



Saylor Academy awards

Dan Rinniceanu

this certificate of achievement for
MA001: College Algebra



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In this course, you will be introduced to basic algebraic operations and concepts, as well as the structure and use of algebra. Topics include linear inequalities, graphing, exponents, polynomials, and rational expressions. You will study basic algebraic operations and concepts, as well as the structure and use of algebra. This includes solving algebraic equations, factoring algebraic expressions, working with rational expressions, and graphing linear equations. You will apply these skills to solve real-world problems (word problems). Each unit will have its own application problems, depending on the concepts you have been exposed to. This course is also intended to provide you with a strong foundation for intermediate algebra and beyond. It will begin with a review of some math concepts formed in pre-algebra, such as ordering operations and simplifying simple algebraic expressions, to get your feet wet. You will then build on these concepts by learning more about functions, graphing of functions, evaluation of functions, and factorization. You will spend time on the rules of exponents and their applications in the distribution of multiplication over addition/subtraction.


Unit 1: Basic Algebra Concepts

We begin by quickly reviewing the basic concepts you will need to understand as you begin your study of algebra. If you have taken a pre-algebra course, you may be familiar with some of these concepts. With practice, every student, regardless of background, can grasp these concepts.

Completing this unit should take you approximately 26 hours.

- Upon successful completion of this unit, you will be able to:
 - evaluate order of operations with absolute value;
 - distribute and combine like terms;
 - evaluate algebraic expressions;
 - solve linear equations (simple, dual side variables, infinite or no solution, and rational coefficients);
 - solve linear absolute value equations (simple and dual side);
 - solve algebraic formulas with several variables for one of the variables; and
 - solve applications of linear equations (age, integers, and triangles).

• 1.1: Order of Operations

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 0.3, Order of Operations"File](#)

Please read section 0.3 to learn about order of operations. The assignment listed under this subunit corresponds to this reading. Mathematics would be useless if some people thought $3 + 4 \times 2 = 14$ and others thought $3 + 4 \times 2 = 11$. Understanding the order of operations is the most basic (and important) task of the student of mathematics.

◦ 1.1.1: Removing Parentheses

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Order of Operations - Introduction"File](#)

Please complete pages 4 to 5 of Wallace's workbook to learn about order of operations. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

Remember that the primary rule for order of operations is that things in parentheses be simplified first.

- [Tyler Wallace's "Order of Operations - Introduction"Page](#)
Watch the first video, which introduces you to the order of operations. Please pay attention to the order in which operations are used and the mnemonic PEMDAS and what it stands for. Note that the video does not make use of the equal sign. Please take a look at Saylor Academy's ["Revision to MA001](#)

[Video](#)" for a detailed explanation of how to solve the two problems presented in the video.

Then, watch the second video. In this video, you will apply PEMDAS to solving problems by first removing parentheses, simplifying exponents, multiplying, dividing, adding, and subtracting. Please understand that regarding multiplication and division, we perform whichever comes first, from left to right.

○ 1.1.2: Absolute Values

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Order of Operations - Absolute Value"File](#)

Complete page 7 of Wallace's workbook to apply your knowledge about order of operations with absolute values. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

Absolute values tell us how far apart two numbers are, and we need to practice working with absolute value equations.

- [Tyler Wallace's "Order of Operations - Absolute Value"Page](#)
Watch this video, paying attention to the examples being used to explain the concept of absolute values. You may refer to the video when doing your homework, if necessary.

○ 1.1.3: Order of Operations on Fractions


- [Tyler Wallace's "Order of Operations - Fractions"Page](#)
Watch this brief video. Pay attention to the examples being used to explain the concept of four operations on integers. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Order of Operations - Fractions"File](#)


Complete page 6 of Wallace's workbook to practice with the four operations on integers. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

Fractions allow us to manipulate complicated expressions that include division. Being able to work with fractions allows us to simplify (and often avoid) division.


○ 1.1.4: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: "Practice - Order of Operation"URL](#)
Review the topics covered in the course so far, and then complete these exercises. Answer only the odd-numbered questions in numbers 1 to 25.

- 1.2: Simplify Algebraic Expressions


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 0.4: Properties of Algebra"URL](#)
Read this section to learn how to evaluate algebraic expressions for some given values.
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- 1.2.1: Evaluate Expressions

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Simplify Algebraic Expressions - Evaluate"URL](#)
Complete page 8 of Wallace's workbook to evaluate algebraic expressions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.


- [Tyler Wallace's "Simplify Algebraic Expressions - Evaluate"Page](#)
Watch this brief video, which discusses how to evaluate expressions. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- 1.2.2: Combine Like Terms

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Simplify Algebraic Expressions - Combine Like Terms"URL](#)
Complete page 9 of Wallace's workbook for practice with combining like terms. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Simplify Algebraic Expressions - Combine Like Terms"Page](#)
Watch this brief video, paying attention to the examples do the practice problem set on to access your understanding. You may watch the video as often as you please. You may refer to the video when doing your homework if necessary.


- 1.2.3: Distributive Properties

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Simplify Algebraic Expressions - Distributive Properties"URL](#)
Complete page 10 of Wallace's workbook for practice with simplifying algebraic expressions, using the distributive property. Try to complete this


exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Simplify Algebraic Expressions - Distributive Property"Page](#)
Watch this brief video. Note that when we distribute, we take into consideration the sign of the number we are distributing. Particularly, if you distribute a negative number over a positive number you get a negative number and vice versa. Be careful when you distribute negative numbers.

○ 1.2.4: Distribute and Combine Like Terms

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Simplify Algebraic Expressions - Distribute and Combine"URL](#)
Complete page 11 of Wallace's workbook for practice with distributing and combining like terms. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
- [Tyler Wallace's "Simplify Algebraic Expressions - Distribute and Combine"Page](#)
Watch this brief video. As we have already familiarized ourselves with distribution in subunit 1.2.3 above, this lesson will expand on that to combine like terms. The goal here is to be able to distribute and combine terms that are alike: terms with the same variable or group of variables and exponents. Remember that combining like terms is simply adding or subtracting the numerical coefficients in the like terms.

○ 1.2.5: Homework Assessment







-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Properties of Algebra"URL](#)
Review the topics covered above, watch the videos, and then do the exercises provided in the link above. Answer every other odd question in 1-81.

• 1.3: Linear Equations in One Variable

○ 1.3.1: Equality Property of Addition and Multiplication

- [Tyler Wallace's "Linear Equations - One Step Equations"Page](#)
Watch this brief video. Note that the take-home message here is that in linear equations, and in other equations you will handle in the future, we can add and multiply same expressions on both sides of the equation. We must do the same thing to each side in order to keep the balance, otherwise we change the solutions to our problem.



○ 1.3.2: Solving One Step Equations

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.1: Solving Linear Equations - One Step Equations"URL](#)
Read this section, beginning on page 28, to learn how to solve "one step equations."
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Linear Equations - One Step Equations"URL](#)
Complete page 12 of Wallace's workbook for practice with solving one step linear equations.
 - [Khan Academy: "Example: Two-Step Equation with x/4 Term"Page](#)
Watch this brief optional video if you feel like you need additional help with this topic.
- 1.3.3: Solving Two Step Equations
-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.2: Linear Equations - Two Step Equations"URL](#)
Read section 1.2 on page 33 to learn how to solve "two step equations." Note that the assignment at the end of this subunit corresponds with this reading.
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Linear Equations - Two Step Equations"URL](#)
Complete page 13 of Wallace's workbook for practice with solving two step linear equations. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
 - [Tyler Wallace's "Linear Equations - Two Step Equations"Page](#)
Watch this video to learn how to solve two-step equations. You may watch the video as often as you please. You may refer to the video when doing your homework if necessary.
- 1.3.4: Solving General Linear Equations in One Variable
-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.3: Solving Linear Equations - General Linear Equations"URL](#)
Read this section, beginning on page 37, to learn how to solve general linear equations.
 - [Khan Academy: "Solving \$Ax + B = C\$ "Page](#)
Watch this brief optional video if you feel like you need additional help with this topic.
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Linear Equations - General"URL](#)

Complete page 14 of Wallace's workbook for practice with simplifying general linear equations with one variable. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions. Note that the video contains a small error in its discussion of Practice B, which will affect the final answer.

- [Tyler Wallace's "Linear Equations - General"Page](#)
Watch this brief video, paying attention to the examples being used to explain how to solve general linear equations with one variable. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary. **Please note that there is a small math error at the 3:15-minute mark in the video; the 5 is not distributed correctly on the right side. The correct answer to the example is -6.** For a full explanation of how to solve the problem, please read the ["Revision to Tyler Wallace's 'Linear Equations in One Variable'"](#).

○ 1.3.5: Solving Equations involving Fractions

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.4: Solving Linear Equations - Fractions"URL](#)
Read this section, beginning on page 43, to learn how to solve equations involving fractions.
-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Linear Equations - Fractions and Linear Equations - Distributing with Fractions"URL](#)
Complete pages 15 and 16 of Wallace's workbook for practice with solving equations with fractions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
- [Tyler Wallace's "Linear Equations - Fractions" and "Linear Equations in One Variable - Distributing with Fractions"Page](#)
The first video demonstrates how to solve equations that involve fractions. The second explains how to distribute fractions in linear equations that have one variable. You may watch the videos as often as you please. You may refer to the videos when doing your homework, if necessary.
- [Khan Academy: "Solving \$Ax + B = C\$ ", "Identifying Fraction Parts", and "Equivalent Fractions Example"Page](#)
Watch these brief optional videos if you feel like you need additional help with this topic.


○ 1.3.6: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Two Step Problems"URL](#)


Answer every other odd-numbered problem in questions 1 through 39.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - General Linear Equations"URL](#)

Answer every other odd-numbered problem in questions 1 through 49.


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Fractions"URL](#)
Answer every other odd-numbered problem in questions 1 through 29.

- 1.4: Formulas

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.5: Solving Linear Equations - Formula"URL](#)
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Read this section. You now have the skills to take a formula that relates two or more quantities and solve it for whichever quantity you want. Notice how this allows us to use formulas in many ways. This is also great practice for algebra skills we will use throughout the course.

- 1.4.1: Two Step Formulas

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Formulas - Two Step Formulas"URL](#)

Complete page 17 of Wallace's workbook for practice with two-step formulas. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Formulas - Two Step Formulas"Page](#)
Watch this brief video, paying attention to the examples being used to explain two-step formulas. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.



- 1.4.2: Multi-Step Formulas




-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Formulas - Multi-Step Formulas"URL](#)

Complete page 18 of Wallace's workbook for practice with multi-step formulas. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Formulas - Multi-Step Formulas"Page](#)
Watch this brief video, which explains how to use multistep formulas. Also, note that the four properties you studied earlier in this course are also applicable here. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- 1.4.3: Fractions


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Formulas - Fractions"URL](#)
Complete page 19 of Wallace's workbook for practice with clearing fractions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
- [Tyler Wallace's "Formulas - Fractions"Page](#)
Watch this five-minute video, paying attention to the examples being used to explain how to clear fractions when using formulas. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.
- 1.4.4: Homework Assessment
 -  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Formulas"URL](#)
Review the topics, watch the videos, and do the exercises provided in the link above. Answer the odd-numbered questions from 1 to 49. Solutions are given on page 2 of the PDF.
- 1.5: Absolute Value Equations

 -  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.6: Solving Linear Equations - Absolute Value"URL](#)
Read this section. The equations $x - 3 = 2$ and $|x - 3| = 2$ are very different from each other, but they are also closely. Notice how we turn an equation with absolute values into two equations without absolute values. Note that this reading covers all the material you need to know for subunits 1.5.1-1.5.3.
 - 1.5.1: Two Solutions
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Absolute Value - Two Solutions"URL](#)
Complete page 20 of Wallace's workbook to practice solving absolute value equations with two solutions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
 - [Tyler Wallace's "Absolute Value - Two Solutions"Page](#)
Watch this five-minute video, which explains how two solutions are applied to absolute value equations. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.
 - 1.5.2: Isolate Absolute Value
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Absolute Value - Isolate Absolute"URL](#)
Complete page 21 of Wallace's workbook for practice with isolating absolute values. Try to complete this exercise before watching the video in this subunit,


and then review the worksheet as you follow along with the video for solutions. (Note that the final term in Example B in the workbook should be -31 rather than -32).

- [Tyler Wallace's "Absolute Value - Isolate Absolute"Page](#)
Watch this five-minute video, paying attention to the examples being used to explain how to isolate an absolute value. Watch the video as many times as necessary to understand the concept. You may refer to the video when doing your homework, if necessary.


○ 1.5.3: Two Absolute Values

- [Tyler Wallace's "Absolute Value Equations - Two Absolutes"Page](#)
Watch this five-minute video, which demonstrates how to solve absolute value equations when two absolute values are involved. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.
-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Absolute Value - Two Absolutes"URL](#)
Complete page 22 of Wallace's workbook to practice solving for variables with equations that contain two absolute values.

○ 1.5.4: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Absolute Value Equations"URL](#)
Review the topics covered in the course so far, and then complete the exercises linked above. Work on only the odd-numbered questions for numbers 1 through 35. Solutions are given on page 2 of the PDF.

