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# honors grade 8 math

# Content, Standards, & Objectives

This document contains an ordered list of all of the topics from the scope and sequence of Thinkwell's Honors Grade 8 Math, along with the learning objectives covered in each topic and the corresponding standards.

Although Thinkwell's Honors Grade 8 Math was not designed as a common core curriculum, this document is provided for those customers whose state homeschool requirements include common core standard mapping information.

# Example:

Topic's number and title — 2.2.2 Solving Two-Step Equations

**Learning Objectives:** 

solving two-step equations

Topic's related standard from
the Grade 8

Common Core State Standards

Standards

→ 8.EE: 7, 8.EE: 7b

for Mathematics

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# 1 Principles of Algebra

## 1.1 Expressions and Properties of Numbers

# 1.1.1 Introduction to Exponents

#### **Learning Objectives:**

- evaluating powers
- expressing whole numbers as powers

# 1.1.2 Using the Order of Operations

#### **Learning Objectives:**

- using the order of operations
- using the order of operations with grouping symbols

# 1.1.3 Variables and Algebraic Expressions

# **Learning Objectives:**

- evaluating algebraic expressions
- evaluating algebraic expressions involving the order of operations
- evaluating algebraic expressions with two variables

#### 1.1.4 Translate Words into Math

#### **Learning Objectives:**

- translating verbal expressions into algebraic expressions
- translating real-world problems into algebraic expressions

# 1.1.5 Properties of Numbers

#### **Learning Objectives:**

- identifying equivalent expressions
- consumer math application
- finding counterexamples to statements about properties

#### 1.2 Operations with Integers

#### 1.2.1 Integers

- graphing integers
- comparing integers using a number line
- ordering integers using a number line
- finding absolute value

Content, Standards, & Objectives

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## 1.2.2 Adding Integers

#### **Learning Objectives:**

- modeling integer addition
- adding integers using absolute values
- evaluating expressions with integers
- business application

#### 1.2.3 Subtracting Integers

#### **Learning Objectives:**

- modeling integer subtraction
- subtracting integers by adding the opposite
- evaluating expressions with integers
- geography application

## 1.2.4 Multiplying and Dividing Integers

#### **Learning Objectives:**

- multiplying integers
- evaluating integer expressions
- dividing integers
- evaluating integer expressions

# 1.3 Operations with Integers

#### 1.3.1 Addition and Subtraction Equations

#### **Learning Objectives:**

- solving an equation by addition
- solving an equation by subtraction
- finance application

#### **Standards:**

8.EE: 7

# 1.3.2 Multiplication and Division Equations

#### **Learning Objectives:**

- solving an equation by multiplication
- solving an equation by division
- health application

#### **Standards:**

8.EE: 7

#### 1.3.3 Introduction to Inequalities

- writing inequalities
- graphing simple inequalities
- solving inequalities with addition or subtraction





#### 2 Rational Numbers

## 2.1 Operations with Rational Numbers

#### 2.1.1 Rational Numbers

#### **Learning Objectives:**

- simplifying fractions
- writing decimals as fractions
- writing fractions as decimals

#### Standards:

8.NS: 1

# 2.1.2 Comparing and Ordering Rational Numbers

# **Learning Objectives:**

- comparing fractions by finding a common denominator
- comparing by using decimals
- recreation application

# 2.1.3 Adding and Subtracting Rational Numbers

#### **Learning Objectives:**

- sports application
- adding and subtracting fractions with like denominators
- adding and subtracting fractions with unlike denominators
- culinary application
- simplifying absolute-value expressions

#### 2.1.4 Multiplying Rational Numbers

#### **Learning Objectives:**

- multiplying fractions
- problem-solving application
- multiplying decimals
- multiplying a fraction and a mixed number by an integer

#### 2.1.5 Dividing Rational Numbers

- introduction to dividing with fractions
- dividing decimals
- evaluating expressions with fractions and decimals
- problem-solving application

Content, Standards, & Objectives

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# 2.2 Equations with Rational Numbers

# 2.2.1 Solving Equations with Rational Numbers

# **Learning Objectives:**

- solving equations with decimals
- solving equations with fractions
- solving word problems using equations

