Your competence will be assessed as you complete the GBC1/2 objective assessment and the GBT1/2 performance assessment. This course of study may take up to 9 weeks to complete.

**Introduction**

In this course of study, you will be able to:

- become a change agent to take children's fears, dislike, and lack of confidence in learning mathematics and transform them into the love of the wonder, beauty, and usefulness of mathematics;
- make the most out of your investment at Western Governors University by satisfying your own curiosity and your commitment to lifelong learning;
- be or remain gainfully employed or be a valued volunteer tutor or mentor-competent and caring math teachers are greatly needed.

If you are just starting a teaching career, you will love learning all the intricate ways to stimulate and inspire your students. For those of you who have been in the classroom already, you will find ways to expand your creativity and enhance your effectiveness as a teacher. Teaching is all about learning. Do all that you can to soak up what is offered to you in your WGU mathematics education program.

This study of college algebra is intended to provide a solid foundation of algebraic concepts and of their applications to real-world problems. This algebra foundation will prepare you for the study of higher mathematics of calculus and beyond. You will learn the relevance and application of mathematical computation and problem solving to real-life situations in areas such as business, science, and economics. You should be able to confidently answer students who ask, "When will we ever use this?"

**Outcomes and Evaluation**

There are 7 competencies covered by this course of study; they are listed in the "Competencies for Mathematics Content (5-9) College Algebra (GBC1/2, GBT1/2)" page.

You will complete the following assessments as you work through the course of study.

**Objective Assessment**

You will complete the following objective assessment:

- GBC1/2

For specific information about this assessment, select this course under the "Course Details" section of your Degree Plan.

**Performance Assessment**

You will complete the following tasks in TaskStream as part of the GBT1/2 performance assessment:
- GBT1/2: RGBT Task 1
- GBT1/2: RGBT Task 2
- GBT1/2: GBT Task 3
- GBT1/2: GBT Task 4

Click on the link located in the "Assessment Preparation" box in the upper left-hand side of your screen to preview expectations for each task. Task instructions and evaluation rubrics are available by clicking the title of the course of study in the navigation options.

**Teaching Dispositions Statement**
Please review the [Statement of Teaching Dispositions](#).

**Preparing for Success**

The information in this section is provided to help you become ready to complete this course of study. As you proceed, you will need to be organized in your studies in order to gain competency in the indicated areas and prepare yourself to pass the final assessments.

**Your Learning Resources**

Enroll in or order the learning resources for this course as early as possible so as to give them time to arrive and give you enough time to become familiar with them.

**Automatically Enrolled Learning Resources**

You will be automatically enrolled at the activity level for the following learning resources. Simply click on the links provided in the activities to access the learning materials.

**Thinkwell**

You will access Thinkwell materials at the activity level within this course of study. This web-based resource includes multimedia video lectures, review notes, interactive animations, and sample exercises.

- Thinkwell College Algebra

**Enroll in Learning Resources**

You will need to enroll in or subscribe to additional learning resources as a part of this course of study.

You may already have enrolled in these resources for other courses. Please check the "Learning Resources" tab and verify that you have access to the following learning resources. If you do not currently have access, please enroll or renew your enrollment at this time.

*Note: For instructions on how to enroll in or subscribe to learning resources through the "Learning Resources" tab, please see the "Acquiring Your Learning Resources" page.*

**CourseCompass**

Check your subscription for CourseCompass MyLabSchool. If you do not have a current subscription, please follow the instructions at the beginning of this activity to renew your
subscription.

After enrolling in this course, you will be emailed access information to the Pearson CourseCompass website. You will be sent a link to the site with your username and password.

The following text is available for this course through CourseCompass:


CourseCompass also includes MyMathLab interactive. This is an independent study course and is provided to you by WGU. You do not need to purchase the resource. The multimedia textbook is online. Additionally, there are videos, practice problems, and quizzes. Throughout each chapter, you will find real-world situations that connect your learning to application.

**Purchase a Calculator**

Acquire a graphing calculator and familiarize yourself with how to use it. Refer to WGU Calculator Guidelines for details regarding calculators that are acceptable on WGU exams and to WGU Calculator Recommendations for calculator suggestions for your program.

**Additional Preparation**

There are many different learning tools available to you within your course of study in addition to the learning resources already discussed. Take the time to familiarize yourself with them and determine how best to fit them into your learning process.

**Message Boards, FAQs, Note-Taking Tool**

Message boards, FAQs, and a note-taking tool are available in every course of study.

Use the "Additional Learning Tools" page to review these tools.

**The WGU Central Library**

The WGU Central Library is available online to WGU students 24 hours a day. The library offers access to a number of resources, including over 60,000 full-text e-books; articles from journals, magazines, and newspapers; course e-reserves; and tutorials on how to use these resources and the library. The library also includes a reference service for help with research questions or navigating the library.