● 1.6: Introduction to Problem Solving (Word Problems)

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.8: Linear Equations - Number and Geometry"URL](#)
Read this section. Word problems are about gathering information, turning it into equations, and then using the equations to solve the stated problem. Please focus on the various ways that we turn English statements into mathematical equations.
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○ 1.6.1: Number Problems


- [Tyler Wallace's "Word Problems - Number Problems"Page](#)
Watch this five-minute video, paying attention to the examples being used to learn how to translate words into mathematical expressions. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Word Problems - Number Problems"URL](#)

Complete page 23 of Wallace's workbook to apply your knowledge of consecutive even and odd integers. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.


- 1.6.2: Consecutive Integers

- [Tyler Wallace's "Word Problems - Consecutive Integers"Page](#)
Watch this five-minute video, paying attention to the examples being used to learn how to solve problems with consecutive integers. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Word Problems - Consecutive Integers"URL](#)

Complete page 24 of Wallace's workbook to practice solving word problems with consecutive integers. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.


- 1.6.3: Consecutive Even/Odd Integers

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Word Problems - Consecutive Even/Odd"URL](#)

Complete page 25 of Wallace's workbook to apply your knowledge of consecutive even and odd integers. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Word Problems - Consecutive Even/Odd"Page](#)
Watch this five-minute video, which shows how to solve problems with consecutive even and odd integers. You may watch the video as often as you please. You may refer to the video when doing

- 1.6.4: Angles of Triangles


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Word Problems - Triangles"URL](#)

Complete page 26 of Wallace's workbook to practice solving word problems that involve angles of triangles. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.


- [Tyler Wallace's "Word Problems - Triangles"Page](#)

Watch this five-minute video, which explains how to solve problems using angles of triangles. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 1.6.5: Perimeter of Rectangles



-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Word Problems - Perimeter"URL](#)
Complete page 27 of Wallace's workbook to practice solving word problems involving perimeters. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
- [Tyler Wallace's "Word Problems - Perimeter"Page](#)
Watch this five-minute video, paying attention to the examples that explain how to problem solve with the perimeter of rectangles. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 1.6.6: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Number and Geometry Problems"URL](#)
Review the topics covered so far in this course, and attempt the odd numbered exercises in questions 1 to 45. Solutions are on page 4 of the PDF.


● 1.7: Further Application Problems

○ 1.7.1: Variable Age Now


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.9: Solving Linear Equations - Age Problems"URL](#)
Read this section.
-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Age Problem - Variable Now"URL](#)
Complete page 28 of Wallace's workbook to practice solving word problems that ask you to solve for a person's age. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
- [Tyler Wallace's "Age Problems - Variable Now"Page](#)
Watch this five-minute video, which demonstrates how to solve age problems. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.
- [Khan Academy: "Age Word Problems 1 and 2"Page](#)

Watch these brief optional videos if you feel like you need additional help with this topic.


○ 1.7.2: Given Sum Ages Now

- [Tyler Wallace's "Age Problems - Sum Now"Page](#)
Watch this five-minute video, paying attention to the examples being used to further explain how to solve age problems. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.
-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Age Problem - Sum Now and Variable Time"URL](#)
Complete pages 29 and 30 of Wallace's workbook to practice solving word problems to determine ages of a person in the past based on information given about the person's age now.
- [Khan Academy: "Age Word Problem 3"Page](#)
Watch this brief optional video if you feel like you need additional help with this topic.

○ 1.7.3: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Age Problems"URL](#)
Answer the odd numbered problems for questions 1 to 39. Solutions are on page 4 of the PDF.

• Unit 1 Practice Test

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-  [Tyler Wallace's "Beginning and Intermediate Algebra: Unit 1 Practice Test"URL](#)
Review Unit 1 before taking this practice test. Be sure that you are ready before taking the practice test, as it will give you a clear picture of what you know and the areas you need to review, if necessary. This is very important. You may review the problems in the work pages in addition to watching the videos to prep for the practice test. When you have finished this practice test, check your answers against Saylor Academy's "[Unit 1 Practice Test - Answer Key](#)".
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Unit 2: Solving Linear Inequalities and Graphing

In this unit, you will learn to apply the concept of solving equations to solve problems involving linear inequalities. You will also learn how to graph a straight line, use different methods to find the slope and intercept of a line, and interpret slope and intercept. You will learn more about types of straight lines.

Completing this unit should take you approximately 20 hours.

- Upon successful completion of this unit, you will be able to:
 - solve, graph, and give interval notation for basic linear inequalities and tripartite inequalities;
 - solve distance, rate, and time problems;
 - find the slope of a line from two points or a graph; and
 - find the equation of a line from a graph, standard form, two points, parallel lines, and perpendicular lines.

- **2.1: Inequalities**

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 3.1: Inequalities - Solve and Graph Inequalities"URL](#)
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Read this section. Note the difference in meaning among "equal," "less than," and "less than or equal," and the symbols we use for these ideas. Focus on how the steps for solving inequalities are different than for solving equations.

- **2.1.1: Graphing Inequalities**

- [Tyler Wallace's "Inequalities - Graphing"Page](#)

Watch this four-minute video, paying attention to the examples being used to explain graphing inequalities. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary. In this unit, the operations on the terms are very similar to solving equations. Here, we make use of inequality instead of an equal sign. The inequality sign switches/flips when you multiply or divide both sides by a negative number.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Inequalities - Graphing"URL](#)

Complete page 32 of Wallace's workbook to practice graphing inequalities on a number line. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Khan Academy: "Graphing Inequalities", "Graphing Linear Inequalities in Two Variables Example 2", and "Graphing Linear Inequalities in Two Variables Example 3"Page](#)

Watch these brief optional videos if you feel like you need additional help with this topic.

- **2.1.2: Interval Notation**

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Inequalities - Interval Notation"URL](#)

Complete page 33 of Wallace's workbook to practice with interval notation. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

We use plots, graphs, and pictures to help us understand and communicate. Interval notation is a very visual way to communicate inequalities, and it also gives us visual techniques for solving them.

- [Tyler Wallace's "Inequalities - Interval Notation"Page](#)

Watch this three-minute video, paying attention to the examples being used to explain interval notation. Note when to use a square bracket and a round bracket. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- [Khan Academy: "Absolute Value Inequalities"Page](#)

Watch this brief optional video if you feel like you need additional help with this topic.

- 2.1.3: Solving Inequalities

- 2.1.3.1: Solving Linear Inequalities

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Inequalities - Solving"URL](#)

Complete page 34 of Wallace's workbook to practice solving inequalities. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Inequalities - Solving"Page](#)

Watch this five-minute video, paying attention to the examples which provide a linear approach to solving inequalities. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- 2.1.3.2: Solve Compound Inequalities (Tripartite)


- [Tyler Wallace's "Inequalities - Tripartite"Page](#)

Watch this five-minute video. Note that compound or tripartite inequalities are very similar to linear inequalities, except for the way they are structured. Bear in mind that in the tripartite inequalities, we will be balancing the left center and right. This means whatever you decide to do to the center in order to get the variable in question by itself, you have to do the same to the other two parts of the inequality. Notice also that if you divide or multiply through by a negative number, then you have to flip the inequality signs.


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Inequalities - Tripartite"URL](#)

Complete page 35 of Wallace's workbook to practice solving inequalities. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- 2.1.4: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Solve and Graph Inequalities"URL](#)


Answer odd-numbered problems 1 to 37.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Compound Inequalities"URL](#)

Answer all problems, from 1 to 19.

- 2.2: Graphing, Slopes, and Rate of Change

- 2.2.1: Point and Lines

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 2.1: Graphing - Point and Lines"URL](#)

Read this section, on pages 89 to 93. One of our most powerful tools is visualization; graphs and XY coordinates comprise the foundation of "seeing" math. Getting comfortable when working with points and lines in a coordinate system is the main point of this section.

- [Wikipedia's "Quadrant \(plane geometry\)"Page](#)

Read the following short article for a brief description of the four quadrants of a Cartesian graph.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Graphing and Slope - Points and Lines"URL](#)

Complete page 36 of Wallace's workbook for practice with graphing based on points provided or equation of the line provided. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Graphing and Slope - Points and Lines"Page](#)

Watch this five-minute video, which discusses points and lines in graphing and slopes. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.


- [Khan Academy: "Plotting \(x,y\) Relationships"Page](#)

Watch this brief optional video if you feel like you need additional help with this topic.

- 2.2.2: Slope from a Graph

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 2.2: Graphing - Slope"URL](#)

Read this section, which focuses on one fundamental property of the line: its slope. The slope tells us how much the line rises as we move to the right. There are several ways to talk about this one idea.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Graphing and Slope - Slope from a Graph"URL](#)

Complete page 37 of Wallace's workbook to work on determining the slope of a line, given the line on a graph. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Graphing and Slope - Slope from Graph"Page](#)

Watch this four-minute video, paying attention to the examples being used to explain the slope of a graph. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 2.2.3: Slope from Two Points

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Graphing and Slope - Slope from Two Points"URL](#)

Complete page 38 of Wallace's workbook to work on finding the slope when given two sets of points. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Graphing and Slope - Slope from Two Points"Page](#)

Watch this five-minute video. Take note of the examples used in the video to explain how to find the slope using two points on the graph. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- [Khan Academy: "Point-Slope and Standard Form"Page](#)

Watch this brief optional video if you feel like you need additional help with this topic.

○ 2.2.4: Homework Assessment


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Points and Lines"URL](#)

Work through problems 1, 2, and every other odd problem from question 3 through 21.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Slope"URL](#)


Attempt the odd problems from questions 1 through 29.

- 2.3: Equations of Lines

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 2.3: Graphing - Slope-Intercept Form"URL](#)
-

Read this section. We know what a line is when we see it plotted. There is more than one useful way to write the equation for a line.

- 2.3.1: Slope-Intercept Equations

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Equations - Slope Intercept Equation"URL](#)

Complete page 39 of Wallace's workbook to practice providing the slope intercept equation when given information of the slope and y-intercept, or a graph. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.


- [Tyler Wallace's "Equations - Slope Intercept Equation"Page](#)

Watch this five-minute video to learn about the slope-intercept equation and its applications. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- [Khan Academy: "Multiple Examples of Constructing Linear Equations in Slope-Intercept Form"Page](#)

Watch this brief optional video if you feel like you need additional help with this topic.

- 2.3.2: Putting Equations in Intercept Form

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Equations - Put in Intercept Form"URL](#)

Complete page 40 of Wallace's workbook to practice putting an equation in intercept form. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Equations - Put in Intercept Form"Page](#)

Watch this four-minute video to learn about putting equations in intercept form. Understand that sometimes there will be no intercept or slope, in which case the slope or intercept will be zero.

- 2.3.3: Equation from Graph

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Equations - Graph"URL](#)

Complete page 41 of Wallace's workbook to work on graphing equations. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Equations - Graph"Page](#)

Watch this five-minute video, paying attention to the examples being used to instruct you on how to graph equations. Be sure that you understand the different parts of the straight line equation and the names that go with them. You may practice by graphing your own lines and seeing if you can label them completely.

- 2.3.4: Vertical and Horizontal Lines


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Equations - Vertical/Horizontal"URL](#)

Complete page 42 of Wallace's workbook to practice graphing or finding the equations for vertical and horizontal lines. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Equations - Vertical/Horizontal"Page](#)

Watch this two-minute video, which discusses the different characteristics of vertical and horizontal lines. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- 2.3.5: Point-Slope Equations

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Equations - Point Slope"URL](#)

Complete page 43 of Wallace's workbook to practice finding the point slope equation, given a point the line passes through and the slope. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Equations - Point Slope"Page](#)

Watch this five-minute video, paying attention to the examples being used to demonstrate the point-slope equation.

- [Khan Academy: "Point-Slope and Standard Form"Page](#)

Watch this brief optional video if you feel like you need additional help with this topic.

- 2.3.6: Using Two Points to Find the Equation of a Line

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Equations - Given Two Points"URL](#)

Complete page 44 of Wallace's workbook to practice with finding an equation when given two points. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Equations - Given Two Points"Page](#)

Watch this five-minute video, focusing on the examples used to find the equation of the line with two points given.

○ 2.3.7: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Slope-Intercept"URL](#)

Answer every other odd-numbered problem in questions 1 through 41.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Point-Slope Form"URL](#)

Answer every other odd-numbered problem in questions 1 through 51.

• 2.4: Parallel and Perpendicular


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 2.5: Graphing - Parallel and Perpendicular Lines"URL](#)

Read this section. Parallel lines never intersect, which is good to know if you are looking for an intersection! The shortest distance from a line to something else is perpendicular to the line. The slopes for parallel and perpendicular lines have simple relationships to each other (which you should memorize!).

- [Khan Academy: "Equations of Parallel and Perpendicular Lines"Page](#)

Watch this brief optional video if you feel like you need additional help with this topic.