#### **Standards:**

8.EE: 7, 8.EE: 7b

# 2.2.2 Solving Two-Step Equations

# **Learning Objectives:**

- problem-solving application
- solving two-step equations

#### Standards:

8.EE: 7, 8.EE: 7b



# 3 Introduction to Graphs, Functions, and Sequences

# 3.1 Tables and Graphs

#### 3.1.1 Ordered Pairs

#### **Learning Objectives:**

- deciding whether an ordered pair is a solution of an equation
- creating a table of ordered pair solutions
- consumer math application

# 3.1.2 Graphing on a Coordinate Plane

#### **Learning Objectives:**

- finding the coordinates and the quadrants of points on a plane
- graphing points on a coordinate plane
- finding horizontal and vertical distances

## 3.1.3 Interpreting Graphs and Tables

# **Learning Objectives:**

- matching situations to tables
- matching situations to graphs
- creating a graph of a situation

#### Standards:

8.F: 5

# 3.2 Introduction to Functions and Sequences

#### 3.2.1 Functions

#### **Learning Objectives:**

- finding the domain and range of a relation
- finding different representations of a function
- identifying functions

#### **Standards:**

8.F: 1

# 3.2.2 Equations, Tables, and Graphs

#### **Learning Objectives:**

- using equations to generate different representations of data
- using tables to generate different representations of data
- using graphs to generate different representations of data

#### **Standards:**

8.F: 4, 8.F: 5, 8.SP: 3

Content, Standards, & Objectives



# 3.2.3 Arithmetic Sequences

# **Learning Objectives:**

- finding the common difference in an arithmetic sequence
- finding missing terms in an arithmetic sequence
- identifying functions in arithmetic sequences
- retail application

#### **Standards:**

8.F: 1, 8.F: 4, 8.SP: 3



# 4 Exponents and Roots

# 4.1 Properties of Exponents

# 4.1.1 Product and Power Properties of Exponents

# **Learning Objectives:**

- review of evaluating powers with whole number exponents
- using the product of powers property
- using the product of powers property to simplify expressions
- using the power of a power property to simplify expressions
- using the power of a product property to simplify expressions

#### **Standards:**

8.EE: 1

#### 4.1.2 Integer Exponents

#### **Learning Objectives:**

- using negative exponents
- simplifying expressions containing negative exponents

#### **Standards:**

8.EE: 1

# 4.1.3 Quotient Properties of Exponents

#### **Learning Objectives:**

- using the quotient of powers property
- using the quotient of powers property to simplify expressions
- using the power of a quotient property to simplify expressions
- using the negative power of a quotient property

#### **Standards:**

8.EE: 1

## 4.1.4 Quotient Properties of Exponents

#### **Learning Objectives:**

- writing numbers in scientific notation
- writing numbers in standard form
- comparing and ordering numbers in scientific notation
- multiplying and dividing with scientific notation
- measurement application

#### Standards:

8.EE: 1, 8.EE: 3, 8.EE: 4





# 4.2 Square Roots and the Pythagorean Theorem

# 4.2.1 Square Roots and Real Numbers

#### **Learning Objectives:**

- finding the positive and negative square roots of a number
- estimating square roots
- problem-solving application
- classifying real numbers

#### Standards:

8.NS: 1, 8.NS: 2, 8.EE: 2

# 4.2.2 Operations with Square Roots

#### **Learning Objectives:**

- adding and subtracting square roots
- multiplying square roots
- simplifying square roots
- simplifying to add and subtract square roots

#### Standards:

8.EE: 2

# 4.2.3 The Pythagorean Theorem and the Distance Formula

#### **Learning Objectives:**

- calculating the length of a side of a right triangle
- finding distance on the coordinate plane
- identifying a right triangle

#### Standards:

8.EE: 2, 8.G: 6, 8.G: 7, 8.G: 8



# **5 Proportionality and Measurement**

#### 5.1 Ratios, Rates, and Proportions

# 5.1.1 Ratios and Proportions

## **Learning Objectives:**

- finding equivalent ratios
- determining whether two ratios are a proportion
- environmental application

# 5.1.2 Ratios, Rates, and Unit Rates

#### **Learning Objectives:**

- finding unit rates
- chemistry application
- estimating unit rates
- finding unit prices to compare costs
- travel application

#### **Standards:**

8.EE: 5, 8.EE: 7

# 5.1.3 Dimensional Analysis

# **Learning Objectives:**

- finding conversion factors
- using conversion factors to solve problems
- problem-solving application
- converting rates
- converting between systems