**Course Mentor Assistance**

Course mentors are available to help you. Their job is to aid understanding in areas where you need to improve and to guide you to learning resources. Request their help as needed when preparing for assessments.

Course mentors cannot provide reviews of entire assessments. If you fail assessment attempts, review the provided feedback first, then ask the course mentor specific questions about what you can do to meet the competency standard. Request course mentor assistance as necessary.
in preparing for second attempts at objective assessments or performance task revisions. Mentors cannot guarantee you pass as they do not evaluate assessments; however, they can provide the assistance and advice necessary to help you succeed.

**Define Algebra**

Within the first week of teaching prealgebra or algebra in a classroom, you will invariably have a student who is going to ask, "So what is algebra?" If you do not know yourself, look it up and be ready to answer that question.

**Preassessment**

Take the pre-assessment if you think that you have a strong background in algebraic concepts.

Follow these directions to receive [access to pre-assessments](#).

**Knowledge of Numbers and Operations**

This section contains a review of number sets and theory and their appropriate operations.

When you have completed this subject's activities, you should be able to:

- convert fractions to decimals to percents,
- solve problems involving proportions,
- answer questions about number sets, number theory, and number properties, and
- perform operations on numbers written in scientific notation.

**Competencies covered by this subject**

209.2.1 - Knowledge of Numbers and Operations

The graduate demonstrates computational proficiency, including a conceptual understanding of numbers, ways of representing numbers, relationships among number and number systems, and meanings of operations.

**Number Theory**

Show how number systems relate to each other, and be able to apply number properties.

**Review Foundational Concepts of Algebra**

Log in to [CourseCompass](#) and read the following in Algebra and Trigonometry:

- the examples given in the first section in chapter P.1 ("Prerequisites: Fundamental Concepts of Algebra: Algebraic Expressions and Real Numbers")

This is a good time to explore MyMathLab and begin testing yourself and your knowledge through the sample quizzes and tracked tutorial exercises.

Recall the relationship between the natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers. Can a real number be written as a fraction?

Review the terms number properties, order of operations, associative, commutative, and distributive.

**Scientific Notation**
Write large and small numbers in scientific notation.
Reading: Scientific Notation

Access Algebra and Trigonometry in CourseCompass and refer to chapter P.2. Practice the tracked tutorial exercises for scientific notation in chapter P.2 in MyMathLab. Work a sampling of the problems as needed in order to know how to convert scientific notation to decimals, and vice versa.

Note: If you need review on how to simplify exponents, practice all the exercises in Section P.2.

Converting Between Notations

Access the following in Thinkwell College Algebra:

- section 1.5 ("Converting Between Notations")

Operations in Scientific Notation
Conduct basic operations in scientific notation.

Computations in Scientific Notation

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter P.2

Scientific Notation

Log in to CourseCompass and review the following in Algebra and Trigonometry:

- chapter P.2

Outline what types of real-world applications frequently make use of scientific notation.

Equations and Inequalities (Part I)

This section covers the study of linear and quadratic equations and inequalities.

When you have completed parts 1 and 2 of the activities, you should be able to demonstrate your ability to do the following:

- write the equation of a line,
- solve linear equations and inequalities,
- solve equations and inequalities with absolute value,
- solve systems of linear and nonlinear equations and inequalities with two variables, and
- solve quadratic equations and inequalities.
Competencies covered by this subject
209.2.2 - Equations and Inequalities
The graduate solves and graphs linear and quadratic equations and inequalities.

**Equation of a Line**
There are a variety of ways to find equations of lines. The particular technique you use will depend on the information you are given or the problem you are trying to solve. Engaging with the following topics will ultimately allow you to find the equation of a line given point-slope, given two points, and given a point and a line. Each of these methods is important, and each is appropriate in different circumstances, so you must learn each method.

**Writing Equation: Given Point-Slope**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 2.3

Complete the following:

- The ratio of students (S) to teacher (T) is 10 to 1. What is the equation? Is it $T = 10S$ or $S = 10T$? Explain why.
- Graph your above equation. Can you make any generalizations? What is point-slope form of the equation of a line? What is slope-intercept form? How are these two forms represented?

**Writing Equation: Given Two Points**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 2.3

Practice the tracked tutorial exercises in chapter 2.3 in MyMathLab.

**Writing Equation: Given Point and Parallel Line**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 2.4

Practice the tracked tutorial exercises in chapter 2.4 in MyMathLab.

**Writing Equation: Given Point and Perpendicular Line**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 2.4

Practice the problems tracked tutorial exercises in chapter 2.4 in MyMathLab.