○ 2.4.1: Slope

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Parallel and Perpendicular - Slope"URL](#)

Complete page 45 of Wallace's workbook to practice determining whether lines will be parallel, perpendicular, or neither. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Parallel and Perpendicular - Slope"Page](#)

Watch this five-minute video, focusing on the examples used to explain how to find the slope of parallel and perpendicular lines. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

- 2.4.2: Equations


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Parallel and Perpendicular - Equations"URL](#)

Complete page 46 of Wallace's workbook to find the equations of parallel and perpendicular lines. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Parallel and Perpendicular - Equations"Page](#)


Watch this five-minute video to learn about equations used for parallel and perpendicular lines.

- 2.4.3: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Parallel and Perpendicular Lines"URL](#)


Answer the odd-numbered problems for questions 1 through 47.

- 2.5: Distance and Rate Problems

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 1.10: Solving Linear Equations - Distance, Rate and Time"URL](#)
-

Read this section. The relationship among distance, rate, and time is one of the simplest and most fundamental of physics and engineering. Notice how $d = rt$ is a relationship that can be solved for any of the three variables.

- 2.5.1: Opposite Directions

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Distance - Opposite Directions"URL](#)

Complete page 47 of Wallace's workbook to practice solving distance problems. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Distance - Opposite Directions"Page](#)

Watch this five-minute video, which demonstrates how to solve distance problems involving opposite directions. In working with distance and rate problems, it will

be helpful if you begin every question by first drawing a picture and translating the picture into a table as demonstrated in the video. Finally, apply the formula to get the required answer. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 2.5.2: Catch-Up

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Distance - Catch Up"URL](#)

Complete page 48 of Wallace's workbook to practice solving distance problems. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

Two objects may be moving in the same direction or in different directions. This is the simplest relationship between two moving objects. "Catch-Up" problems are about moving in the same direction but at different speeds.

- [Tyler Wallace's "Distance - Catch Up"Page](#)

Watch this five-minute video, which demonstrates distance problems in which one person is trying to catch up with another person. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 2.5.3: Total Time

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Distance - Total Time"URL](#)

Complete page 49 of Wallace's workbook to practice solving distance problems. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Distance - Total Time"Page](#)

Watch this five-minute video, paying attention to the distance and rate problems shown to demonstrate the concept of total time. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 2.5.4: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Distance, Rate, and Time Problems"URL](#)

Answer the odd-numbered problems for questions 1 through 37.

• Unit 2 Practice Test

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Unit 2 Practice Test"URL](#)

Review Unit 2 before taking this practice test. Be sure that you are ready before taking the practice test, as it will give you a clear picture of what you know and the areas you need to review, if necessary. You may review the problems in the work pages in addition to watching the videos to prep for the practice test. When you have finished this practice test, you may check your answers against the "[Unit 2 Practice Test - Answer Key](#)".

Unit 3: Exponents and Polynomials


This section introduces you to the concept of evaluating exponents, converting scientific notations to decimal notations, and vice versa. You will apply these concepts to evaluating polynomial expressions.

Completing this unit should take you approximately 19 hours.

- Upon successful completion of this unit, you will be able to:
 - simplify exponential expressions with positive and/or negative exponents;
 - multiply or divide expressions in scientific notation;
 - evaluate polynomials for values of the variable;
 - add and subtract polynomials;
 - distribute and multiply with polynomials (including special products); and
 - divide polynomials by monomials and with long division.


- 3.1: Exponents

- 3.1.1: Rules of Exponents

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 5.1: Polynomials - Exponent Properties"URL](#)

Read this section. Polynomials are all about adding and multiplying powers of x . Notice that we have specific rules that govern multiplying and dividing powers of x and raising a power of x to another power.

- 3.1.1.1: Product Rule

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Exponents - Product Rule"URL](#)

Complete page 51 of Wallace's workbook to practice implementing the product rule. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Exponents - Product Rule"Page](#)

Watch this three-minute video, which discusses the product rule for exponents.

- 3.1.1.2: Quotient Rule


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Exponents - Quotient Rule"URL](#)

Complete page 52 of Wallace's workbook to practice implementing the quotient rule. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Exponents - Quotient Rule" and MathIsPower4U's "Simplify Exponential Expressions - Quotient Rule"Page](#)

Watch these two videos, which discuss the quotient rule for exponents.

▪ 3.1.1.3: Power Rule


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Exponents - Power Rules"URL](#)

Complete page 53 of Wallace's workbook to practice implementing the power rule. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Exponents - Power Rules"Page](#)

Watch these two videos, which discuss the power rule for exponents.

▪ 3.1.1.4: Zero Exponents

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 5.2 Polynomials - Negative Exponents"URL](#)

Read this section. Notice that a negative exponent in the denominator is the same as a positive exponent in the numerator. Conversely, a negative exponent in the numerator is the same as a positive exponent in the denominator.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Exponents - Zero"URL](#)

Complete page 54 of Wallace's workbook to practice with the zero power rule. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Exponents - Zero"Page](#)

Watch this four-minute video, which discusses the zero power rule with exponents. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

▪ 3.1.1.5: Negative Exponents

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Exponents - Negative Exponents"URL](#)

Complete page 55 of Wallace's workbook to practice with negative exponents. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Exponents - Negative Exponents" and MathIsPower4U's "Simplify Exponential Expressions with Negative Exponents"Page](#)

Watch these two videos, which discuss rules for negative exponents.

- [Khan Academy: "Raising a Number to the 0th and 1st Power"Page](#)

Watch this video, which shows a short proof of the zero exponent.

○ 3.1.2: Properties

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Exponents - Properties"URL](#)

Complete page 56 of Wallace's workbook to solve equations using the properties of exponents. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Exponents - Properties" and MathIsPower4U's "Simplify an Exponential Expression Video Series"Page](#)

Watch each of these videos, focusing on the examples used that demonstrate how to simplify exponents with the properties and rules you have learned so far, i.e., product rule, quotient rule, etc.

○ 3.1.3: Homework Assessment


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Exponent Properties"URL](#)

Answer the odd-numbered problems for questions 1 through 43.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Negative Exponents"URL](#)


Answer the odd-numbered problems for questions 1 through 39.

• 3.2: Scientific and Decimal Notation

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 5.3: Polynomials - Scientific Notation"URL](#)

Read this section. Scientific notation allows us a general idea of the size of a number with a glance at the exponent, instead of counting places before or after a decimal point.

○ 3.2.1: Convert

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Scientific Notation - Convert"URL](#)

Complete page 57 of Wallace's workbook to practice with converting between standard and scientific notation. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Scientific Notation - Convert"Page](#)

Watch this five-minute video, which demonstrates how to convert between standard and scientific notation.

○ 3.2.2: Close to Scientific


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Scientific Notation - Close to Scientific"URL](#)

Complete page 58 of Wallace's workbook for more practice with scientific notation. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Scientific a Notation - Close to Scientific"Page](#)

Watch this four-minute video, paying attention to the examples being used to further explain scientific notation. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 3.2.3: Multiply/Divide


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Scientific Notation - Multiply/Divide"URL](#)

Complete page 59 of Wallace's workbook for more practice with scientific notation. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Scientific Notation - Multiply/Divide"Page](#)

Watch this three-minute video, which discusses how to multiply and divide with scientific notation.

○ 3.2.4: Multiply/Divide Leaving Answer in Decimal Notation

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Scientific Notation - Multiply/Divide Where Answer is Not in Scientific Notation"URL](#)

Complete page 60 of Wallace's workbook to practice with multiplying and dividing scientific notation with a result that is not in scientific notation. Try to

complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Scientific Notation - Multiply/Divide Where Answer Is Not in Scientific Notation"Page](#)

Click on the link above and watch this four-minute video, which addresses multiplication and division and then converting the answer to scientific notation.


○ 3.2.5: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Scientific Notation"URL](#)

Answer the odd-numbered problems for questions 1 through 41.

• 3.3: Polynomials

○ 3.3.1: Evaluate

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 5.4: Polynomials - Introduction to Polynomials"URL](#)

Read this section. Evaluating a polynomial is simply plugging in a value for the variable and then simplifying.

- [Tyler Wallace's "Polynomials - Evaluate"Page](#)

Watch this five-minute video, which provides definitions and characteristics of polynomials and gives examples of evaluating polynomials.

○ 3.3.2: Add/Subtract

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Polynomials - Add/Subtract"URL](#)

Complete page 62 of Wallace's workbook to practice adding and subtracting polynomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Polynomials - Add and Subtract"Page](#)

Watch this four-minute video, paying attention to the examples being used to add and subtract polynomials.

○ 3.3.3: Multiply Polynomials

▪ 3.3.3.1: Monomial by Polynomial

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 5.5: Polynomials - Multiplying Polynomials"URL](#)

Read this section. Multiplying polynomials is all about being careful with distribution (focus on how parentheses are used to make sure we distribute correctly) and following the rules for exponents (focus on how we use $x^p x^q = x^{p+q}$).

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Polynomials - Multiply by Monomials"URL](#)

Complete page 63 of Wallace's workbook to practice multiplying by monomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Polynomials - Multiply by Monomial"Page](#)

Watch this three-minute video, paying attention to the examples being used to explain how to multiply by monomials.

▪ 3.3.3.2: Binomial by Binomial (FOIL)

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Polynomials - Multiply by Binomials"URL](#)

Complete page 64 of Wallace's workbook to practice multiplying by binomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Polynomials - Multiply by Binomials"Page](#)

Watch this four-minute video, paying attention to the explain of how to multiply binomials.

▪ 3.3.3.3: Multiply with Trinomials


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Polynomials - Multiply by Trinomials"URL](#)

Complete page 65 of Wallace's workbook to practice multiplying by trinomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Polynomials - Multiply by Trinomials"Page](#)

Watch this five-minute video, paying attention to the explanation of how to multiply trinomials.

▪ 3.3.3.4: Multiply Monomial by Two Binomials

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Polynomials - Multiply Monomials and Binomials"URL](#)


Complete page 66 of Wallace's workbook to practice multiplying monomials by binomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Polynomials - Multiply Monomial by Binomials"Page](#)

Watch this four-minute video, paying attention to the examples being used to explain how to multiply monomials by two binomials.

- 3.3.4: Special Products

- 3.3.4.1: Sums and Difference

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 5.6: Polynomials - Multiply Special Products"URL](#)

Read this section. The idea of this section is to point out a few nice and important special cases of polynomial multiplication. Memorize these special products and it will pay off big later!

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Polynomials - Sums and Difference"URL](#)

Complete page 67 of Wallace's workbook to practice multiplying monomials by binomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Polynomials - Sum and Difference", MathIsPower4U's "Simplify an Expression Involving Squares of Binomials", and TheLearningPub's "Factoring Polynomials - Difference of two Squares"Page](#)

Watch these videos, paying attention to the examples used to explain sums and differences with polynomials.

- 3.3.4.2: Perfect Square

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Polynomials - Perfect Square"URL](#)

Complete page 68 of Wallace's workbook to practice with perfect squares. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Polynomials - Perfect Square"Page](#)

Watch these videos, which discuss the perfect square shortcut.

- 3.3.5: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Introduction to Polynomials"URL](#)

Answer every other odd numbered problem for questions 1 through 41.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Multiply Polynomials"URL](#)


Answer every other odd numbered problem for questions 1 through 39.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Multiply Special Products"URL](#)

Answer every other odd numbered problem for questions 1 through 39.

- 3.4: Division of Polynomials

- 3.4.1: Divide a Polynomial by Monomial

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 5.7: Polynomials - Divide Polynomials"URL](#)

Read this section. Dividing polynomials is just the same as the long division you learned in elementary school. It is also great practice in solidifying your skills in exponents and multiplication. Pay special attention to how the exponents work as place holders just as the digits in the 1s, 10s, 100s, and so forth, places did for us in elementary school.


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Division - By Monomials"URL](#)

Complete page 69 of Wallace's workbook to practice dividing monomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Division By Monomials"Page](#)

Watch these videos, which discuss division by monomials.

- 3.4.2: Divide a Polynomial by a Polynomial

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Division By Polynomials"URL](#)

Complete page 70 of Wallace's workbook to practice dividing polynomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Division - Missing Terms"URL](#)

Complete page 71 of Wallace's workbook for more practice with dividing polynomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Division - Polynomials"Page](#)

Watch these videos, paying attention to the examples used to explain the division of polynomials. You may watch the videos as often as you please. You may refer to the video when doing your homework, if necessary.

- 3.4.3: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Divide Polynomials"URL](#)

Answer odd-numbered problems for questions 1 through 43. Keep in mind that you are allowed to watch the videos as often as you please to help you answer the homework problems.

- Unit 3 Practice Test

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Unit 3 Practice Test"URL](#)

Review Unit 3 before clicking on the link above to take the practice test. Be sure that you are ready before taking the practice test, as it will give you a clear picture of what you know and the areas you need to review, if necessary. You may review the problems in the work pages in addition to watching the videos to prep for the practice test. When you have finished this practice test, you may check your answers against the "[Unit 3 Practice Test - Answer Key](#)".


Unit 4: Factoring Polynomials

This unit expands on what you learned in Unit 3. In Unit 4, you will learn to factor the greatest common factor by grouping and other factoring methods. Because factoring and distribution are opposite actions, you will be able to determine whether you have factored correctly by going in the opposite direction, which is distributing through multiplication.

