THE MATH TRANSLATOR

ALGEBRA and TRIGONOMETRY

COURSE OUTLINE

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This course is designed to be flexible. Your student may start at any time and work at whatever pace is comfortable for them. Please use this document in combination with the Course Calendar for planning purposes. The calendar can be adjusted to make the course slower or faster, as desired by you and your student. There are four main elements to this course:

Step 1
Students watch the video lesson for that day and take notes as they would if they were in class.

Step 2
Students do the suggested homework exercises listed on each lesson page. The homework is done out of the free online OpenStax Algebra and Trigonometry textbook (www.openstax.org). Students can check their answers on the homework problems in the answer key of the OpenStax book and if they have questions they can reference the homework support videos posted on the lesson page.

Step 3
At the end of the chapter, students study for the test by doing the assigned review exercises out of the OpenStax book. They may check their answers in the answer key of the book.

Step 4
When students are ready, they do the assigned exercises on the Practice Test provided in the OpenStax book. Students, or parents, can then grade the test using the "Practice Test Answer Keys" posted on the Courses Homepage.

The rest of this document lists the course topics, homework exercises, review exercises, and test exercises in detail.

> Please watch the "Orientation Video for Homeschool Parents" on the Courses Homepage to become oriented in more detail with how this course works as well as the various features of the website.

COURSE OVERVIEW

Chapter 1 – Prerequisites
- 1.1 Real Numbers: Algebra Essentials
- 1.2 Exponents and Scientific Notation
- 1.3 Radicals and Rational Exponents
- 1.4 Polynomials
- 1.5 Factoring Polynomials
- 1.6 Rational Expressions

Chapter 2 – Equations and Inequalities
- 2.1 The Rectangular Coordinate System and Graphs
- 2.2 Linear Equations in One Variables
- 2.3 Models and Applications
- 2.4 Complex Numbers
- 2.5 Quadratic Equations
- 2.6 Other Types of Equations
- 2.7 Linear Inequalities and Absolute Value Inequalities

Chapter 3 – Functions
- 3.1 Functions and Function Notation
- 3.2 Domain and Range
- 3.3 Rates of Change and Behavior of Graphs
- 3.4 Composition of Functions
- 3.5 Transformation of Functions
- 3.6 Absolute Value Functions
- 3.7 Inverse Functions

Chapter 4 – Linear Functions
- 4.1 Linear Functions
- 4.2 Modeling with Linear Functions
- 4.3 Fitting Linear Models to Data

Chapter 5 – Polynomial and Rational Functions
- 5.1 Quadratic Functions
- 5.2 Power Functions and Polynomial Functions
- 5.3 Graphs of Polynomial Functions
- 5.4 Dividing Polynomials
- 5.5 Zeros of Polynomial Functions
- 5.6 Rational Functions
- 5.7 Inverses and Radical Functions
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Chapter 6 – Exponential and Logarithmic Functions
- 6.1 Exponential Functions
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- 6.4 Graphs of Logarithmic Functions
- 6.5 Logarithmic Properties
- 6.6 Exponential and Logarithmic Equations
- 6.7 Exponential and Logarithmic Models

Chapter 7 – The Unit Circle: Sine and Cosine Functions
- 7.1 Angles
- 7.2 Right Triangle Trigonometry
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- 7.4 The Other Trigonometric Functions

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Chapter 9 – Trigonometric Identities and Equations
- 9.1 Verifying Trigonometric Identities
- 9.2 Sum and Difference Identities
- 9.3 Double-Angle, Half-Angle, and Reduction Formulas
- 9.4 Sum-to-Product and Product-to-Sum Formulas
- 9.5 Solving Trigonometric Equations

Chapter 10 – Further Applications of Trigonometry
- 10.1 Non-right Triangles: Law of Sines
- 10.2 Non-right Triangles: Law of Cosines
- 10.3 Polar Coordinates
- 10.4 Polar Coordinates: Graphs
- 10.5 Polar Form of Complex Numbers
- 10.6 Parametric Equations
- 10.7 Parametric Equations: Graphs
- 10.8 Vectors