**Rate of Change**
Log in to CourseCompass and review the following in Algebra and Trigonometry:

- chapter 2.3 - 2.4

Describe (suggested length of one paragraph) what is meant by slope as a "rate of change." Provide a specific example of how this is used in real-world applications.

**Linear Equations**

Learn to solve linear equations. It is not enough to simply graph lines; you also need to know how to solve equations of the form $ax + b = c$. Recall that all linear equations can be rewritten in that format. Once you are familiar with how this is done, you will be able to solve any linear equation.

**Linear Equations**

Access the following in Thinkwell College Algebra:

- section 2.1 ("Linear Equations")
- section 2.2 ("Word Problems with Linear Equations: Math Topics")
- section 2.3 ("Word Problems with Linear Equations: Applications")

Watch the video lecture and review the notes in chapter sections 2.1-2.3

*Note: Be sure to review how linear equations relate to real-world applications.*

**Solving Linear Equations**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 1.2
- chapter 1.3

Practice the tracked tutorial exercises for chapter 1.2-1.3 in MyMathLab. Remember to check your answers.

What is a linear equation in one variable? What is the general strategy for solving linear equations? What are some real-world problems that can be solved using linear equations?

**Equations with Absolute Values**

The activities will give you practice in solving equations with absolute values. Recall that the absolute value of a number refers to how far from zero that number lies. What about the absolute value of a variable or variable expression? Soon you will see the techniques that will allow you to conquer any absolute value problem that you encounter.

**Absolute Value Equations**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:
• chapter 1.6

Complete the following:

• Graph several absolute value equations on the same axis to see how they compare. How do you make the graphs narrower? Wider? An upside down "V"?
• Can you think of a real-life application of an absolute value equation?

**Solving Linear Inequalities**

Learn how to solve simple linear inequalities and those with absolute value. You may want to review open and closed intervals and the definition of an absolute value. Why do solutions involve an infinite number of values?

**Solve Linear Inequalities**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

• chapter 1.7

Complete the following practice:

• What do the phrases "at least" and "at most" have to do with inequalities?
• For graphing $x + y > 10$, how do you know which half-plane is shaded? Is there a way to check?

**Inequalities With Absolute Values**

Learn how to solve inequalities with absolute values. What happens when an absolute value symbol encloses a variable or variable expression? What happens if the absolute value of a variable expression is not equal to a set number but is instead greater than or less than a particular value?

**Solving Absolute Value Inequalities**

Access the following in Thinkwell College Algebra:

• [section 2.14](#) ("Absolute Value")

Watch the videos and review the notes in section 2.14

**Absolute Value Inequalities**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

• chapter 1.7

**Bounded and Unbounded Intervals**
Write a paragraph explaining why the solutions of $|x| < a$ is a single bounded interval and the solutions $|x| > a$ are two unbounded intervals. Assume that $x$ is an algebraic expression and $a$ is a real number.

**Equations and Inequalities (Part II)**

This section involves the study of linear and quadratic equations and inequalities. This extends each of the fundamental topics that were previously learned and works towards solving sets of equations and inequalities instead of a single equation or inequality.

When you have completed parts 1 and 2 of the activities, you should know how to:

- write the equation of a line,
- solve linear equations and inequalities,
- solve equations and inequalities with absolute value,
- solve systems of linear and nonlinear equations and inequalities in two variables, and
- solve quadratic equations and inequalities.

**Competencies covered by this subject**

209.2.2 - Equations and Inequalities

The graduate solves and graphs linear and quadratic equations and inequalities.

**Systems of Linear Equations in Two Variables**

Solve systems of linear equations with two variables. How many solutions do systems have? Is this always the case? What are the exceptions? How can you identify the exceptions?

**Systems of Linear Equations**

Log in to CourseCompass and read the following in *Algebra and Trigonometry*:

- chapter 8.1

Can you define and give examples of a system of equations? Make sure you are able to solve by graphing, substitution, and elimination.

Access the following in Thinkwell College Algebra Online.

- **section 6.1** ("Linear Systems of Equations")

Watch the video lectures and review the notes in section 6.1.

**Solving by Substitution**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 8

Practice the tracked tutorial exercises in chapter 8.1 in MyMathLab.

*Note: When using the substitution method, it does not matter which variable you solve for, so
Pick the easiest one.

**Solving by Elimination**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 8

Practice the tracked tutorial exercises in chapter 8.1 in MyMathLab.

*Note: Elimination is also referred to as the addition method.*

**Solving by Graphing**

A system of two linear equations can have no solutions, one solution, or an infinite number of solutions. As a study tool, draw an example graph for each of these three possibilities for a system of linear equations.

**Systems of Linear Inequalities in Two Variables**

In this topic area, you will learn how to solve a given system of inequalities in two variables. Describe what you expect as the solution of such a system. What would the graph look like? Why does it look like this? Can you conceive of any real-world phenomena that could also be modeled in this way?