Completing this unit should take you approximately 19 hours.

- Upon successful completion of this unit, you will be able to:
 - remove a common factor;
 - factor by grouping (including rearranging terms);
 - factor special products;
 - factor trinomials; and
 - solve quadratic equations by factoring.

- 4.1: Greatest Common Factor (GCF) and Grouping

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.1: Factoring - Greatest Common Factor"URL](#)
-

Read this section. Pay special attention to page 212.

○ 4.1.1: Find the GCF

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: GCF and Grouping - Find the GCF"URL](#)

Complete page 73 of Wallace's workbook to practice finding the greatest common factor. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "GCF and Grouping - Find GCF"Page](#)

Watch this two-minute video, which discusses how to find the Greatest Common Factor (GCF). You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 4.1.2: Factor the GCF


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: GCF and Grouping - Factor GCF"URL](#)

Complete page 74 of Wallace's workbook to practice factoring the greatest common factor. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.


- [Tyler Wallace's "GCF and Grouping - Factor GCF" and MathIsPower4U's "Factor and Solve a Polynomial Equation"Page](#)

Watch these videos to learn how to factor the Greatest Common Factor (GCF).

○ 4.1.3: Grouping

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.2: Factoring - Grouping"URL](#)

Read this section. Pay special attention to page 216.


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: GCF and Grouping - Binomial GCF"URL](#)

Complete page 75 of Wallace's workbook to practice factoring the greatest common factor. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "GCF and Grouping - Grouping" and AlgebraHelpForHumans' "Factor by Grouping"Page](#)

Watch these videos, which discuss the GCF and grouping methods. You may watch the videos as often as you please. You may refer to the videos when doing your homework, if necessary.

○ 4.1.4: Grouping with Order Change

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: GCF and Grouping - Grouping and Change Order"URL](#)

Complete pages 76 and 77 of Wallace's workbook to practice with grouping and order change. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "GCF and Grouping - Change Order"Page](#)

Watch this five-minute video, paying attention to the examples being used to explain grouping with order change. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

You may take different steps than in the video - or even more steps - but please make sure that you get the same result and that you understand the steps taken in the video.

○ 4.1.5: Homework Assessment


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Greatest Common Factor"URL](#)

Answer every other odd-numbered problem for questions 1 through 31.

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Grouping"URL](#)

Answer every other odd-numbered problem for questions 1 through 27.


● 4.2: Factoring Trinomials

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.3: Factoring - Trinomials Where \$a = 1\$ "URL](#)
-

Read this section. Pay special attention to page 221.

This method of factoring (the ac method) really is the workhorse of factoring trinomials: We need two numbers whose product is the constant term and whose sum is the x coefficient.

○ 4.2.1: Leading Coefficient Is 1 - Part 1

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Trinomials - \$a = 1\$ "URL](#)

Complete page 80 of Wallace's workbook to practice with trinomials when $a = 1$. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Trinomials - \$a = 1\$ " and MathIsPower4U's "Factor Trinomials when A equals 1"Page](#)

Watch these videos, paying attention to the examples used to explain how to factor trinomials when a is equal to 1. You may watch the videos as often as you please. You may refer to the video when doing your homework, if necessary.

○ 4.2.2: Leading Coefficient Is 1 with GCF - Part 2

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Trinomials - \$a = 1\$ with GCF"URL](#)

Complete page 81 of Wallace's workbook for more practice with trinomials when $a = 1$. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Trinomials - \$a = 1\$ with GCF"Page](#)

Watch this four-minute video for a continuation of the video that explains how to factor trinomials when a is equal to 1.

○ 4.2.3: Leading Coefficient Is Not 1 - Part 1

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.4: Factoring - Trinomials Where \$a \neq 1\$ "URL](#)

Read this section. When we multiply polynomials we are distributing across parentheses. Here we are doing the reverse: We are trying to write a polynomial as a product of factors. We will introduce several techniques, and you should focus on learning them all because later it will be up to you to match the correct technique to a given problem.




-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Trinomials - \$a \neq 1\$ "URL](#)


Complete page 78 of Wallace's workbook for practice with trinomials when $a \neq 1$. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Trinomials - \$a \neq 1\$ Part 1"Page](#)

Watch this four-minute video. Pay attention to the examples used to describe how to factor trinomials when the leading coefficient is not 1. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.


○ 4.2.4: Leading Coefficient Is Not 1 - Part 2

- [Tyler Wallace's "Trinomials - \$a \neq 1\$ Part 2" and MathIsPower4U's "Factor Trinomials when A is NOT equal to 1 - Grouping Method"Page](#)
Watch these videos, which demonstrate how trinomials can be factored when the leading coefficient is not 1.
- 4.2.5: Leading Coefficient Is Not 1 with GCF - Part 1
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Trinomials - \$a \neq 1\$ with GCF"URL](#)
Complete page 79 of Wallace's workbook for more practice with trinomials when $a \neq 1$. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
 - [Tyler Wallace's "Trinomials - \$a \neq 1\$ with GCF Part 1"Page](#)
Watch this four-minute video, paying attention to the examples being used to explain the concept in this unit.
- 4.2.6: Leading Coefficient Is Not 1 with GCF - Part 2
 - [Tyler Wallace's "Trinomials - \$a \neq 1\$ with GCF Part 2"Page](#)
Watch this four-minute video. Pay attention to the examples being used to explain the concept in this unit. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.
- 4.2.7: Homework Assessment
 -  [Tyler Wallace's "Beginning and Intermediate Algebra: "Practice - Trinomials Where \$a = 1\$ "URL](#)
Answer the odd-numbered problems 1 to 25.
 -  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Trinomials Where \$a \neq 1\$ "URL](#)
Answer the odd-numbered problems 1 to 39.
- 4.3: Special Products

 -  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.5: Factoring - Factoring Special Products"URL](#)

Read this section. There is an error in Exercise 308 on page 231. You can find the correction in Saylor Academy's "[Correction to Exercise 308, Page 231](#)".

- 4.3.1: Difference of Squares

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Special Products - Difference of Squares"URL](#)

Complete page 82 of Wallace's workbook to reinforce your understanding of differences of squares. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Special Products - Difference of Squares" and MathIsPower4U's "Factoring a Difference of Squares"Page](#)

Watch these videos, which discuss the difference of squares.

○ 4.3.2: Sum of Squares


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Special Products - Sum of Squares"URL](#)

Complete page 83 of Wallace's workbook to reinforce your understanding of sum of squares. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Special Products - Sum of Squares"Page](#)

Watch this two-minute video, which discusses the sum of squares. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 4.3.3: Difference of 4th Powers

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Special Products - Difference of 4th Powers"URL](#)

Complete page 84 of Wallace's workbook to reinforce your understanding the difference of 4th powers. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Special Products - Difference of 4th Powers"Page](#)

Watch this four-minute video, which addresses how to use fourth powers. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 4.3.4: Perfect Square


-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Special Products - Perfect Squares"URL](#)

Complete page 85 of Wallace's workbook for practice with perfect squares. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Special Products - Perfect Square" and MathIsPower4U's "Factoring a Perfect Square Trinomial"Page](#)

Watch these videos, which discuss perfect squares and perfect square trinomials.

○ 4.3.5: Cubes

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Special Products - Cubes"URL](#)

Complete page 86 of Wallace's workbook to practice with cubes. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Special Products - Cubes" and MathIsPower4U's "Factoring a Sum or Difference of Cubes"Page](#)

Watch these videos, which explain the concept of cubes.

○ 4.3.6: GCF

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Special Products - GCF"URL](#)

Complete page 87 of Wallace's workbook for practice with the greatest common factor in terms of special products. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Special Products - GCF"Page](#)

Watch this three-minute video, paying attention to the examples being used to explain the concept of special products with the GCF. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.


○ 4.3.7: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Factoring Special Products"URL](#)


Answer all of the odd-numbered problems for questions 1 through 47.

• 4.4: Factoring Strategy

○ 4.4.1: Strategy

-  Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.6: Factoring - Factoring Strategy"URL

Read this section. Pay special attention to page 234. Note that this reading corresponds to the workbook assignment at the end of this subunit.


-  Tyler Wallace's "Beginning Algebra Lab Notebook: Factoring Strategy - Strategy"URL

Complete page 88 of Wallace's workbook to reinforce your knowledge of when to use certain methods of factoring. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- Tyler Wallace's "Factoring Strategy" and Bigbend Emporium's "Factoring Strategy"Page


Watch these videos, which discuss factoring strategies. You may watch the videos as often as you please. You may refer to the videos when doing your homework, if necessary.

- 4.4.2: Homework Assessment

-  Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.7: Factoring - Solve by Factoring"URL

Read this section. Here we emphasize how we can solve problems by factoring. Focus on the rule - "if $ab = 0$, then $a = 0$ or $b = 0$ (or both)" - and how factoring makes this rule so important.

- 4.5: Solve by Factoring

-  Tyler Wallace's "Beginning and Intermediate Algebra: Section 6.7: Factoring - Solve by Factoring"URL
-

Read this section. Here we emphasize how we can solve problems by factoring. Focus on the rule - "if $ab = 0$, then $a = 0$ or $b = 0$ (or both)" - and how factoring makes this rule so important.

- 4.5.1: Zero Product Property

-  Tyler Wallace's "Beginning Algebra Lab Notebook: Solve by Factoring - Zero Product Property"URL

Complete page 89 of Wallace's workbook to reinforce your knowledge of the zero product property. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Solve by Factoring - Zero Product Rule"](#) and [MathIsPower4U's "The Zero-Product Property" and "Solve an Equation in Factored Form"Page](#)

Watch these videos, which explain the zero product rule.

○ 4.5.2: Need to Factor

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Solve by Factoring - Need to Factor"URL](#)

Complete page 90 of Wallace's workbook for practice with factoring. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Solve by Factoring - Need to Factor"Page](#)

Watch this four-minute video. Pay attention to the examples to demonstrate how to solve by factoring.

○ 4.5.3: Make Equal to Zero

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Solve by Factoring - Equal to Zero"URL](#)

Complete page 91 of Wallace's workbook for practice with factoring. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Solve by Factoring - Make Equal to Zero"Page](#)

Watch this five-minute video. Pay attention to the examples being used to explain how to factor by making the equation equal zero.

○ 4.5.4: Simplifying Needed

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Solve by Factoring - Simplify"URL](#)

Complete page 92 of Wallace's workbook for practice with simplifying and factoring. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Solve by Factoring - Simplify First"Page](#)

Watch this five-minute video, focusing on the examples that discuss how to simplify equations. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 4.5.5: Homework Assessment

-  Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Solve by Factoring"URL

Answer all of the odd-numbered problems for questions 1 through 35.

- Unit 4 Practice Test

-  Tyler Wallace's "Beginning and Intermediate Algebra: Unit 4 Practice Test"URL

Review Unit 4 before taking this practice test. Be sure that you are ready before taking the practice test, as it will give you a clear picture of what you know and the areas you need to review, if necessary. You may review the problems in the work pages in addition to watching the videos to prep for the practice test. When you have finished this practice test, you may check your answers against the "[Unit 4 Practice Test - Answer Key](#)".

Unit 5: Rational Expressions

In this unit, you will learn how to evaluate rational expressions and perform operations such as addition, multiplication, and division involving rational expressions. You will apply the concept of multiplying rational expressions to dimensional analysis, where you will convert units from single/dual unit of measurement to another.

Completing this unit should take you approximately 17 hours.

- Upon successful completion of this unit, you will be able to:
 - evaluate rational expressions;
 - reduce rational expressions;
 - multiply rational expressions (with and without factoring);
 - divide rational expressions (with and without factoring);
 - find least common denominators;
 - add and subtract rational expressions (with and without common denominators); and
 - convert units using dimensional analysis (with one and two units).

- 5.1: Reduce Rational Expressions





-  Tyler Wallace's "Beginning and Intermediate Algebra: Section 7.1 Rational Expressions - Reduce Rational Expressions"URL

Read this section. Rational expressions are just fractions and fractions of polynomials. Focus on the use of the rules of exponentiation and when we can cancel in fractions.

- 5.1.1: Evaluate

-  Tyler Wallace's "Beginning Algebra Lab Notebook: Reduce - Evaluate"URL

Complete page 94 of Wallace's workbook for practice with reducing rational expressions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Reduce - Evaluate"Page](#)
Watch this four-minute video. Pay attention to the examples being used to explain evaluate rational expressions.
- 5.1.2: Reduce Fractions
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Reduce - Reduce Fractions"URL](#)
Complete page 95 of Wallace's workbook for practice with reducing fractions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
 - [Tyler Wallace's "Reduce - Reduce Fractions"Page](#)
Watch this two-minute video. Pay attention to the examples being used to explain the concept of reducing fractions in rational expressions. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.
- 5.1.3: Reduce Monomials
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Reduce - Monomials"URL](#)
Complete page 96 of Wallace's workbook for practice with reducing monomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
 - [Tyler Wallace's "Reduce - Monomials"Page](#)
Watch these videos. Pay attention to the examples used to explain the concepts in this unit.
- 5.1.4: Reduce Polynomials
 -  [Tyler Wallace's "Beginning Algebra Lab Notebook: Reduce - Polynomials"URL](#)
Complete page 97 of Wallace's workbook for practice with reducing polynomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
 - [Tyler Wallace's "Reduce - Polynomials" and MathIsPower4U's "Simplify Rational Expressions"Page](#)
Watch these videos, which discuss how to reduce polynomials.
- 5.1.5: Homework Assessment
 -  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Reduce Rational Expressions"URL](#)
Answer all of the odd-numbered problems for questions 1 through 49.