#### **5.1.4 Solving Proportions**

- using cross products to identify proportions
- using ratios
- physics application
- solving proportions using factor of change

Content, Standards, & Objectives

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# 5.2 Similarity, Scale, and Measurement

# **5.2.1** Similar Figures

#### **Learning Objectives:**

- identifying similar figures
- finding missing measures in similar figures
- advertising application

#### Standards:

8.G: 4

#### 5.2.2 Dilations

#### **Learning Objectives:**

- identifying dilations
- dilating a figure
- using the origin as the center of dilation

#### Standards:

8.G: 3, 8.G: 4

#### 5.2.3 Indirect Measurement

# **Learning Objectives:**

- geography application
- problem-solving application

# 5.2.4 Scale Drawings and Scale Models

- using proportions to find unknown scales
- finding unknown dimensions given scale factors
- life science application



#### **6 Percents**

## **6.1 Proportions and Percents**

# 6.1.1 Relating Decimals, Fractions, and Percents

# **Learning Objectives:**

- finding equivalent ratios and percents
- comparing fractions, decimals, and percents
- ordering fractions, decimals, and percents
- physical science application

#### **Standards:**

8.NS: 1

#### 6.1.2 Estimate with Percents

## **Learning Objectives:**

- estimating with percents
- problem-solving application
- manufacturing application

#### **6.1.3 Finding Percents**

# **Learning Objectives:**

- finding the percent one number is of another
- community application
- finding the percent of a number

# 6.1.4 Finding a Number When the Percent is Known

- finding a number when the percent is known
- architecture application
- recreation application

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# **6.2 Applying Percents**

#### 6.2.1 Percent Increase and Decrease

# **Learning Objectives:**

- finding percent increase or decrease
- business application
- finding discounts and markups

# **6.2.2 Applications of Percents**

#### **Learning Objectives:**

- multiplying by percents to find commission amounts
- multiplying by percents to find sales tax amounts
- using proportions to find the percent of earnings
- dividing by percents to find total sales

# 6.2.3 Simple Interest

- finding interest and total payment on a loan
- determining the amount of investment time
- computing total savings
- finding the rate of interest



# 7 Foundations of Geometry

## 7.1 Points, Lines, and Angles

#### 7.1.1 Points, Lines, and Planes

# **Learning Objectives:**

- identifying points, lines, and planes
- identifying line segments and rays

# 7.1.2 Angles and Their Relationships

## **Learning Objectives:**

- identifying and classifying angles
- finding the supplement and the complement of angles
- finding the measure of vertical angles
- applying angle relationships

# 7.2 Polygons

# 7.2.1 Triangles

#### **Learning Objectives:**

- classifying triangles by angles
- finding unknown angle measures using properties
- classifying triangles by lengths of sides
- using the triangle inequality theorem

#### Standards:

8.EE: 7, 8.G: 5

#### 7.2.2 Classifying Polygons

# **Learning Objectives:**

- identifying polygons
- classifying quadrilaterals
- drawing quadrilaterals

#### Standards:

8.G: 5

# 7.2.3 Coordinate Geometry

# **Learning Objectives:**

- using coordinates to classify polygons
- finding the coordinates of a missing vertex
- finding the coordinates of a midpoint

#### Standards:

8.EE: 2

Content, Standards, & Objectives

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#### 7.2.4 Congruence

#### **Learning Objectives:**

- naming congruent corresponding parts
- identifying congruent triangles
- using congruence to find missing measures

#### Standards:

8.G: 2

# 7.3 Patterns in Geometry

#### 7.3.1 Transformations

#### **Learning Objectives:**

- graphing translations on a coordinate plane
- graphing reflections on a coordinate plane
- graphing rotations on a coordinate plane

#### **Standards:**

8.G: 1a, 8.G: 1b, 8.G: 1c, 8.G: 2, 8.G: 3

# 7.3.2 Symmetry

# **Learning Objectives:**

- identifying line symmetry
- social studies application
- identifying rotational symmetry