Chapter 11 – Systems of Equations and Inequalities
- 11.1 Systems of Linear Equations: Two Variables
- 11.2 Systems of Linear Equations: Three Variables
- 11.3 System of Nonlinear Equations and Inequalities: Two Variables
- 11.4 Partial Fractions
- 11.5 Matrices and Matrix Operations
- 11.6 Solving Systems with Gaussian Elimination
- 11.7 Solving Systems with Inverses
- 11.8 Solving Systems with Cramer's Rule

Chapter 12 – Analytic Geometry
- 12.1 The Ellipse
- 12.2 The Hyperbola
- 12.3 The Parabola

Chapter 13 – Sequences, Probability, and Counting Theory
- 13.1 Sequences and Their Notations
- 13.2 Arithmetic Sequences
- 13.3 Geometric Sequences
- 13.4 Series and Their Notations
- 13.5 Counting Principles
- 13.6 The Binomial Theorem
- 13.7 Probability

CHAPTER 1 - PREREQUISITES

1.1 Real Numbers: Algebra Essentials

Topics:
A. Classify a real number as a natural, whole, integer, rational, or irrational number (1)
B. Perform calculations using order of operations (5 – 27 odd)
C. Use the properties of real numbers: commutative, associative, distributive, inverse, and identity (3)
D. Evaluate algebraic expressions (29 – 37 odd)
E. Simplify algebraic expressions (39 – 59 odd)
Suggested Homework Exercises: 1 – 59 odd

1.2 Exponents and Scientific Notation

Topics:
A. Simplify expressions using properties of exponents (1 – 19 odd, 25 – 43 odd)
B. Use scientific notation (21, 23, 45 – 49 odd)
Suggested Homework Exercises: 1 – 49 odd

1.3 Radicals and Rational Exponents

Topics:
A. Evaluate square roots (7 – 65 odd)
B. Use the product rule to simplify square roots (7 – 65 odd)
C. Use the quotient rule to simplify square roots (13, 17, 25, 27, 43, 59, 61)
D. Add and subtract square roots (15, 19, 31)
E. Rationalize denominators (29 – 33 odd, 47, 49, 53)
F. Use rational roots (7 – 65 odd)
Suggested Homework Exercises: 1 – 65 odd

1.4 Polynomials

Topics:
A. Identify the degree and leading coefficient of polynomials (1, 5 – 9 odd)
B. Add and subtract polynomials (11 – 15 odd)
C. Multiply polynomials using the distributive property (3, 17 – 37 odd, 53)
D. Perform operations with polynomials of several variables (39 – 51 odd)
Suggested Homework Exercises: 1 – 53 odd

1.5 Factoring Polynomials

Topics:
A. Factor the greatest common factor (GCF) of a polynomial (1, 5 – 9 odd)
B. Factor a trinomial by grouping (AC Method) (3, 11 – 15 odd)
C. Factor a trinomial by trial and error (17 – 35 odd)
D. Factor a difference of squares (17 – 35 odd)
E. Factor the sum and difference of cubes (37 – 43 odd)
F. Factor expressions using fractional or negative exponents (45 – 49 odd)
Suggested Homework Exercises: 1 – 49 odd

1.6 Rational Expressions

Topics:
A. Simplify rational expressions (1, 5 – 13 odd)
B. Multiply rational expressions (15 – 23 odd)
C. Divide rational expressions (25 – 31 odd, 53)
D. Add and subtract rational expressions (3, 33 – 41 odd)
E. Simplify complex rational expressions (43 – 51 odd)
Suggested Homework Exercises: 1 – 53 odd

SUGGESTED REVIEW: Chapter 1 Review Exercises

Day One of review do review exercises: 1 – 33 odd
Day Two of review do review exercises: 35 – 69 odd

SUGGESTED ASSESSMENT: Chapter 1 Practice Test

Suggested Test: Do all exercises 1 – 29 on the Chapter 1 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 2 – EQUATIONS AND INEQUALITIES