- 5.2: Multiply & Divide Rational Expressions

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 7.2: Rational Expression - Multiply & Divide"URL](#)
-

Read this section. Again, rules for exponents are paramount, but now focus on dividing as "inverting and multiplying."

- 5.2.1: Multiply & Divide Fractions

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Multiply and Divide - Fractions"URL](#)

Complete page 98 of Wallace's workbook for practice with multiplying and dividing fractions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Multiply and Divide - Fractions" and MathIsPower4U's "Multiplication Involving Fractions"Page](#)

Watch these videos, which show how to multiply and divide fractions.

- 5.2.2: Multiply & Divide Monomials

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Multiply and Divide - Monomials"URL](#)

Complete page 99 of Wallace's workbook for practice with multiplying and dividing monomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Multiply and Divide - Monomials" and MathIsPower4U's "Multiply Rational Expressions - Monomials" and "Dividing Rational Expressions - Monomials"Page](#)

Watch these videos, which discuss the multiplication and division of monomials.

- 5.2.3: Multiply & Divide Polynomials

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Multiply and Divide - Polynomials"URL](#)


Complete page 100 of Wallace's workbook for practice with multiplying and dividing polynomials. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Multiply and Divide - Both at Once"URL](#)

Complete page 101 of Wallace's workbook for practice with multiplying and dividing polynomials both at once. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Multiplying and Dividing Polynomials"Page](#)
Watch these videos, which discuss the multiplication and division of polynomials. Remember that you may watch the videos as often as you please. You may refer to the video when doing your homework, if necessary.
- [MathIsPower4U's "Multiplying and Dividing Rational Expressions"Page](#)
Watch these videos if you feel like you need additional help with this topic. These videos demonstrate how to solve variations on this kind of problem.

○ 5.2.4: Homework Assessment


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Multiply and Divide"URL](#)
Answer all of the odd-numbered problems for questions 1 through 43.

• 5.3: Least Common Denominator (LCD)


-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 7.3: Rational Expressions - Least Common Denominators"URL](#)

Read this section. One of the skills students have most difficulty with is adding fractions. You can make this much easier by understanding least common denominators.

○ 5.3.1: Numbers

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: LCD - Numbers"URL](#)
Complete page 102 of Wallace's workbook for practice with the Lowest Common Denominator (LCD). Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.
- [Tyler Wallace's "LCD - Numbers" and MathIsPower4U's "Determining the Least Common Multiple Using a List of Multiples" and "Determining the Least Common Multiple Using Prime Factorization"Page](#)
Watch these videos, which discuss the Least Common Denominator (LCD). You may watch the videos as often as you please. You may refer to the video when doing your homework, if necessary.

○ 5.3.2: Monomials

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: LCD - Monomials"URL](#)
Complete page 103 of Wallace's workbook for more practice with Lowest Common Denominators. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "LCD - Monomials" and Bigbend Emporium's "Least Common Multiple \(LCM\) with Variables"Page](#)

Watch these videos, which discuss the Least Common Denominator with monomials.

○ 5.3.3: Polynomials

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: LCD - Polynomials"URL](#)

Complete page 104 of Wallace's workbook for more practice with Lowest Common Denominators. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "LCD - Polynomials"Page](#)

Watch this five-minute video, which discusses the Least Common Denominator with polynomials.

○ 5.3.4: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Least Common Denominator"URL](#)

Answer questions 11-20. If necessary, use the videos and information in this subunit to help you solve these problems.

● 5.4: Add & Subtract Rational Expressions

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Section 7.4: Rational Expressions - Add & Subtract"URL](#)
-

Read this section and complete the corresponding workbook assignment for this subunit. Notice that most of the work involves finding a common denominator; once that is done, we simply need to be careful with multiplication.

○ 5.4.1: Add & Subtract Fractions

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Add and Subtract - Fractions"URL](#)

Complete page 105 of Wallace's workbook for practice with adding and subtracting fractions. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Add and Subtract - Common Denominator"Page](#)

Watch this five-minute video. Pay attention to the examples being used to explain how to add and subtract fractions.

○ 5.4.2: Add & Subtract Rational Expressions with Different Denominators

- 5.4.2.1: Different Denominator - Part 1

-  Tyler Wallace's "Beginning and Intermediate Algebra: Section 7.5: Add and Subtract Rational Expressions: Different Denominator (Part 1)"URL

Read this section and complete the corresponding workbook assignment for the subunit.

-  Tyler Wallace's "Beginning Algebra Lab Notebook: Add and Subtract - Common Denominator"URL

Complete page 106 of Wallace's workbook for practice with adding and subtracting common denominators. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- Tyler Wallace's "Add and Subtract - Different Denominators Part 1"Page

Watch this five-minute video. Pay attention to the examples used to explain adding and subtracting when there are different denominators. Here, one would first obtain a common denominator for the expressions involved and then proceed as in subunit 5.4.2.1 above.

5.4.2.2: Different Denominator - Part 2

-  Tyler Wallace's "Beginning Algebra Lab Notebook: Add and Subtract - Different Denominators"URL

Complete page 107 of Wallace's workbook for practice with adding and subtracting different denominators. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- Tyler Wallace's "Add and Subtract - Different Denominators Part 2"Page

Watch this five-minute video which discusses adding and subtracting when there are different denominators. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

5.4.3: Homework Assessment

-  Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Add and Subtract"URL

Answer the odd-numbered problems for questions 1 through 43.

5.5: Dimensional Analysis

- o  Tyler Wallace's "Beginning and Intermediate Algebra: Section 7.8: Rational Expressions - Dimensional Analysis"URL

Read this section and complete the corresponding workbook assignment for this subunit. Notice how converting from minutes to hours or feet to miles or cups to gallons all have the same foolproof method: canceling units of measurement.

○ 5.5.1: Convert Single Unit

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Dimensional Analysis - Convert Single Unit"URL](#)

Complete page 108 of Wallace's workbook for practice with dimensional analysis in which you convert single units. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Dimensional Analysis - Convert Single Unit"Page](#)

Watch this five-minute video which discusses converting single units. You may watch the video as often as you please. You may refer to the video when doing your homework, if necessary.

○ 5.5.2: Convert Dual Unit

-  [Tyler Wallace's "Beginning Algebra Lab Notebook: Dimensional Analysis - Convert Two Units"URL](#)

Complete page 109 of Wallace's workbook for practice with dimensional analysis with converting dual units. Try to complete this exercise before watching the video in this subunit, and then review the worksheet as you follow along with the video for solutions.

- [Tyler Wallace's "Dimensional Analysis - Convert Two Units"Page](#)

Watch this five-minute video, which discusses converting dual units.

○ 5.5.3: Homework Assessment

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Practice - Dimensional Analysis"URL](#)

Answer all of the problems.

Unit 5 Practice Test

-  [Tyler Wallace's "Beginning and Intermediate Algebra: Unit 5 Practice Test"URL](#)

Review Unit 5 before taking this practice test. Be sure that you are ready before taking the practice test, as it will give you a clear picture of what you know and the areas you need to review, if necessary. You may review the problems in the work pages in addition to watching the videos to prep for the practice test. When you have finished this practice test, you may check your answers against the ["Unit 5 Practice Test - Answer Key"](#).



Saylor Academy awards

Dan Rinniceanu

this certificate of achievement for

RWM102: Algebra

27 mai 2018

Issue Date



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Certificate ID

Algebra lets us solve many different types of calculations by using basic formulas and steps that work regardless of the specific numbers in the problem. For example, we can use an algebraic formula to calculate a monthly payment or to pay off a loan of any size using a given interest rate.

In this course, we explore how to use standard mathematical and business formulas, and how to translate verbal descriptions into mathematical equations to establish relationships and create predictions. In the later units, we explore how to use graphs to make these same predictions. You can apply the problem-solving strategies we discuss in this course to business, science, and many other fields.

To succeed in this introductory course you should know how to perform operations with real numbers, including negative numbers, fractions, and decimals. Be sure to review [RWM101: Foundations of Real World Math](#) if you need a refresher!

Unit 1: Variables and Variable Expressions

In algebra, we use letters to represent numbers in equations. We call these letters variables, because the numbers they represent vary. For example, let's say your salary is \$10 per hour. If you worked two hours, you would be paid $\$10 \times 2$, or \$20. If you worked five hours you would be paid $\$10 \times 5$, or \$50. To generalize this we can say that if you work h hours, you will be paid $\$10 \times h$.

In this unit, we learn that the properties of numbers also apply to the letters we use in these formulas: you treat variables the same way you treat numbers in calculations. We discuss how to recognize like terms, which you can add and subtract as if they were numbers.

Completing this unit should take you approximately 4 hours.

- Upon successful completion of this unit, you will be able to:
 - identify parts of algebraic expressions, including terms, factors, and coefficients;
 - evaluate algebraic expressions for the given values of the variables; and
 - apply commutative, associative, and distributive properties of real numbers to simplify algebraic expressions.

• 1.1: Variables, Constants, and Coefficients

The first step in understanding algebra is knowing the definitions of variables, constants, and coefficients. These are all important parts of an algebraic equation.

◦ [Identifying Variable Parts and Coefficients of Terms](#)

Read these notes to get a handle on the definitions we'll be using and to see a few examples. After you read, complete a few practice problems and check your answers.

• 1.2: Replacing Variables with Their Values

We often know the value of a variable for a given problem. For the example given at the start of the chapter, we said that if you make \$10 per hour and you work h hours, your pay would be $\$10 \times h$. Let's say you worked 40 hours in a given week. For that week, we say $h = 40$. So, your pay would be $\$10 \times 40 = \400 .

Being able to substitute a value in for a variable appropriately is an important skill in algebra. You also need to understand how to write variable expressions when multiplication is involved.

- [How to Write Multiplication in AlgebraPage](#)

Watch this video, which highlights some common ways to write multiplication in algebra. It also shows examples of how to substitute values in algebraic expressions.

- [Practice Evaluating Expressions in One VariableURL](#)

After you watch, complete these assessments that involve substituting values into algebraic expressions with variables. If you need help, use the review tools at the bottom of the page.

- [Practice Evaluating Expressions in Two VariablesURL](#)

Continue with this second set of assessments. If you need help, use the review tools at the bottom of the page.

- 1.3: Order of Operations Review

Mathematicians use the convention order of operations to ensure we always evaluate expressions with many operations in the same way. This ensures we complete complicated calculations the same way every time.

- [Order of OperationsPage](#)

Watch this video to review the rules for order of operations. Many use the acronym PEMDAS to remember the order of operations: parentheses, exponents, multiplication and division, addition and subtraction.

- [Practice Using PEMDASURL](#)

Try each of the examples on this worksheet without looking at the solution. Then, check your answers. If you need more practice, you can do the review problems that follow the examples.

- 1.4: Commutative Property of Addition and Multiplication

In addition to knowing the order of operations, we need to understand some properties of arithmetic before we can begin evaluating more complicated algebraic expressions.

The commutative property of addition and multiplication states that the order of the input numbers does not matter. For example, $3 + 2 = 5$ and $2 + 3 = 5$. Likewise, $3 \times 2 = 6$ and $2 \times 3 = 6$.

- [Commutative Laws of Addition and MultiplicationPage](#)

Watch these videos for examples of how to apply these laws in arithmetic.

- **1.5: Associative Property of Addition and Multiplication**

The associative property states that we can add or multiply several numbers in any order. We use this property frequently, such as when we switch terms around to simplify algebraic expressions. For example, $(1 + 1) + 3 = 5$ and $1 + (1 + 3) = 5$.

- [Associative Laws of Addition and MultiplicationPage](#)

Watch these videos for examples of how to use this property in arithmetic.

- **1.6: Distributive Property of Multiplication over Addition/Subtraction**

The distributive property is another property we use extensively to simplify algebraic expressions. It allows us to "distribute" a multiplicative factor over an addition or subtraction. For example, for the expression $4 \times (3 + 2)$, we can distribute the multiple of four across the addition in the parentheses to get $(4 \times 3) + (4 \times 2) = 12 + 8 = 20$.

- [Distributive Property of Multiplication over AdditionPage](#)

Watch this video for examples of how to use this property in arithmetic.

- **1.7: Definition and Examples of Like Terms**

Like terms have the same variables using the same exponents, but may have different numerical coefficients. You need to recognize like terms to add and subtract them. For example, $3x$ and $8x$ are like terms because they have the same variables and exponents. The terms $3x$ and $8x^2$ are not like terms because, although the variables are the same, the exponents on the variables are different.

- [Like TermsURL](#)

Review this brief definition and examples in this encyclopedia entry.