#### **Standards:**

8.G: 1a, 8.G: 1b, 8.G: 1c, 8.G: 2, 8.G: 4

#### 7.3.3 Tessellations

#### **Learning Objectives:**

- creating a tessellation
- creating a tessellation by transforming a polygon

#### **Standards:**

8.G: 2



# 8 Perimeter, Area, and Volume

#### 8.1 Perimeter and Area

# 8.1.1 Perimeter and Area of Rectangles and Parallelograms

#### **Learning Objectives:**

- finding the perimeter of rectangles and parallelograms
- using a graph to find area
- estimating area using composite figures
- finding area and perimeter of a composite figure

## 8.1.2 Perimeter and Area of Triangles and Trapezoids

#### **Learning Objectives:**

- finding the perimeter of triangles and trapezoids
- finding a missing measurement
- multi-step application
- finding the area of triangles and trapezoids

#### **Standards:**

8.EE: 2, 8.EE: 7, 8.G: 7, 8.G: 8

#### 8.1.3 Circles

# **Learning Objectives:**

- finding the circumference of a circle
- finding the area of a circle
- finding area and circumference on a coordinate plane
- recreation application

#### 8.2 Three-Dimensional Geometry

#### 8.2.1 Drawing Three-Dimensional Figures

#### **Learning Objectives:**

- identifying vertices, edges, and faces
- drawing a figure when given different perspectives
- drawing different perspectives of a figure

#### 8.2.2 Volume of Prisms and Cylinders

#### **Learning Objectives:**

- finding the volume of prisms and cylinders
- exploring the effects of changing dimensions
- construction application
- finding the volume of composite figures

#### **Standards:**

8.G: 9

**Content, Standards, & Objectives** 

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# 8.2.3 Volume of Pyramids and Cones

#### **Learning Objectives:**

- finding the volume of pyramids and cones
- exploring the effects of changing dimensions
- nutrition application
- using a calculator to find volume

#### Standards:

8.G: 9

# 8.2.4 Surface Area of Prisms and Cylinders

# **Learning Objectives:**

- finding surface area
- exploring the effects of changing dimensions
- art application

# 8.2.5 Surface Area of Pyramids and Cones

#### **Learning Objectives:**

- finding surface area
- exploring the effects of changing dimensions
- life science application

#### **Standards:**

8.EE: 2, 8.G: 7

#### 8.2.6 Spheres

#### **Learning Objectives:**

- finding the volume of a sphere
- finding surface area of a sphere
- comparing volumes and surface areas

#### **Standards:**

8.G: 9

# 8.2.7 Scaling Three-Dimensional Figures

# **Learning Objectives:**

- scaling models that are cubes
- scaling models that are other solid figures
- business application

# 8.2.8 Converting Units of Measurement

#### **Learning Objectives:**

- converting units of area
- converting units of volume
- recreation application

#### **Standards:**

8.G: 9



#### 9 Data and Statistics

# 9.1 Collecting and Describing Data

# 9.1.1 Samples and Surveys

#### **Learning Objectives:**

- identifying sampling methods
- analyzing sample methods
- comparing samples

# 9.1.2 Identifying Sampling Errors and Bias

#### **Learning Objectives:**

- identifying potentially biased samples
- identifying potentially biased questions
- evaluating survey claims

# 9.1.3 Organizing Data

# **Learning Objectives:**

- organizing data in line plots
- reading stem-and-leaf plots
- organizing data in back-to-back stem-and-leaf plots
- organizing data in venn diagrams

#### Standards:

8.SP: 4

#### 9.1.4 Measures of Central Tendency

#### **Learning Objectives:**

- finding measures of central tendency and range
- exploring the effects of outliers
- choosing the best measure of central tendency
- finding weighted averages

#### **Standards:**

8.SP: 4

# 9.1.5 Variability and Box-and-Whisker Plots

- finding measures of variability
- making a box-and-whisker plot
- using interquartile range to identify outliers
- comparing data sets using box-and-whisker plots

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# 9.2 Data Displays

# 9.2.1 Displaying Data

#### **Learning Objectives:**

- displaying data in a double-bar graph
- displaying data in a histogram
- displaying data in a line graph

#### **Standards:**

8.SP: 4

# 9.2.2 Analyzing Data Displays

#### **Learning Objectives:**

- analyzing histograms
- interpreting circle graphs
- reading and interpreting line graphs

#### **Standards:**

8.F: 5, 8.SP: 4

# 9.2.3 Misleading Graphs and Statistics

#### **Learning Objectives:**

- identifying misleading graphs
- identifying misleading statistics

#### Standards:

8.SP: 4

#### 9.2.4 Scatter Plots

#### **Learning Objectives:**

- describing correlation from scatter plots
- using a scatter plot to make predictions