**Solving a System of Linear Inequalities**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 8.5

Practice the tracked tutorial exercises for chapter 8.5 in MyMathLab.

**Quadratic Equations**

Recognize and solve nonlinear equations through a variety of methods.

**Solve Quadratic Equations**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 1.5

Practice the tracked tutorial exercises in chapter 1.5 of MyMathLab. Remember to check your answers.

Complete the following practice:

- A pizza cook decides to charge $5 for a small 4-inch cheese pizza and $10 for a large 8-inch pizza. Is this reasonable? Why or why not?
- What is the general strategy for solving quadratic equations? Know how to use a variety of methods (graphing, formula, or calculator) to solve these equations.

**Quadratic Inequalities**
In this topic area, you will learn how to recognize and solve quadratic inequalities. Describe what you expect as the solution of such a system. What would the graph look like? Why?

**Quadratic Inequalities**

Access the following in Thinkwell College Algebra:

- [section 2.12](#) ("Inequalities: Quadratics")

Watch the videos and review the notes in section 2.12.

**Solving Quadratic Inequalities**

Access the following in Thinkwell College Algebra:

- [section 2.12](#) ("Inequalities: Quadratics")

Complete the sample problems in section 2.12.

**Systems of Nonlinear Equations in Two Variables**

Given two nonlinear equations in two variables, be able to solve using any method.

**Solving a System of Nonlinear Equations**

Log in to [CourseCompass](#) and refer to the following in *Algebra and Trigonometry*:

- chapter 8.4

Watch the animation in Check Point 3 on solving nonlinear equations using the addition method.

Practice the tracked tutorial exercises for chapter 8.4 in MyMathLab.

**Polynomials**

Polynomials are typically characterized by their degree--that is, the highest power of the variable. What relationship does this have with the number of roots (zeros) that it may possess? How can you find those roots? What is the tail behavior of the graph? How can you detect these characteristics?

When you have completed this week's activities, you should be able to:

- perform basic operations with algebraic fractions and equations,
- find roots of polynomial functions,
- use synthetic division, and
- graph polynomials by examining degree, roots, and tail behavior.

**Competencies covered by this subject**

**209.2.3 - Polynomials**

The graduate identifies roots of polynomial functions and uses characteristics of polynomials as
an aid to graphing.

**Algebraic Fractions**

Be able to perform basic operations with algebraic fractions, including solving fractional equations. What is an algebraic fraction? How do you find common denominators?

**Working With Algebraic Fractions**

Access the following in Thinkwell College Algebra:

- **section 1.11** ("Working with Rationals")

**Additional Practice with Algebraic Fractions**

For foundational information on manipulating polynomial expressions and algebraic fractions, log in to **CourseCompass** and review the following in *Algebra and Trigonometry*:

- sections P.4 – P.6

**Rational Equations**

Log in to **CourseCompass** and refer to the following in *Algebra and Trigonometry*:

- chapter 1.2

Practice solving equations with algebraic fractions.

Practice the tracked tutorial exercises in chapter 1.2 in MyMathLab.

Make sure you are proficient in working with and solving rational equations.

**Graphing Polynomials**

You can graph polynomials using roots, degree, and tail behavior.

**Working with Polynomials**

For foundational information on polynomials, log in to **CourseCompass** and refer to the following in *Algebra and Trigonometry*:

- section P.4
- section P.5

Be sure to review multiplying polynomial expressions and factoring methods before moving onto the activities below.

**Graphing Quadratics**

Log in to **CourseCompass** and refer to the following in *Algebra and Trigonometry*:

- section 3.1
Practice the tracked tutorial exercises for chapter 3.1 in MyMathLab. Make sure you have a comprehensive knowledge of graphing of quadratics.

**Graph Polynomials**

Log in to [CourseCompass](#) and refer to the following in *Algebra and Trigonometry*:

- section 3.2

Practice the tracked tutorial exercises for chapter 3.2 in MyMathLab. Make sure you have a comprehensive knowledge of graphing of polynomials.

**Matching Graphs**

Access the following in Thinkwell College Algebra:

- **section 4.7** ("Graphing Polynomials")

Watch the videos and review the notes in section 4.7.

**Tail Behavior**

As you discovered while graphing polynomials, the tail behavior of a polynomial is an important and potentially distinguishing characteristic of a polynomial graph. Focus your energies on describing the tail (or end) behavior of polynomials.

**Tail Behavior**

Log in to [CourseCompass](#) and revisit to the following in *Algebra and Trigonometry*:

- section 3.2

Synthesize your learning:

- How can you determine the tail behavior for an even-degree polynomial if given knowledge of the leading coefficient? How do you know if both tails point upward? downward?