- **1.8: Simplifying Expressions by Combining Like Terms**

In general algebraic expressions, we open the parentheses to combine like terms. Due to the commutative and associative properties, we can move like terms around to combine them. This makes it easier to solve complicated-looking expressions.

- [Combining Like TermsPage](#)

Watch these videos to see examples of how to combine like terms to simplify algebraic expressions.

- [Practice Combining Like Terms with Negative CoefficientsURL](#)
After you watch, complete this first set of assessments. If you need help, use the review tools at the bottom of the page.
- [Practice Combining Like Terms with Negative Coefficients and DistributionURL](#)
Continue with this second set of assessments. If you need help, use the review tools at the bottom of the page.

Unit 2: Linear Equations

We use equations everyday without realizing it. Examples include calculating the unit price to compare the price of brands in the grocery store, converting inches into feet (or centimeters into meters), estimating how much time it will take to drive to a destination at a certain speed.

In this unit, we explore formal procedures for solving equations. After reviewing basic math rules, we apply the skills we learned in Unit 1 to simplify the sides of an equation before attempting to solve it and work with equations that contain more than one variable. Because variables represent numbers, we use the same rules to find the specific variables we are looking for.

Completing this unit should take you approximately 5 hours.

- Upon successful completion of this unit, you will be able to:
 - determine whether a given real number is a solution of an equation;
 - simplify equations using addition and multiplication properties;
 - find solution of a given linear equation with one variable;
 - determine the number of solutions of a given linear equation in one variable;
 - solve a literal equation for the given variable; and
 - rearrange formulas to isolate a quantity of interest.
- 2.1: Definition of an Equation and a Solution of an Equation

We define an equation as a statement that contains a variable, which may or may not be true, depending on the value of the variable. Solving an equation means finding the possible values of the variable that make the equation true.

- [Solving Linear Equations with One VariableURL](#)
Read the "Define Linear Equations in One Variable" and "Solutions to Linear Equations in One Variable" sections. Then, complete exercises 1 to 5 and check your answers.
-

- **2.2: Addition/Subtraction Property of Equations**

When solving algebraic equations, we need to be aware of the properties of the types of mathematical operations we are doing. The first property we explore is the addition and subtraction property of equations.

- [The Subtraction and Addition Properties of EqualityURL](#)

Read up to the "Solve Equations that Require Simplification" section. Pay attention to the "Solve Equations Using the Subtraction and Addition Properties of Equality" section, which gives a good example of how the two sides of an equation must be equal. After you read, complete examples 2.2 through 2.5 and check your answers.

- **2.3: Multiplication/Division Property of Equations**

Much like in the previous section we must use the properties of multiplication and division when solving algebraic expressions involving these types of calculations.

- [The Division and Multiplication Properties of EqualityURL](#)

Read up to the "Sole Equations that Require Simplification" section. Complete examples 2.13 to 2.17.

- **2.4: Equations of the Form $x + a = b$ and $x - a = b$**

Algebraic equations can be categorized based on the form and types of operations in the equation. In the next few sections, we will explore different forms of equations.

The first form is the simplest: $x + a = b$ or $x - a = b$. An example of this type of equation is: $5 + x = 8$.

- [Adding and Subtracting the Same Thing to Both SidesPage](#)

Watch this video for examples of these types of equations.

- [Practice Solving One-Step EquationsURL](#)

After you watch, complete this assessment to test yourself.

- **2.5: Equations of the Form $ax = b$ and $x/a = b$**

The next general form of equations involve multiplying or dividing the variable by a coefficient. These equations are of the form $ax = b$ or $x/a = b$. An example of this type of equation is: $x/2 = 6$.

- [Algebraic Equations with Multiplication and DivisionPage](#)

Watch these videos for a few examples of how to solve algebraic equations involving multiplication and division. Pay attention to the problem-solving steps for fractional coefficients in the third video. Instead of dividing both sides by the fraction, you can multiply both sides of the equation by the reciprocal of the fraction. It is often easier to multiply fractions rather than dividing them, so this trick can be useful.

- [Practice One-Step Equations with Multiplication and DivisionURL](#)

After you watch, complete this assessment and check your answers.

- 2.6: Equations of the Form $ax + b = c$

Often types of mathematical operations are combined in an equation. For example, multiplication can be combined with addition in an equation. An example of this type of equation is: $2x + 1 = 11$. This requires a two-step process for solving the equation.

- [Solving More Complicated EquationsPage](#)

Watch this video for examples of how to solve these types of problems in a two-step process.

- [Practice Solving Two-Step EquationsURL](#)

After you watch, complete this assessment and check your answers.

- 2.7: Equations of the Form $ax + b = cx + d$

This section involves solving more complicated equations where the variable appears on both sides. We can use what we learned about combining like terms to make solving these types of equations possible.

- [Equations with Variables on Both SidesPage](#)

Watch these videos to see examples of how we use like terms to solve these types of equations.

- [Practice Solving Equations with Variables on Both SidesURL](#)

After you watch, complete this assessment and check your answers.

- 2.8: Equations with Parentheses

The last general type of linear equation we can solve are those involving parentheses. For example, we can have an equation $2(4 + x) = 12$. We need to use order of operations and the distributive property to solve this type of equation.

- [Solving Equations with the Distributive PropertyPage](#)

Watch these videos to see examples of how this type of equation can be solved.

- [Practice Solving Multistep Equations with DistributionURL](#)

After you watch, complete this assessment and check your answers.

- 2.9: Solving Literal Equation for One of the Variables

We can use the methods we learned in the previous sections to solve literal equations, or formulas which often have more than one variable. When a literal equation has more than one variable, we can solve for the variable of interest with respect to the other variable.

For example, consider the equation $2a + b = 10$. Here, there are two variables, a and b . If we want to solve for b , we can do so with respect to a . We can subtract $2a$ from both sides to obtain: $10 - 2a = b$.

- [Solving Linear Equations with One VariableURL](#)

Read the section on linear literal equations. Be sure to go through the examples in detail. After read, complete the exercises for literal equations and check your answers.

- [Solving for One VariablePage](#)

We can apply these concepts to known formulas, such as formulas for area of a shape or rates.

Watch these videos for real examples of using formulas. In the first video, the formula for perimeter of a rectangle is solved for the width. In the second, a formula is used to convert between Fahrenheit and Celsius.

Unit 3: Word Problems

Now, let's apply what we learned about solving equations to various types of word problems. To set up the equation, read the word problem carefully to identify the quantity you are being asked to find, the known quantities, and the relationship between them. This is an important skill in algebra since we use algebra to solve many real-world problems.

In this unit, we will identify common types of word problems and discuss how to translate these problems into algebraic equations that can be solved.

Completing this unit should take you approximately 5 hours.

- Upon successful completion of this unit, you will be able to:
 - translate a verbal expression into a variable expression;
 - use the basic percent equation to solve problems involving percents;
 - apply the basic percent equation to problems involving mixtures, markups, and discounts;
 - use the uniform motion equation to solve problems involving uniform motion; and
 - create equations in one variable and use them to solve problems.
 - 3.1: Mathematical Symbols and Expressions for Common Words and Phrases
-

Before we can begin solving word problems, we need to understand their language. Common words are used to indicate different types of calculations. For example, when you see the word "difference", it indicates you will be doing subtraction.

- [Translating Words into Mathematical SymbolsURL](#)

Read this page. Pay close attention to the mathematical dictionary table. It may be helpful to copy this table so you can use it as a reference as you become more comfortable working with word problems.

Read through sample sets A and B to see how the word problems are translated into equations. After you read, complete practice sets A and B and check your answers.

- 3.2: Translating Verbal Expression into Mathematical Equations

Now that we know the language, we can begin translating word problems into equations.

- [Writing Algebraic EquationsPage](#)

Watch these videos which provide step-by-step examples of how to translate word problems into equations we can solve.

- 3.3: Number Problems

The first common type of word problem you will encounter are number problems. These word problems describe numerical operations (addition, subtraction, multiplication, division).

- [Solving Algebraic Expressions and Equations Part IURL](#)

Read the five step method section, which outlines a way to organize your thinking and solve number problems. Note the five steps that set up the equation for a word problem. Then, read the first two examples in sample set A. These examples show how to use the five step method to set up and solve number problems. Finally, do the first two problems in practice set A and check your answers.

- 3.4: Consecutive Integer Problems

The next type of problem we see in algebra are consecutive integer problems. Consecutive integers are integers that follow one another. In other words, we can define the variable n as an integer. Then, $n + 1$ is the next consecutive integer.

- [Adding Consecutive and Odd IntegersPage](#)

Watch these videos. The first shows word problems involving consecutive integers. The second shows a more challenging problem involving the sum of odd integers. When summing odd integers, the equation must be slightly altered.

- [Solving Algebraic Expressions and Equations Part IIURL](#)

Read the discussion on consecutive integers, which shows how to write consecutive integers or consecutive even or odd integers. After you read, complete questions 3 and 4 in practice set A and check your answers.

- 3.5: General Statement Problems

Often we can use algebra to solve real-life problems by translating word problems into equations.

- [Solving Linear Word Problems with SubstitutionPage](#)

Watch this video for examples of these types of problems. Recall the five step method we discussed in section 3.3. When you solve these types of problems, the first key step is to identify the variable.

- [Simple Word Problems Resulting in Linear EquationsURL](#)

Read this article for another example of this type of a general statement problem. In this problem, it looks like there are two variables. However, we can relate the quantity of one variable to that of the other. This allows us to write the equation in terms of only one variable.

At the bottom of the page, try a few practice problems and check your answers. Try a couple of these until you feel comfortable writing and solving equations from general word problems.

- **3.6: Applying the Uniform Motion Equation**

The uniform motion equation allows us to solve problems involving rate, or speed.

For example, let's say you need to drive 150 miles on the highway with an average speed of 55 miles per hour. How long will it take you to arrive at your destination? We can use a simple formula to solve for the time it will take to drive that distance.

- [Solving a Formula for a Specific VariableURL](#)

Read the section on the distance, rate, and time formula. We use this equation for all uniform motion problems. Then, do examples 2.58 through 2.60 and check your answers. If you want more practice, you can try exercises 376 and 387.

- **3.7: Value Mixture Problems**

Other common types of word problems involve percents, price mark-ups or discounts, and mixtures. In this section we explore these common types of word problems.

- Mixture problems involve mixtures of different variables. We can then relate the variables to each other and reduce the problem to one variable.

- [Mixture ProblemsPage](#)

Watch this video for examples of how to express a mixture problem in an algebraic equation.

- [Solving Mixture Word ProblemsPage](#)

Then, watch these videos to see more examples of how to write and solve these types of problems.

- [Practice Solving Mixture Word ProblemsURL](#)

After you watch, complete examples 3.26 through 3.32 and check your answers.

- Percent problems are also a common type of algebra word problem which often come up when dealing with price mark-ups, sale prices, or calculating tips at restaurants.

- [Solving Percent Word ProblemsURL](#)

Read this section for examples of how to calculate percent from fractions, and how to translate a percent word problems into equations. Pay attention to the

formula for finding the percent of change, since we use this formula frequently to determine sale prices.

- [Practice Solving Percent Word ProblemsURL](#)

After you read, complete this assessment and check your answers to practice solving problems with percents.

Unit 4: Inequalities

You probably use inequalities, just like equations, in everyday life without thinking about it. Every time you go to the store, you need to decide whether you have enough money to pay for the items you need to purchase. The inequality you need to solve is: your amount of money must be GREATER than the total cost of items.

In this unit, we generalize the procedure we use to solve inequalities. We explore which properties of inequalities are the same and which are different from the properties of equations.

Completing this unit should take you approximately 2 hours.

- Upon successful completion of this unit, you will be able to:
 - simplify inequalities using addition and multiplication properties;
 - find and graph on a number line the solution of a given linear inequality with one variable; and
 - create inequalities in one variable and use them to solve problems.
- 4.1: Definition and Notation of an Inequality

Before we can begin using inequalities in equations and graphing, we need to understand the definition and language of inequalities.

- [Using the Language of AlgebraURL](#)

Read the section on inequalities, which shows the symbols used to denote greater than and less than. You must be able to quickly recognize these two symbols. Do example 1.12 and check your answer.

- 4.2: Graphing Inequalities on a Number Line

When we think about inequalities, it can be helpful to graph them on a number line.

- [Plotting Inequalities on a Number LinePage](#)

Watch this video.

-  [Introduction to Linear InequalitiesURL](#)

Read these notes for more examples of how to plot inequalities.

- 4.3: Solving One-Step Inequalities

We are now ready to begin solving inequalities. In this section we will solve one-step inequalities, and in the next section we will solve more complex inequalities.

- [One-Step InequalitiesPage](#)

Watch this video for examples of how to work with inequalities.

- [One-Step Inequalities Word ProblemsPage](#)

Then, watch this video to see examples of how inequalities are used in real world examples.

- [Practice Solving One-Step InequalitiesURL](#)

After you watch, complete this assessment and check your answers.

- 4.4: Solving Multi-Step Inequalities

Now we are ready to solve more complex inequalities that require multiple steps.

- [Multi-step Inequalities with Variables on Both SidesPage](#)

Watch these three videos.

- [Practice Solving Multipstep InequalitiesURL](#)

After you watch, complete this assessment and check your answers.