#### **Standards:**

8.SP: 1, 8.SP: 2

# 9.2.5 Choosing the Best Representation of Data

#### **Learning Objectives:**

- selecting a data display
- problem-solving application

#### **Standards:**

8.SP: 1, 8.SP: 2



# 10 Probability

## 10.1 Experimental Probability

# 10.1.1 Probability

#### **Learning Objectives:**

- finding probabilities of outcomes in a sample space
- finding probabilities of events
- problem-solving application

## 10.1.2 Experimental Probability

#### **Learning Objectives:**

- estimating the probability of an event
- safety application
- using a number cube for simulation

#### 10.1.3 Use a Simulation

# **Learning Objectives:**

• problem-solving application

## 10.2 Theoretical Probability and Counting

#### 10.2.1 Theoretical Probability

#### **Learning Objectives:**

- calculating theoretical probability
- calculating probability for two fair number cubes
- altering probability
- finding geometric probability
- finding the probability of mutually exclusive events

# 10.2.2 Independent and Dependent Events

# **Learning Objectives:**

- classifying events as independent or dependent
- finding the probability of independent events
- finding the probability of dependent events

#### 10.2.3 Making Decisions and Predictions

- using probability to make decisions and predictions
- deciding whether a game is fair

Content, Standards, & Objectives

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#### 10.2.4 Odds

#### **Learning Objectives:**

- finding odds
- converting odds to probabilities
- converting probabilities to odds

# 10.2.5 Counting Principles

# **Learning Objectives:**

- using the fundamental counting principle
- using a tree diagram
- using the addition counting principle
- using a tree diagram for dependent events

#### **10.2.6 Permutations and Combinations**

- evaluating expressions containing factorials
- finding permutations
- finding combinations



# 11 Multi-Step Equations and Inequalities

# **11.1** Solving Equations

# 11.1.1 Simplifying Algebraic Expressions

#### **Learning Objectives:**

- combining like terms to simplify
- combining like terms in two-variable expressions
- using the distributive property to simplify
- combining like terms to solve algebraic equations

#### **Standards:**

8.EE: 7

## 11.1.2 Solving Multi-Step Equations

# **Learning Objectives:**

- solving equations that contain like terms
- solving equations that contain fractions
- travel application
- fitness application

#### **Standards:**

8.EE: 7, 8.EE: 7b

# 11.1.3 Solving Equations with Variables on Both Sides

# **Learning Objectives:**

- solving equations with variables on both sides
- solving multi-step equations with variables on both sides
- business application
- multi-step application

#### **Standards:**

8.EE: 7, 8.EE: 7a, 8.EE: 7b, 8.F: 4

# 11.1.4 Solving Literal Equations

# **Learning Objectives:**

• solving literal equations for a variable

# 11.2 Solving Inequalities and Systems of Equations

# 11.2.1 Solving Inequalities by Multiplying or Dividing

- solving inequalities by multiplying or dividing
- problem-solving application

Content, Standards, & Objectives



# 11.2.2 Solving Multi-Step Inequalities

# **Learning Objectives:**

- solving two-step inequalities
- solving inequalities that contain fractions
- school application
- solving multi-step inequalities

# 11.2.3 Systems of Equations

# **Learning Objectives:**

• solving systems of equations

#### **Standards:**

8.EE: 8, 8.EE: 8a, 8.EE: 8b



# **12 Graphing Lines**

# **12.1 Linear Equations**

# 12.1.1 Graphing Linear Equations

#### **Learning Objectives:**

- graphing equations
- identifying constant and variable rates of change in data
- recreation application

#### **Standards:**

8.EE: 5, 8.EE: 6, 8.F: 4, 8.F: 5, 8.SP: 3

#### 12.1.2 Slope of a Line

# **Learning Objectives:**

- finding slope
- finding slope given two points
- identifying constant and variable rates of change in graphs
- physics application

#### **Standards:**

8.EE: 5, 8.EE: 6, 8.F: 4, 8.F: 5, 8.SP: 3

# 12.1.3 Using Slopes and Intercepts

#### **Learning Objectives:**

- finding x-intercepts and y-intercepts to graph linear equations
- using slope-intercept form to find slopes and y-intercepts
- consumer application
- writing slope-intercept form