- How can you determine the tail behavior for an odd-degree polynomial if given knowledge of the leading coefficient? How is the tail behavior of odd-degree polynomials different from even-degree polynomials? How do you know which tail points upward and which tail points downward?

**Synthetic Division**

Synthetic division of polynomials can be used to find roots of polynomials. How does synthetic division work? How is synthetic division related to factoring? Why might synthetic division be
useful for finding roots of polynomials and when graphing polynomials?

**Synthetic Division**

Log in to [CourseCompass](#) and refer to the following in *Algebra and Trigonometry*:

- section 3.3

**Synthetic Division With Polynomials**

Access the following in Thinkwell College Algebra:

- section 4.2 ("Polynomials: Synthetic Division")

Watch the videos and review the notes in section 4.2.

**Rational Root Theorem**

The Rational Root Theorem is helpful when trying to find the zeros of a polynomial? But, how?

What does the theorem state? How is it helpful in finding zeros of polynomials?

**Rational Root Theorem**

Access the following in Thinkwell College Algebra:

- section 4.5 ("The Rational Root Theorem")

**Finding Roots Using the Rational Root Theorem**

Log in to [CourseCompass](#) and refer to the following in *Algebra and Trigonometry*:

- section 3.4

Use the Rational Root Theorem. Complete the tracked tutorial exercises for section 3.4 in MyMathLab.

**Zeros of Polynomials**

Find the zeros of a polynomial, perhaps by using the Rational Root Theorem, synthetic division, and/or factoring. What are the different algebraic methods you can use to find the zeros of a polynomial?

**Polynomial Equations**

Log in to [CourseCompass](#) and revisit the following in *Algebra and Trigonometry*:

- section 3.4

Review the tracked tutorial exercises in chapter 3.4 in MyMathLab. Make sure you are proficient in calculating the zeros of a polynomial equation.

**Conic Sections**
The study of conic sections includes parabolas, hyperbolas, circles, and ellipses. These common shapes result from slicing a cone with a plane.

When you have completed this week's activities, you should be able to:

- recognize the equations of parabolas, hyperbolas, circles, and ellipses,
- create graphs of conic sections using given equations, and
- find the equations of conic sections using given graphs.

Competencies covered by this subject
209.2.4 - Conic Sections
The graduate identifies and analyzes important characteristics of conic sections and graphs them.

**Circles, Equations, and Graphs**
Recognize the equation of a circle, and be able to graph a circle using its appropriate equation:

\[(x - h)^2 + (y - k)^2 = r^2\]

This will help you make explicit connections between algebra (equations) and geometry (graphs).

**Circles Video**
Access the following in Thinkwell College Algebra:

- **section 3.4** ("Circles")

Watch the video lecture and review the notes in section 3.4.

**Circles Text**
Log in to [CourseCompass](#) and read the following in *Algebra and Trigonometry*:

- chapter 2.8

Practice the tracked tutorial exercises for chapter 2.8 in MyMathLab.

**Ellipses, Equations, and Graphs**
Recognize the equation of an ellipse, and be able to graph an ellipse using its appropriate equation:

\[\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1\]

**Ellipses**
Access the following in Thinkwell College Algebra:

- **section 7.2** ("Ellipses")
Watch the video lecture and review the notes in section 7.2.

**Ellipses Practice**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 10.1

Write the equations from graphs in exercises 19-24 within this section. Practice the tracked tutorial exercises for chapter 10.1 in MyMathLab

Can you explain what an ellipse is? Do you know the relationship between an ellipse and a circle?

**Hyperbolas, Equations, and Graphs**

Recognize the equation of a hyperbola, and be able to graph a hyperbola using its appropriate equation:

\[
\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1
\]

**Hyperbola**

Access the following in Thinkwell College Algebra:

- section 7.3 ("Hyperbolas")

Watch the video lecture and review the notes in section 7.3.

**Hyperbolas Practice**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 10.2

Practice the tracked tutorial exercises for chapter 10.2 in MyMathLab

**Parabolas, Equations, and Graphs**

Recognize the equation of a parabola, and be able to graph a parabola using its appropriate equation: \( y = a(x-h)^2 + k \)

**Parabolas**

Access the following in Thinkwell College Algebra:

- section 7.1 ("Parabolas")

Watch the video lecture and review the notes in section 7.1.

**Parabolas Practice**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:
chapter 10.3

Practice the tracked tutorial exercises for chapter 10.3 in MyMathLab.

**Functional Analysis (Part I)**

This section focuses on the study of functions and their graphs, identifying important characteristics of functions, and dissecting graphical meanings through careful analyses.

When you have completed parts 1 and 2 of the activities, you should be able to:

- identify relations and functions,
- identify domain and range,
- work with functions with absolute value and logarithmic and exponential equations,
- recognize equations from graphs, and
- graph functions.

