# honors 



## 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

Topic's learning objectives

Topic's related standard from the Grade 8 Common Core State Standards for Mathematics
$\longrightarrow$ 2.2.2 Solving Two-Step Equations
Learning Objectives:
$\longrightarrow$ • problem-solving application

- solving two-step equations

Standards:
$\longrightarrow$ 8.EE: 7, 8.EE: 7b

We suggest keeping this document handy. Please let us know if you have any questions about the content here. Email us at support@thinkwell.com.

## 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: <br> - evaluating algebraic expressions <br> - evaluating algebraic expressions involving the order of operations <br> - 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

Learning Objectives:

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


### 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

Learning Objectives:

- 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

## Learning Objectives:

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


### 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

### 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

Learning Objectives:

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


### 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

Learning Objectives:

- 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

## Learning Objectives:

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


### 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

Learning Objectives:

- 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

### 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

### 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:

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

Learning Objectives:

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


### 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

Learning Objectives:

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


### 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

Learning Objectives:

- 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 Learning Objectives: <br> - solving inequalities by multiplying or dividing <br> - problem-solving application

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### 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

### 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

### 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

## Learning Objectives:

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