#### **Standards:**

8.EE: 5, 8.EE: 6, 8.F: 4, 8.SP: 3

#### 12.1.4 Point-Slope Form

#### **Learning Objectives:**

- using point-slope form to identify information about a line
- writing the point-slope form of an equation
- medical application

#### **Standards:**

8.EE: 5, 8.F: 4, 8.F: 5, 8.SP: 3

Content, Standards, & Objectives



#### 12.2 Linear Relationships

#### 12.2.1 Direct Variation

## **Learning Objectives:**

- determining whether a data set varies directly
- finding equations of direct variation
- consumer application

#### **Standards:**

8.EE: 5, 8.F: 4, 8.SP: 1, 8.SP: 3

# 12.2.2 Graphing Inequalities in Two Variables

# **Learning Objectives:**

- graphing inequalities
- space application

#### **Standards:**

8.EE: 5

# 12.2.3 Solving Systems of Linear Equations By Graphing

# **Learning Objectives:**

- graphing a system of linear equations to solve a problem
- solving systems of linear equations by graphing

#### **Standards:**

8.EE: 8, 8.EE: 8a, 8.EE: 8b, 8.EE: 8c, 8.F: 4

#### 12.2.4 Lines of Best Fit

#### **Learning Objectives:**

- finding a line of best fit
- sports application

#### **Standards:**

8.F: 4, 8.SP: 1, 8.SP: 2, 8.SP: 3



# 13 Sequences and Functions

## 13.1 Sequences

#### 13.1.1 Terms of Arithmetic Sequences

### **Learning Objectives:**

- identifying arithmetic sequences
- finding a given term of an arithmetic sequence
- consumer application

#### **Standards:**

8.F: 1, 8.F: 4

#### 13.1.2 Terms of Geometric Sequences

## **Learning Objectives:**

- identifying geometric sequences
- geometry application
- finding a given term of a geometric sequence
- money application

#### **Standards:**

8.F: 1, 8.F: 4

# 13.1.3 Other Sequences

#### **Learning Objectives:**

- using first and second differences
- finding a rule given terms of a sequence
- finding terms of a sequence given a rule
- using the fibonacci sequence

#### Standards:

8.F: 1

#### 13.2 Functions

#### 13.2.1 Linear Functions

# **Learning Objectives:**

- identifying linear functions
- writing the equation for a linear function
- physical science application

#### **Standards:**

8.EE: 5, 8.EE: 6, 8.F: 1, 8.F: 3, 8.F: 4, 8.SP: 3

Content, Standards, & Objectives

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# 13.2.2 Exponential Functions

# **Learning Objectives:**

- graphing exponential functions
- using an exponential growth function
- using an exponential decay function

#### **Standards:**

8.EE: 1, 8.F: 1

# 13.2.3 Quadratic Functions

# **Learning Objectives:**

- graphing quadratic functions
- astronomy application

#### **Standards:**

8.F: 1

#### 13.2.4 Inverse Variation

# **Learning Objectives:**

- identifying inverse variation
- graphing inverse variation
- music application

#### **Standards:**

8.F: 1



# 14 Polynomials

# 14.1 Introduction to Polynomials

# 14.1.1 Introduction to Polynomials

# **Learning Objectives:**

- identifying monomials
- classifying polynomials by the number of terms
- classifying polynomials by their degrees
- physics application

# 14.1.2 Simplifying Polynomials

#### **Learning Objectives:**

- identifying like terms
- simplifying polynomials by combining like terms
- simplifying polynomials by using the distributive property
- business application

# 14.2 Operations with Polynomials

#### 14.2.1 Adding Polynomials

#### **Learning Objectives:**

- adding polynomials horizontally
- adding polynomials vertically
- art application

#### 14.2.2 Subtracting Polynomials

#### **Learning Objectives:**

- finding the opposite of a polynomial
- subtracting polynomials horizontally
- subtracting polynomials vertically
- business application

#### 14.2.3 Multiplying Polynomials by Monomials

#### **Learning Objectives:**

- multiplying monomials
- multiplying a polynomial by a monomial
- problem-solving application

#### 14.2.4 Multiplying Binomials

- multiplying two binomials
- problem-solving application
- special products of binomials