Competencies covered by this subject

209.2.5 - Functional Analysis

The graduate explores, analyzes, and represents patterns, relations, and functions, including absolute value and radical, logarithmic, exponential, polynomial, and rational functions and their graphs.

**Functions, Relations, and Notation**

Conduct a basic review of functions and their notations.

**Functions, Relations, and Notation**

Log in to [CourseCompass](#) and review the following in *Algebra and Trigonometry*:

- chapter 2

Through your review, you should refresh your knowledge of the basic vocabulary of functions. Make sure you understand the difference between a relation and a function.

How do you define the term function? How can you use the definition to show that a given relation either is, or is not, a function?

*Note: Start using f(x) (pronounced “f of x”) instead of y when working on the example problems. This will help you become more familiar with this notation.*

*Note: The term function and its notation, f(x), refer to a special type of equation. For example, you can write the equation y = 3x + 1 as the function f(x) = 3x + 1. The only visible difference is that the variable f(x) is used instead of y.*

**Identifying Functions**

Access and review the following in Thinkwell College Algebra:

- section 3.6 ("Function Basics")
Check out the animation in chapter 3.6.1 titled, "Function Basics."

**Explaining Functions**

Write a letter to a fictitious person who knows little about mathematics. Explain in your letter how a function is different from an equation.

If you need help, review the glossary of terms in the following section of Thinkwell College Algebra Online:

- section 3.6 ("Function Basics")

**Domain and Range**

Know the definition of *domain* and *range*, and learn how to determine them. Domain refers to all possible values for which a function is defined. The range is all of the values that the function takes on. Another way to think about it is this: Domain = Inputs (D = x); Range = Outputs (R = y).

**Domain and Range**

Access the following in Thinkwell College Algebra:

- section 3.8 ("Function, Domain, and Range")

Make sure you understand why specific values must be excluded from the domain. This should include values that cause a division by zero and value that cause an even root of a negative number.

Be careful not to confuse the codomain with the range. The codomain is the set of possible outputs, while the range is the set of actual outputs.

**Exponents**

Conduct operations with negative and fractional exponents. Remember that $a^{-n} = 1/a^n$. In other words, negative exponents can be instantly written as fractional quantities. What about fractional exponents like $a^{m/n}$? Just remember to "slide and drop" by sliding the $n$ over, making it the index of your radicand, then "drop the top"—that is, the $m$ becomes the new power on the radical. Thus, $a^{m/n} = \text{the } n\text{th root of } a$, raised to the $m\text{th power}$.  

**Review of Exponents**

Access the following in Thinkwell College Algebra:

- section 1.4 ("Exponents")

Watch the video lecture and review the notes in section 1.4.

Be sure you know how to evaluate expressions with negative and fractional exponents.  

**Operations With Radical or Fractional Exponents**
Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter P.2
- chapter P.3

Practice the tracked tutorial exercises for P.2 and P.3 in MyMathLab.

**Exponential Equations**

Know how to solve an exponential equation. The inverse operation of raising something to a power is to take the root of that number. This undoes the exponentiation.

**Exponential Equations**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 4.4

**Logarithms and Logarithmic Equations**

Define logarithms and solve a logarithmic equation. The key to understanding logarithms is to remember the following: \( y = \log_b x \) means that \( b^y = x \). In other words, if you do not prefer working with logarithmic equations, you may rewrite them as exponential equations.

**Definition of a Logarithm**

Write a sentence or two explaining the definition of logarithm and what type of notation is used to express a logarithm. State the logarithm for general base \( b \).

**Working With Logarithms**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 4.2

Watch the animation in section 4.3 check points 4 and 5.

**Logarithmic Equations**

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 4.2

Practice the tracked tutorial exercises in chapter 4.2 of My Math Lab.

**Functional Analysis (Part II)**

This section continues the study of functions and their graphs and extends your knowledge base to cover more about functions and the ways you can manipulate them.

When you have completed parts 1 and 2 of the activities, you should be able to:

- identify relations and functions,
- identify domain and range,
work with functions with absolute value, composition of functions, and logarithmic and exponential equations,
recognize equations from graphs, and
graph functions.
Competencies covered by this subject
209.2.5 - Functional Analysis
The graduate explores, analyzes, and represents patterns, relations, and functions, including absolute value, radical, logarithmic, exponential, polynomial, and rational functions and their graphs.

Graphing Functions
Know how to recognize and graph common functions. Recall the difference between an exponential and logarithmic graph and how they are related. In addition, remember how radicals and exponentials are related and what an asymptote is. This section will cover graphing polynomials using roots, degree, and tail behavior.

Review of Common Function Graphs
Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- table 2.3 in chapter 2.5

Review common graphs, domain, and range.

