterns to find the next term and predict the “nth” term.
- Use algebraic concepts to solve problems.

### Data Analysis and Statistics

- Data investigation is the process of collecting, organizing, displaying, and analyzing sets of data.

- Collect, organize, and display data using the various formats of data representation.
- Make and evaluate inferences and predictions from representations of data.
- Given a set of single variable data, calculate the measures of central tendency.
- Describe, calculate, and apply the concepts of central tendency and dispersion.
- Use a variety of technology techniques to analyze and make sensible predictions.
- Determine if the conclusions drawn from a statistical study are valid by analyzing method of display, measure of central tendency, and experimental results.

### **Geometry and Measurement**

- Use sides, angles, parallel, and perpendicular lines, similarity, congruence, and symmetry to identify properties of figures.
- Identify, draw, use, and explain geometric transformations.
- Locate, give coordinates, and graph plane figures in all quadrants of a coordinate plane.
- Select and use appropriate units and tools to measure to the degree of accuracy required in a measurement task.
- Understand and apply formulas for perimeter, area, circumference, surface area, and volume.
- Investigate, explain, and use right triangle geometry using the Pythagorean Theorem.
- Use and explain geometry, measurement, and spatial relation's concepts to draw conclusions and justify predictions about real world situations.

### **Probability**

- Represent probabilities in multiple ways such as fractions, decimals, and percents.
- Use theoretical and experimental probability results to make predictions about events.
- Understand, apply, explain, predict, and justify possible outcomes using the basic notions of probability.
- Solve problems involving notions of fairness.
- Design, conduct, interpret, and justify the results of real world probability tasks.

### **Functions**

- Understand, apply, and explain how tables and rules can show functions.
- Express functions in words and represent them in algebraic, graphical, and table form.
- Understand, use, and explain functions as a means of showing quantitative change.
- Understand and use appropriate procedures to solve inequalities.
- Understand, apply, and explain how to represent equations and inequalities on a coordinate plane.
- Understand, apply, and explain how to find solutions of equations with two variables.
- Explain the strategies for graphing equations with two variables.
- Find the slope and intercepts of a line and write the equation using the slope intercept form.
- Use algebraic and analytical methods to identify and describe relationships in data, solve problems, and predict and defend results.

# GRADE 8 – ALGEBRA I

## MATHEMATICS

In grade eight at the middle school there are three different mathematics courses. For those students who have successfully completed our Phase II mathematics program we offer Algebra I.

### Introduction to Algebra

- Evaluate algebraic expressions using substitution and then following order of operations.
- Apply number properties to simplify algebraic expressions.
- Use exponential notation to simplify and evaluate expressions.
- Use the distributive property over addition to write equivalent expressions, factor, and to collect like terms.
- Translate verbal expressions into algebraic expressions.
- Solve algebraic equations by substituting values in for the variables.
- Evaluate formulas by substituting given numerical values for the variables and calculate the results.
- Use guess, check, and revise strategy to solve problems.

### Integers and Rational Numbers

- Demonstrate that a rational number can be written as a ratio of 2 integers and can be plotted on a number line.
- Perform operations on all rational numbers including positive and negative numbers.
- Divide rational numbers by multiplying by the reciprocal.
- Use the distributive property over subtraction to multiply and factor algebraic expressions and to collect like terms.
- Rename the inverse of a sum as the sum of the inverses to simplify expressions.
- Solve word problems by writing an algebraic equation.

### Equations

- Solve algebraic equations by using inverse operations (addition and multiplication properties of equality) to isolate the variable.
- Translate verbal expressions / sentences into algebraic expressions / equations and use to solve word problems.
- Solve algebraic equations that have variables on both sides of the equation by using inverse operations.
- Solve formulas for a given variable by using inverse operations.
- Translate a word problem into a proportion and solve.
- Solving problems involving percents by using an algebraic equation or proportion.
- Solve word problems with more than one unknown.

### Inequalities

- Order and compare rational numbers.
- Determine whether a given number is a solution of an inequality.
- Solve algebraic inequalities using inverse operations to isolate the variable, and graph the solution.
- Solve word problems by translating to an inequality and then solving the inequality.

### **Exponents and Polynomials**

- Apply properties of exponents to simplify numeric or algebraic expressions that contain exponents.
- Express negative exponents as positive exponents.
- Raise a power to a power.
- Multiply & divide monomials and simplify.
- Translate scientific notation into standard notation and vice versa.
- Name the terms and coefficients of a polynomial.
- Add and subtract polynomials.
- Multiply a monomial by a polynomial by using the distributive property.
- Multiply binomials by applying the FOIL method.
- Multiply 2 polynomials by multiplying each term of one polynomial by every term of the other then collect like terms.
- Solve word problems using the strategy of making a table and looking for a pattern.

### **Polynomials and Factoring**

- Factor monomials and polynomials by factoring out the greatest common factor of each term.
- Factor the difference of two squares into two binomials.
- Factor trinomials into two binomials.
- Factor polynomials completely.
- Solve quadratic equations using the principle of zero products. (Use inverse operations to get zero on one side of equation, then factor and solve).
- Translate verbal sentences into quadratic equations and use to solve real – world problems.

### **Graphs and Linear Equations**

- Graph ordered pairs on a coordinate plane and identify the quadrant.
- Graph linear equations by graphing ordered pairs that are solutions to the equation.
- Use the x-intercept and y-intercept to graph a linear equation.
- Determine the slope of a line when two points on the line are known.
- Use the slope-intercept equation ( $y=mx+b$ ) to graph a linear equation.
- Write an equation for a line when the slope and y-intercept are known,
- Write an equation for a line when two points of the line are known.
- Use a linear equation to solve problems involving a prediction between two variables.
- Determine whether the graphs of 2 linear equations are parallel, perpendicular, or neither.

### **Systems of Equations**

- Determine whether a given point is a solution to a system of equations by substituting the point into each equation.
- Solve a system of equations by graphing, using the substitution method or the addition method.
- Translate real-world problems into a system of equations and solve.
- When there are two unknowns you must write two equations in order to have one solution.
- Use the distance formula to write two equations to solve problems involving uniform motion.

### **Radical Expressions and Equations**

- Find the square root of a number.
- Determine whether a number is rational, irrational, real or unreal.
- Simplify radical expressions.

- Multiply and divide radicals in order to simplify radical expressions.
- Add or subtract real numbers that have the same radicand.
- Use the Pythagorean theorem to find the hypotenuse or one of the legs of a right triangle.
- Use the Pythagorean theorem to solve real – world problems with right triangles.

### **Introduction to Probability and Statistics**

- Find the theoretical probability of an event.
- Determine whether two events are mutually exclusive or not.
- If the probability of one of two complementary events is known find the probability of the other event.
- Find experimental probability and use simulations to find a desired experimental probability.