2.1 The Rectangular Coordinate System and Graphs

Topics:
A. Plot ordered pairs in a Cartesian Coordinate System (1, 27 – 33 odd)
B. Graph equations by plotting points (35 – 41 odd)
C. Find x and y-intercepts (3, 5 – 15 odd)
D. Use the distance formula (17 – 21 odd, 43 – 47 odd)
E. Use the midpoint formula (23, 25)
Suggested Homework Exercises: 1 – 47 odd

2.2 Linear Equations in One Variables

Topics:
A. Solve equations in one variable algebraically (7 – 15 odd)
B. Solve a rational equation (5, 17 – 21 odd)
C. Find a linear equation (3, 23 – 35 odd, 41, 43, 55 – 59 odd)
D. Given the equations of two lines, determine whether their graphs are parallel or perpendicular (1, 37, 39, 45
E. Write the equation of a line parallel or perpendicular to a given line (29)
Suggested Homework Exercises: 1 – 45 odd, 55 – 59 odd

2.3 Models and Applications

Topics:
A. Set up a linear equation to solve a real-world application (1 – 15 odd)
B. Use a formula to solve a real-world application (17 – 31 odd)
C. Solve a formula for a given variable (33 – 53 odd)
Suggested Homework Exercises: 1 – 53 odd

2.4 Complex Numbers

Topics:
A. Express square roots of negative numbers as multiples of i (5 – 9 odd, 35)
B. Plot a complex number on the complex plane (11, 13)
C. Add and subtract complex numbers (1, 15 – 19 odd)
D. Multiply and divide complex numbers (21 – 33 odd, 37)
E. Simplify powers of i (39, 41)
Suggested Homework Exercises: 1 – 41 odd

2.5 Quadratic Equations

Topics:
A. Solve quadratic equations by factoring (1, 3, 7 – 17 odd)
B. Solve quadratic equations by using the square root property (5, 19 – 23 odd)
C. Solve quadratic equations by completing the square (25 – 31 odd)
D. Solve quadratic equations by using the quadratic formula (33 – 43 odd, 55, 57)
Suggested Homework Exercises: 1 – 43 odd, 55, 57

2.6 Other Types of Equations (Part 1)

Topics:
A. Solve polynomial equations by factoring (13 – 19 odd)
B. Solve polynomial equations in quadratic form (1, 37 – 41 odd)
C. Solve equations involving rational exponents (3 – 11 odd)
D. Solve absolute value equations (29 – 35 odd)
Suggested Homework Exercises: 1 – 19 odd, 29 – 41 odd

2.6 Other Types of Equations (Part 2)

Topics:
E. Solve rational equations resulting in a quadratic
F. Solve radical equations (21 – 27 odd)
Suggested Homework Exercises: 21 – 27 odd

2.7 Linear Inequalities and Absolute Value Inequalities

Topics:
A. Using interval notation and set notation (1, 3, 43 – 53 odd)
B. Solve inequalities in one variable algebraically (7 – 13 odd, 39, 41,)
C. Solve compound inequalities (29, 31)
D. Solve absolute value inequalities (5, 15 – 27 odd, 33 – 37 odd)
Suggested Homework Exercises: 1 – 53 odd

SUGGESTED REVIEW: Chapter 2 Review Exercises

Day One of review do review exercises: 1 – 39 odd
Day Two of review do review exercises: 41 – 69 odd

SUGGESTED ASSESSMENT: Chapter 2 Practice Test

Suggested Test: Do all exercises 1 – 30 on the Chapter 2 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 3 - FUNCTIONS

3.1 Functions and Function Notation (Part 1)
Topics:
A. Determine whether a relation represents a function (1 – 25 odd, 61 – 67 odd)
B. Find the value of a function (27 – 39 odd, 69 – 73 odd, 89, 91)
C. Read information from the graph of a function (53)
Suggested Homework Exercises: 1 – 39 odd, 53, 61 – 73 odd, 89, 91