Log in to CourseCompass and review the following in Algebra and Trigonometry:

- chapter 3

Graph polynomials given the roots, degree, and tail behavior.

Review how to graph a quadratic function, and watch the animation at 3.1 check point 3.

Using Slope
Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- section 2.4

Transformations
Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 2.5

This section covers basic transformations including shifts and reflections.

Practice the tracked tutorial exercises in chapter 2.5 of My Math Lab. Remember that when you
click on the exercise icon, you also have the option of choosing "Help me solve."

**Graphing**

Log in to [CourseCompass](#) and refer to the following in *Algebra and Trigonometry*:

- chapter 2

Practice tracked tutorial exercises in 2.2 of MyMathLab. This is also a good time to review intercepts.

*Note: The vertical line test relates to the original definition of a function because a function must have only one output for any given input. Thus, a vertical line cannot intersect two points on the graph of a function.*

What is meant by piece-wise functions? Can you create your own?

**Introduction to Exponential Functions and Their Graphs**

Access the following in Thinkwell College Algebra:

- [section 5.3](#) ("Exponential Functions")

Watch the videos and review the notes in section 5.3.

Why are exponential functions not allowed to have negative bases? What is the number e? What is its importance? Can you give some real-world examples to illustrate e?

**Exponential Functions**

Log in to [CourseCompass](#) and refer to the following in *Algebra and Trigonometry*:

- chapter 4

Watch the animation in section 4.1 check point 3.

Practice the tracked tutorial exercises in chapter 4.1 of My Math Lab.

Can you describe the graph of an exponential function, given f(x)=bx? Where does the graph cross the y-axis? Where is it increasing? Decreasing?

**Applying Exponential Functions**

Access the following in Thinkwell College Algebra:

- [section 5.5.2](#) ("The Number e")

Watch the videos and review the notes in section 5.5.2.

Understand how to apply exponential functions to population growth.
Rate of Growth and Decay

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 4.5

Describe three real-world uses for exponential functions in understanding rate of growth or decay.

How would you know if a given exponential function is describing growth or decay?

Introduction to Logarithmic Functions and Their Graphs

Access the following in Thinkwell College Algebra:

- section 5.6 ("Logarithmic Functions")
- section 5.7 ("Solving Logarithmic Functions")

Watch the videos and review the notes in sections 5.6-5.7.

Logarithmic Function Graphs

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 4

Practice the tracked tutorial exercises in chapter 4.2 in MyMathLab.

Can you name the characteristics of the graphs of logarithmic functions, given \( f(x) = \log_b x \).

What is the x-intercept? When is the function increasing? Decreasing?

Composition of Functions

Learn how to work with a combination of functions by adding, subtracting, multiplying, and dividing. When composing one function with another, what happens to the domain and range?

What happens when you try to evaluate \( f(g(x)) \)? Is this the same as \( g(f(x)) \)? Why or why not?

The Composition of Functions

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 2.6

Watch the animation in 2.6 check point 4.

Practice the tracked tutorial exercises for chapter 2.6 in MyMathLab.

Think of a composition \( f(g(x)), \) where \( g(x) = x + 1 \) and \( f(x) = x^2 \). Be sure you work from the inside of the parenthesis out by first taking your \( x \)-value, then add one, then take \((x + 1)^2\). How might \( g(f(x)) \) look?
Asymptotes
Not only should you know how to find horizontal and vertical asymptotes, but you should also know why to do so. Evaluating functions at their vertical asymptotes is not always effective; horizontal and slant asymptotes can give insight to the ultimate destiny of a function.

Finding Asymptotes

Access the following in Thinkwell College Algebra:

- section 4.9 ("Graphing Rational Functions")

Watch the video and read the notes in section 4.9.

Why do you need to find horizontal and vertical asymptotes? What does it mean if a function has no asymptotes?

Graphing Rational Functions

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 3.5

Find the vertical asymptotes. Find the horizontal asymptotes. Practice the tracked tutorial exercises for chapter 3.5 in MyMathLab.

Inverse Functions

This section covers the study of inverses and answers the following questions: Why is it that some functions have inverses and others do not? What is the relationship between the domains and ranges of inverse functions? What is the relationship between the graph of a function and the graph of its inverse?

When you have completed this section's activities, you should be able to:

- define inverse,
- identify if an inverse exists,
- find inverses of functions, including exponential and logarithmic, and
- explain the role of inverse functions in mathematics.

Competencies covered by this subject
209.2.6 - Inverse Functions
The graduate demonstrates a conceptual understanding of and finds the inverse of a function.

Inverse Functions
Know how to find function inverses and their graphs, and distinguish whether an inverse of function exists.

Inverses
Access the following in Thinkwell College Algebra:

- section 5.1 ("Function Inverses")

Watch the video lectures and review the notes in section 5.1.