Unit 5: Graphs of Linear Equations and Inequalities

We use graphs to help us visualize how one quantity relates to another. This unit will help you become comfortable with graphing pairs of numbers on the coordinate plane and understand how we can use lines to represent equations and relationships.

For example, we can graph how the location of a train depends on when it left the station. If the train is moving at constant speed, the line in the graph is straight. The slope or slant of the line depends on the speed: the greater the speed, the steeper the line. If the line is going up (from left to right), it tells you the distance is growing with time: the train is moving away from the station. If the line is going down, it tells you the distance is

decreasing: the train is approaching the station. You can gather a lot of information about the train's journey from just one graph.

Completing this unit should take you approximately 5 hours.

- Upon successful completion of this unit, you will be able to:
 - graph points with given coordinates on the rectangular coordinate plane;
 - determine coordinates of a point on the rectangular coordinate system;
 - determine whether a given ordered pair is a solution of the equation with two variables;
 - find and graph solutions of the equation in two variables;
 - graph a straight line given either its equation, or a slope and y-intercept;
 - find slope and intercepts of a straight line given its equation or its graph;
 - write the equation of a line passing through two given points;
 - write the equation of a line with a given slope passing through a given point;
 - locate on a coordinate plane all solutions of a given inequality in two variables;
 - represent relationships between quantities as an equation or inequality in two variables; and
 - interpret the meaning of slope and intercepts of the graph of a relationship between quantities.

• **5.1: Graphing Points in the Rectangular Coordinate Plane**

First, we need to understand the coordinate plane, the space in which we produce graphs. In this section we will focus on finding and graphing points on the coordinate plane to become comfortable with it.

○ [Points in the Coordinate PlaneURL](#)

Read this page and watch the videos in the text. Pay attention to the example near the end of the page and how the author identifies points that do not directly match up with the tick marks on the graph.

• **5.2: Ordered Pairs as Solutions of an Equation in Two Variables**

Now we are ready to begin using graphs to determine if a pair of numbers (an ordered pair) is a solution to an equation.

○ [Ordered Pair Solutions to EquationsPage](#)

In this video, we see that if we graph an equation, the solutions must lie on the graph. This gives us an additional way to test if an ordered pair of numbers is a solution to an equation.

- [Practice Ordered Pair Solutions to Linear EquationsURL](#)

After you watch, complete this assessment and choose to solve the equations using algebra or graphs.

- 5.3: Graphing Equations in Two Variables of the Form $Ax + By = C$

A common way equations can be written is: $Ax + By = C$, where A , B , and C are numbers.

- [Graphing Linear Equations with Two VariablesPage](#)

Watch these videos, which explain how to manipulate an equation into a format that allows for graphing.

- 5.4: Intercepts of a Straight Line

One of the properties of linear graphs is that they have intercepts on the x- and y-axis. The intercept is the point at which the line crosses the axis.

- [Graphs with InterceptsURL](#)

Read this section to learn how to identify intercepts and how to use them in graphing and the general form of x- and y-intercepts.

After you read, complete examples 4.19 through 4.24.

- 5.5: Definition of Slope and Slope Formula

Another important property of linear graphs is the slope of the graph. The slope tells us how steep the line is. When a linear equation is written in a specific form that we'll discuss later, the slope helps us determine how to graph the line.

- [Understanding the Slope of a LineURL](#)

Read this section. Pay attention to the definition of slope and how we define positive and negative slope. Also, pay attention to the slope formula given toward the end of the page. The slope formula will allow you to calculate the slope of any given line.

After you read, complete examples 4.25, 4.26, and 4.29 through 4.37 and check your work.

- 5.6: Slopes of Parallel and Perpendicular Lines

Here, we learn about how the slopes of parallel and perpendicular lines are related. Parallel lines have the same slope, while perpendicular lines have slopes that are reciprocals.

- [Parallel and Perpendicular LinesURL](#)

Read this page to see the special relationship of the slopes of parallel and perpendicular lines. After you read, try a few practice problems.

- 5.7: Graphing Equations in Two Variables of the Form $y = mx + b$

One of the most common types of graph is that of a line with the form $y = mx + b$. In this form, m is the slope of the line, and b is the y -intercept of the line. When an equation is in this form, it is easy to plot the linear graph, so it is important to be able to recognize when an equation is in this form.

- [Using the Slope-Intercept Form of an Equation of a LineURL](#)

Read up to the section on choosing the most convenient method to graph a line. The form $y = mx + b$ is often called the slope-intercept form of a linear equation.

After you read, complete examples 4.40 through 4.46 and check your work.

- 5.8: Point-Slope Form

In the last section we discussed the slope-intercept form of a linear equation. We can also write linear equations in a form known as the point-slope form. This form works for when you want to make a line between two known points.

This form is: $y - y_1 = m(x - x_1)$.

- [Linear Equations in Point-Slope FormURL](#)

Read this page, which describes writing and graphing equations in point-slope and shows how to convert from the point-slope form to slope-intercept form, which can often be more useful. Watch the videos for more examples.

After you read, complete review problems 3, 4, 7, 8, 14, and 15 and check your answers.

- 5.9: Graphing Linear Inequality of Two Variables on the Coordinate Plane

The last type of linear graphing we need to study is the graph of an inequality rather than an equation. When we graph inequalities, we must pay attention not only to the numbers and variables but also the inequality itself. That is, are we graphing a less-than, or greater-than inequality?

- [Graphs of Linear InequalitiesURL](#)

Read this page, which reviews some calculations with inequalities and shows how we use shading on a graph to indicate inequality. Pay attention to the summary of graphing inequalities.

Complete examples 4.70 to 4.75 and check your answers.

Unit 6: Systems of Linear Equations and Inequalities

In previous units, we learned that linear equations with one variable generally have one solution. However, linear equations with two variables have an infinite number of solutions. If we pair two linear equations together, we can solve for the pair of numbers that would solve both equations. This is called a system of linear equations. In this unit, we will learn how to solve systems of linear equations.

Completing this unit should take you approximately 3 hours.

- Upon successful completion of this unit, you will be able to:
 - determine the number of solutions of a given system of linear equations;
 - classify systems of linear equations according to the number of solutions;
 - solve systems of linear equations using graphing, substitution, or elimination;
 - locate on a coordinate plane all solutions of a given system of inequalities;
 - create systems of equations and use them to solve world problems; and
 - use systems of inequalities to model word problems and interpret their solutions in the context of the problem.

• 6.1: Solution of a System of Linear Equations

First, we'll look at how to determine whether a given ordered pair of numbers is a solution to a system of linear equations. We do this using the techniques you already learned in this course.

- [Checking Solutions for Systems of Linear EquationsPage](#)

Watch this video to see examples of how we apply algebra techniques to testing solutions to systems of equations.

• 6.2: Solving Systems of Linear Equations by Graphing

There are several methods for solving systems of linear equations. The first method we explore is using graphing to solve systems of linear equations.

- [Using Graphs to Solve Linear EquationsURL](#)
-

Read this page, starting at the section on solving a system of linear equations by graphing. After you read, complete examples 5.3 through 5.7 and check your answers. You should use graph paper for these examples, since you will need to identify the intersection point between two lines.

• 6.3: Solving Systems of Linear Equations Using the Substitution Method

Sometimes it is not practical to solve a system of equations by graphing. The substitution method is a non-graphical method for solving systems of equations, and it uses algebra techniques you already know.

For the substitution method, we solve one of the equations for one of the variables in terms of the other variable. Then, we substitute that expression into the second equation to solve for the variable. Then, once you have solved for one variable, you can solve for the other.

- [Using the Substitution MethodPage](#)

Watch this video to see examples of using the substitution method.

- [Practice Using the Substitution MethodURL](#)

After you watch, complete this assessment and check your answers.

• 6.4: Solving Systems of Linear Equations Using the Elimination Method

The elimination method is another non-graphical method for solving systems of linear equations. For this method, we use the addition property of equality. This states that if we add the same amount to both sides of an equation, the two sides of the equation will still be equal.

- [The Elimination MethodPage](#)

Watch these videos for examples of how to solve systems of equations with the elimination method using a few different methods.

- [Practice Solving Linear Equations with EliminationURL](#)

After you watch, complete this assessment and check your answers.

• 6.5: Choosing a Strategy for Solving Systems of Linear Equations

It can be difficult to decide which of the three methods (graphing, substitution, or elimination) is best for solving a given system of linear equations.

- [Comparing Methods for Solving Linear SystemsURL](#)

Read this article and watch the videos. The beginning provides a nice summary of the main methods for solving systems of equations, and when you should use each one. The rest of the article offers a good overview of the different methods with a discussion of why each method was chosen for a given problem.

- **6.6: Solving Word Problems by Using Systems of Equations**

Linear systems of equations appear in many real-world applications. Systems of equations are often used to conduct comparisons, such as when comparing prices. It can be difficult to translate a world problem into equations and to determine the appropriate variables.

- [Coin and Mixture ProblemsPage](#)

Watch this video for examples of common real-world word problems.

- [Solving Word Problems with Linear SystemsURL](#)

Read this article and watch the video. The article describes examples in which systems of equations can be used to solve real-world quantities. After you review, complete problems 1 to 4 and check your answers.

- **6.7: Graphing Systems of Linear Inequalities**

We can use graphical methods to solve systems of linear inequalities, much like we graphed single inequalities earlier in this course.

- [Graphing Systems of Linear InequalitiesURL](#)

Read this page until the section Solve Applications of Linear Inequalities. Pay attention to the steps needed to solve a system of linear inequalities.

After you read, complete examples 5.51 through 5.56 and check your answers.

- **6.8: Applications of Systems of Linear Inequalities**

Linear inequalities appear in many real-world applications.

- [Solving Applications of Linear InequalitiesURL](#)

Read the section on solving applications of linear inequalities. Review the examples to see how the authors use systems of linear inequalities to solve problems involving cost of objects and budgets.

- [Linear ProgrammingURL](#)

Linear programming uses a system of several linear inequalities to analyze a real-world situation. Linear programming takes a set of inequalities and determines the optimal or best solution for the given set of conditions. Read this article to learn about this application of linear inequalities.

Unit 7: Operations with Monomials

As we have seen, algebra involves the use of variables to represent unknown quantities in equations. Here we will begin the study of expressions that primarily consist of variables.

The rules that govern operations with these expressions arise from the properties of operations with numbers, such as the distributive property and the order of operations. In this unit we focus on monomials, which are expressions that contain only one term. We will learn how to multiply, divide, and apply rules of exponents to monomials.

Completing this unit should take you approximately 3 hours.

- Upon successful completion of this unit, you will be able to:
 - apply the rules of exponents to simplify algebraic exponential expressions; and
 - multiply, divide, and simplify the powers of monomials.

- **7.1: Algebraic Exponential Expressions**

The first mathematical functions we will explore are the exponential functions of monomials.

- [Exponential ExpressionsURL](#)

Read this article through the section on the product of powers property. This page reviews writing and solving exponential expressions. Pay attention to how we multiply monomials with exponents, the products of powers property, and example 2.

After you read, complete questions 2, 3, 6, 7, 8, 25, 26, 27 and 28 in the practice set and check your answers.

- **7.2: Manipulating Exponents**

In this section, we will look at important rules for manipulating exponents.

- [Exponential Properties Involving ProductsURL](#)

Read this article, which shows the rules for multiplying exponents, taking the power of an exponent, and taking the exponent of a product. It may help to write a list of these properties to keep track of them. Watch the video to see a few examples.

After you read, complete questions 2, 3, 6, 7, 14, 15, 25, 26, 33, and 34 in the practice set and check your answers.

- **7.3: Quotient of Exponents and Power of a Quotient**

The next important operation is the quotient of exponents, which is what we use when dividing monomials with exponents.

- [Exponential Properties Involving QuotientsURL](#)

Read this article and pay attention to the quotient of powers property and the power of a quotient property in examples 1 and 2.

After you read, complete questions 1, 2, 5, 6, 12, and 13 in the practice set and check your answers.

- **7.4: Negative Exponents**

In this section, we learn how to use negative exponents and how to translate between negative exponents and fractions.

- [Negative Exponent IntuitionPage](#)

Watch these videos, which walk you through the logic of why negative exponents can be written as fractions.

- [Practice Solving Problems with Negative ExponentsURL](#)

After you watch, complete this assessment and check your answers.

- **7.5: Multiplying Monomials**

Now that you are comfortable with the rules of exponents, you are ready to apply them to functions of monomials. In this section, we will discuss multiplying monomials.

- [Multiplication Properties of ExponentsURL](#)

Read the section on multiplying monomials and the solution for example 6.26.

After you read, complete example 6.27 and check your answer.

- **7.6: Dividing Monomials**

The last function we must apply to monomials is division.

- [Dividing MonomialsURL](#)

This article gives an excellent review of the properties of monomials and exponents, as well as how to divide monomials. Review the summary of exponent properties, which goes over everything we discussed in this unit.

After you read, complete examples 6.72 through 6.75 and check your work.

