

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 Grade 8 Math, along with the learning objectives covered in each topic and the corresponding standards.

Although Thinkwell's 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:

Topic's learning objectives →

- *problem-solving application*
- *solving two-step equations*

Topic's related standard from the Grade 8 Common Core State Standards for Mathematics → **Standards:**
→ 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:

- *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

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*

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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*

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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

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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

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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

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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*

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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

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

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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

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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

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*

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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

Learning Objectives:

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

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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

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:

- *solving inequalities by multiplying or dividing*
- *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