**Inverse Functions and Notation**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 2.7

Practice the tracked tutorial exercises for chapter 2.7 in MyMathLab.

Can you define inverse and how to draw the inverse from a graph?

**One to One**

Access the following in Thinkwell College Algebra:

- section 5.1 ("Function Inverses")
- section 5.2 ("Finding Function Inverses")

Watch the video lectures and review the notes in sections 5.1-5.2.

Does an one to one function always have an inverse?

*Note: Make sure you understand when the vertical and horizontal line tests are used. The vertical line test is used to determine if a graph is a function, while the horizontal line test is used to determine if a function has an inverse.***

**Role of Inverse**

Know the role of the inverse in mathematics. Recall that inverse operations "undo" the initial operation. Similarly, an inverse function returns the function's output to the original input value, thus "undoing" the work of the first function. Symbolically, \( f^{-1}(f(x)) = x \), and \( f(f^{-1}(x)) = x \).

**Inverse Functions**

State the role of inverse functions in mathematics.

**Inverse of Exponential Function**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 4.1
- chapter 4.2
- chapter 4.3
- chapter 4.4

How is the definition of logarithm related to the inverse of an exponential function?
Inverse of Logarithmic Function

Log in to CourseCompass and refer to the following in Algebra and Trigonometry:

- chapter 4.1
- chapter 4.2
- chapter 4.3
- chapter 4.4

Explain what the inverse of a logarithmic function is.

Task 1 Performance Task

Complete the following task in TaskStream:

- RGBT Task 1

For directions on how to receive access to performance assessments, see the "Accessing Performance Assessments" page.

Algebraic Modeling

This section covers the study of algebraic modeling. Algebraic modeling refers to using mathematical equations to represent real-world data and then using the models to predict various outcomes. Here is where you begin to actually apply much of the knowledge you have learned thus far.

When you have completed this section's activities, you should be able to:

- take a verbal expression and write an equation,
- solve problems using mathematical models, and
- analyze a model for accuracy, given a set of data.

Competencies covered by this subject

209.2.7 - Algebraic Modeling

The graduate appropriately defines functions in order to model and analyze change.

Mathematical Models

Use mathematic models to predict and solve problems.

Introduction to Mathematical Models

Log in to CourseCompass and read the following in Algebra and Trigonometry:

- chapter P.1

What is meant by mathematical modeling?

Review the example of modeling of global temperature in chapter 2.3. Watch animation at 2.3 in check point 9. What method was used to examine in this example?
**Modeling as a Problem-Solving Tool**

Know how to take a verbal expression, draft an equation, and solve a problem using mathematical modeling.

**Writing Equations that Model Given Conditions**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 1.3

Practice writing equations and solving problems with use of models in the tracked tutorial exercises for chapter 1.3 in MyMathLab.

**Modeling with Linear Functions**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 2.3

Practice writing equations and solving problems with use of models in the tracked tutorial exercises for chapter 2.3 in MyMathLab.

**Rate of Change**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 2.4

Use slope concepts to find average rates of change. Practice the tracked tutorial exercises for chapters 2.3-2.4 in MyMathLab.

**Solving Problems With Modeling**

Log in to CourseCompass and refer to the following in *Algebra and Trigonometry*:

- chapter 4.5

Practice solving problems with modeling in the tracked tutorial exercises for chapter 4.5 in MyMathLab.

If you are given data sets for particular situations, can you discuss the accuracy of any given
model?

**Task 2 Performance Task**

Complete the following task in TaskStream:

- RGBT Task 2

For directions on how to receive access to performance assessments, see the "Accessing Performance Assessments" page.

**Final Steps**

Congratulations on completing the activities in this course of study! This section will guide you through the assessment process.

**Assessment Information**

The activities in this course of study have prepared you to complete the GBC1/2 objective assessment and the GBT1/2 performance assessment. The following activities will guide you through the assessment process if you have not already completed the assessment.

**Accessing Performance Assessments**

You should have completed the performance tasks as you worked through this course of study. If you have not completed the tasks in TaskStream, do so now.

For directions on how to receive access to performance assessments, see the "Accessing Performance Assessments" page.

**Accessing Pre-Assessments**

Complete the following pre-assessment:

- PGB

For directions on how to receive access to pre-assessments, see the "Accessing Pre-Assessments" page.

**Accessing Objective Assessments**

Complete the following objective assessment:

- GBC1/2

For directions on how to receive access to objective assessments, see the "Accessing Objective Assessments" page.

**Feedback**

WGU values your input! If you have comments, concerns, or suggestions for improvement of
this course, please submit your feedback using the following form:

- Course Feedback

**ADA Requirements**

Please review the [University ADA Policy](#).