Unit 8: Operations with Polynomials

Polynomials are a special type of algebraic expression that contain two or more terms. For example, a polynomial might look like $5x + 2x^3 + x^2 + 2$. In this unit, we discuss how to recognize, classify, add, subtract, multiply, and divide polynomials by combining like terms and using the distributive property. These skills help us make calculations that pertain to the motion of two or more objects. For example, we can calculate when and where a runner will overtake a competitor, or how much interest you will earn from two or more savings accounts.

Completing this unit should take you approximately 4 hours.

- Upon successful completion of this unit, you will be able to:
 - identify the degree of a polynomial;
 - classify polynomial according to the number of terms;
 - add, subtract, and multiply polynomials;
 - divide a polynomial by a monomial and a binomial; and
 - identify special products of binomials by completing the square and finding the difference of two squares.

- **8.1: Classifying Polynomials**

When we discuss polynomials, we are referring to an algebraic expression that includes more than one term. We classify polynomials based on the number of terms in the expression.

- [Introduction to PolynomialsPage](#)

Watch this video to review the terminology we will use in this unit.

- **8.2: Adding and Subtracting Polynomials**

Like all mathematical expressions, we can perform basic mathematical operations on polynomials. In this section we learn how to add and subtract polynomials using different common methods.

- [Adding and Subtracting PolynomialsURL](#)

Read this page, which reviews how to classify polynomials. Pay attention to the section on adding and subtracting polynomials. You can rearrange the order of terms in a polynomial to make addition or subtraction possible. Read example 6.7 and its solution to see an example of adding polynomials.

After you review, complete examples 6.8 to 6.12 and check your work.

- [More on Adding and Subtracting PolynomialsPage](#)

Watch these videos for more examples of adding and subtracting polynomials.

- **8.3: Multiplying a Polynomial by a Monomial**

We can multiply polynomials by monomials or other polynomials. In this section, we will see how to multiply a polynomial by a monomial. We can use the distributive property to do this.

- [Multiplying Monomials by PolynomialsURL](#)

Read this article and watch the videos. It may be helpful to review the section on multiplying monomials. Then, focus on how to use the distributive property and the examples of using it.

After you review, complete review problems 6 to 11 and check your answers.

- **8.4: Multiplying Binomials (FOIL)**

When multiplying two binomials (polynomials with two terms), we cannot simply use the distributive property. We need to ensure that each term in one binomial is multiplied by each term in the other binomial. The technique we use to do this is called FOIL. FOIL is a mnemonic that stands for **F**irst, **O**uter, **I**nnner, **L**ast. When we place two binomials next to each other, FOIL reminds us of the order we multiply the terms in.

- [Using the FOIL Technique to Multiply BinomialsURL](#)

Read this article, which gives many examples of using the FOIL technique to multiply two binomials. Then, try some practice problems.

- [Multiplying Binomials by a BinomialPage](#)

Watch this video, which gives another example of using the FOIL technique.

- **8.5: Complete the Square and Difference of Two Squares**

We sometimes need to take the square of a binomial. In this section, we will look at the specific rules for squaring binomials. These rules are derived from the FOIL method.

- [Finding the Square of a Binomial with One VariablePage](#)

Watch this video, which takes square of a binomial in two different ways: using the FOIL method and the quadratic formula. Both methods give the same answer.

- [Special Products of PolynomialsURL](#)

Read this article, which gives examples of squaring binomials and the general formulas that always work for them. Example 1 shows how to use the formula. Note the definitions of sum and difference, which are used when multiplying one addition binomial and one subtraction binomial. Example 2 shows how to use this definition.

After you read, complete questions 1 through 5 and 14 through 18 in the practice set and check your answers.

- **8.6: Multiplying Polynomials with Any Number of Terms**

Polynomials can have more than two terms, and we will need to know the methods for multiplying these larger polynomials.

- [Multiplying a Polynomial by a BinomialPage](#)

Watch this video, which shows a method for ensuring that all terms in the polynomial (in this case a trinomial) are multiplied by both of the terms in the binomial using the distributive property.

- [Multiplying PolynomialsURL](#)

Read the section on multiplying a trinomial by a binomial. Review the solution to example 6.45 to see how the distributive property can be used to multiply.

After you read, complete exercises 267, 269, 271, and 273 and check your answers.

- **8.7: Dividing a Polynomial by a Monomial**

We also need to be able to divide polynomials. In this section, we will review some techniques for dividing a polynomial by a monomial.

- [Dividing Polynomials with Monomials with RemainderPage](#)

Watch this example of dividing a polynomial by a monomial. This video gives an example of the technique we use to divide.

- [Dividing PolynomialsURL](#)

Read the section on dividing a polynomial by a monomial. Review the solutions for examples 6.77 and 6.78, which show how to divide a polynomial by a number and by a monomial.

After you read, complete examples 6.79 to 6.83 and check your answers.

- 8.8: Dividing a Polynomial by a Binomial

The last mathematical operation we need to discuss is dividing polynomials by binomials.

- [Dividing Polynomials by BinomialsURL](#)

Read the section on dividing a polynomial by a binomial. Pay attention to the review of long division, since it will help you understand the technique. Review the solution to example 6.84 to see how to divide a trinomial by a binomial. Then, review the solution to example 6.85 to see how we handle dividing by a subtraction binomial. Be careful, and make sure you keep track of the negative sign.

After you study these examples, complete questions 6.167 through 6.170 in the Try It section.

Unit 9: Factoring Polynomials

Factoring is multiplication in reverse: rather than multiplying two polynomials, you write a given polynomial as a product of two or more different expressions. Factoring is an important tool for solving advanced equations, such as quadratic equations. Quadratic equations occur in problems that involve rectangular objects and their areas, such as planning gardens, framing photographs, or carpeting a floor.

Completing this unit should take you approximately 7 hours.

- Upon successful completion of this unit, you will be able to:
 - rewrite polynomial as a product of two or more polynomials;
 - identify polynomials that cannot be factored;
 - choose appropriate factoring strategy for a given polynomial; and
 - solve quadratic equations by factoring.

- 9.1: Identifying Greatest Common Factor

Reading and understanding algebraic expressions, much like translating sentences from a foreign language, is a skill that takes time to develop. Before learning how to factor an

algebraic expression (or write the expression as a product), you need to be able to break down the parts.

- [The Language of FactoringURL](#)

Read this article for an overview of the definitions you need to understand to be able to factor.

- [Using the Greatest Common Factor and Factoring by GroupingURL](#)

Read this page up to the section on factoring by grouping. Factoring takes advantage of the distributive property in the opposite way from how we did it in Unit 8.

After you read, complete examples 7.1 through 7.7 and check your work.

- **9.2: Factoring Polynomials by Grouping**

There are four steps you need to take to factor a four-term polynomial:

1. Separate the polynomial into two groups of two terms.
2. Identify a common factor in each member of the group and factor it out.
3. Check that the resulting expressions contain a common binomial factor. If they do not, then the polynomial cannot be factored (at least not when the terms are grouped this way).
4. Factor out a common binomial factor, and rewrite the polynomial as a product of two binomials.

- [Factoring by GroupingPage](#)

Watch the first six minutes of this video.

- [Practice Factoring PolynomialsURL](#)

Work through example 3 in the section on factoring by grouping, and solve problems 11 to 15, 17, 18, and 23 through 27 in the practice set. All of these problems are four-term polynomials that you can factor by grouping. After you complete the practice problems, check your answers.

- **9.3: Revisiting FOIL by Working Backwards**

When we factor binomials, we are essentially "undoing" the FOIL technique we learned in the last unit.

- [Basic Concepts Involved in Factoring TrinomialsURL](#)

Read this article. The section on the key tools for factoring trinomials gives an overview of how factoring works, and the section on the key ideas for finding the numbers that work also gives some basic rules to keep in mind when factoring.

- 9.4: Factoring Trinomials of the Form $x^2 + bx + c$ when c is Positive

We will study how to factor trinomials in two different forms: when c is positive and when c is negative. In this section, we will study how to factor trinomials with a positive c value.

- [Factoring TrinomialsPage](#)
-

Watch this video for an example of factoring a polynomial in this form.

- [Practice Factoring PolynomialsURL](#)
-

After you watch, complete this assessment and check your answers.

- 9.5: Factoring Trinomials of the Form $x^2 + bx + c$ when c is Negative

Now we can study trinomials where c is a negative number. These can be more complicated.

- [Factoring Trinomials of the Form \$x^2 + bx + c\$ when \$c\$ is NegativeURL](#)
-

Read this article and pay attention to the steps for these problems. Read the examples and note where factoring is not possible, like in the last example.

After you read, complete a few practice problems until you feel comfortable. Be sure to check your answers when you are done.

- 9.6: Factoring by Grouping

One useful method for factoring polynomials is factoring by grouping, using the bridge or the AC method.

- [Factoring by GroupingPage](#)
-

Watch these two videos which go through examples of using the factoring by grouping method.

- [Practice Factoring by GroupingURL](#)
-

After you have watched the videos, complete this assignment and check your answers.

- [9.7: Factoring Trinomials of the Form \$x^2 + bxy + cy^2\$ and \$ax^2 + bxy + cy^2\$](#)

The previous examples of factoring trinomials only included one variable. Often, algebraic expressions include more than one variable, and we need ways to factor polynomials with two variables. The methods used to factor trinomials with two variables are based on the same principles as those with one variable.

- [Factoring Trinomials with Two VariablesPage](#)

Watch these videos, which demonstrate different methods for factoring trinomials with two variables.

- [Practice Factoring Trinomials with Two VariablesURL](#)

After you have watched the three videos, complete this assignment and check your answers.

- [9.8: Identifying and Factoring Complete Square Trinomials](#)

We can identify some trinomials as perfect squares. A perfect square trinomial has the form $a^2 + 2ab + b^2$ or $a^2 - 2ab + b^2$. Because each term is a square, they can be factored into $(a + b)^2$ or $(a - b)^2$, respectively. It is important to be able to identify trinomials in this form to easily factor them after determining the values of a and b .

- [Factoring Using Perfect Square TrinomialsURL](#)

Read this article up to the section on solving quadratic polynomial equations by factoring. Watch the videos and work through the guided practice examples.

After you review, complete practice problems 1 through 8 and check your answers.

- [Factoring Perfect Square TrinomialsPage](#)

This video shows how to check whether the given trinomial is a complete square. Factor it if it is. You should try to factor by grouping if it is not.

- [9.9: Identifying and Factoring the Difference of Two Squares](#)

A special case of polynomials is the difference of two squares. For example, the equation $x^2 - 4$ is a difference of two squares because it can be written as $x^2 - 2^2$.

- [Factoring Using Difference of SquaresURL](#)

Read this article, which reviews the sum, difference, and square of the binomial equations we discussed earlier. Make sure you are comfortable with this before

moving on. Pay attention to the examples of factoring the difference of two squares, since they show how to use the method.

After you read, complete review questions 1 through 5 and check your answers.

- **9.10: Identifying and Factoring the Sum and Difference of Two Cubes**

Much like factoring the difference of two squares, we can use special techniques to factor the sum and difference of two cubes. An example of the sum of two cubes is $x^3 + 27$, as this can be written as $x^3 + 3^3$.

- [Factoring Sum of CubesPage](#)

Watch this video to see an example of how we treat this special case of factoring.

- **9.11: Factoring General Polynomials**

Sometimes factoring a polynomial requires more than one step. When this occurs, we combine the different techniques we have learned to completely factor the complex polynomial.

- [Factoring PolynomialsPage](#)

Watch these videos. Factoring a trinomial requires two steps. First, a common monomial factor is factored out, and then the resulting polynomial is factored by grouping. The second video gives an example of a multi-step factoring process by factoring out a common monomial and then using the difference of cubes formula.

- [More on Factoring PolynomialsURL](#)

This article gives more examples and introduces the idea of "prime polynomials" that cannot be factored.

- [Practice Factoring PolynomialsURL](#)

Complete this assignment and check your answers.

- **9.12: The Principle of Zero Product and Identifying Solutions**

The principle of zero product tells us that if the product of two quantities is 0, one of the quantities must also be 0.

- [Using the Principle of Zero Product to Solve Quadratic EquationsURL](#)

Read the section on solving quadratic equations using the zero product property. Review the solution to example 7.69 to see the steps for using the principle of zero product.

After you read, complete examples 7.70 and 7.71 and check your answers.

- 9.13: Using Factoring to Solve Quadratic Equations

We are now ready to use factoring to solve quadratic equations.

- [Using Factoring to Solve Quadratic EquationsURL](#)

Read this article, which gives examples of using factoring to solve quadratic equations. Try to identify the factoring methods, and think about why we perform each step.

After you read, complete a few practice problems and check your answers.

- [Using Factoring to Solve Complicated Quadratic EquationsURL](#)

Read each example slowly and try to identify the factoring methods being used and why each step is performed.

After you have reviewed the materials, complete a few practice problems and check your answers.

- 9.14: Applications for Solving Problems

Now that we have spent so much time learning about factoring, we are ready to see how it applies to everyday life.

- [Using Factoring to Solve ProblemsURL](#)

Read this article, which shows how we use factoring in geometry and in problems where we need to find an unknown value.

After you read, complete review questions 1, 2, 5, 7, and 9 and check your answers.