3.1 Functions and Function Notation (Part 2)
Topics:
D. Use the vertical line test to identify functions (41 – 51 odd)
E. Use the horizontal line test to identify one-to-one functions (55 – 59 odd)
F. Graph the functions listed in the library of functions
Suggested Homework Exercises: 41 – 51 odd, 55 – 59 odd

3.2 Domain and Range
Topics:
A. Find the domain of a function defined by an equation (1, 3, 7 – 37 odd, 61)
B. Graph piecewise defined functions (5, 39 – 53 odd)
Suggested Homework Exercises: 1 – 53 odd, 61

3.3 Rates of Change and Behavior of Graphs
Topics:
A. Find the average rate of change of a function (1, 5 – 17 odd, 27 – 33 odd, 43 – 47 odd)
B. Use a graph to determine where a function is increasing, decreasing, or constant (19, 21)
C. Use a graph to locate local maxima and local minima (23)
D. Use a graph to locate absolute maximum and absolute minimum (3, 25, 41)
Suggested Homework Exercises: 1 – 33 odd, 41 – 47 odd

3.4 Composition of Functions
Topics:
A. Combine functions using algebraic operations (5 – 9 odd)
B. Create a new function by composition of functions (3, 13 – 25 odd)
C. Evaluate composite functions (11, 43 – 79 odd)
D. Find the domain of a composite function (1, 5 – 9 odd)
E. Decompose a composite function into its component functions (27 – 41 odd)
Suggested Homework Exercises: 1 – 79 odd

3.5 Transformation of Functions (Part 1)

Topics:
A. Graph functions using vertical and horizontal shifts (1, 7 – 29 odd)
B. Graph functions using reflections about the x-axis and y-axis (33 – 45 odd)
C. Determine whether a function is even, odd, or neither (5, 47 – 51 odd)
Suggested Homework Exercises: 1, 5 – 29 odd, 33 – 51 odd

3.5 Transformation of Functions (Part 2)

Topics:
D. Graph functions using compressions and stretches (3, 53 – 61 odd)
E. Combine transformations (63 – 81 odd)
Suggested Homework Exercises: 3, 53 – 81 odd

3.6 Absolute Value Functions

Topics:
A. Graph an absolute value function (9 – 31 odd)
B. Solve an absolute value equation (1 – 7, 11 – 23 odd in Section 1.6 of Precalculus)
Suggested Homework Exercises: 1 – 31 odd, also do 11 – 23 odd in Section 1.6 of the Precalculus book

3.7 Inverse Functions

Topics:
A. Verify inverse functions (1, 3, 17)
B. Determine the domain and range of an inverse function (13, 15)
C. Find the inverse of a function (5, 7 – 15 odd, 33 – 41 odd)
D. Use the graph of a one-to-one function to graph its inverse function on the same axes (19 – 31 odd)
Suggested Homework Exercises: 1 – 41 odd

SUGGESTED REVIEW: Chapter 3 Review Exercises

Day One of review do review exercises: 1 – 37 odd
Day Two of review do review exercises: 39 – 75 odd

SUGGESTED ASSESSMENT: Chapter 3 Practice Test

Suggested Test: Do all exercises 1 – 33 on the Chapter 3 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 4 – LINEAR FUNCTIONS

4.1 Linear Functions (Part 1)

Topics:
A. Represent a linear function (1)
B. Calculate and interpret slope (15 – 27 odd)
C. Write the point-slope form of an equation (29 – 35 odd)
D. Write and interpret a linear function (7 – 13 odd, 89 – 95, 115 – 121 odd)
Suggested Homework Exercises: 1, 7 – 35 odd, 89 – 95 odd, 115 – 121 odd

4.1 Linear Functions (Part 2)

Topics:
A. Graph linear functions (41 – 45 odd, 71 – 83 odd)
B. Write the equation for a linear function from the graph of a line (57 – 69 odd, 85, 87)
C. Determine whether lines are parallel or perpendicular (37, 39, 47 – 51 odd)
D. Write the equation of a line parallel or perpendicular to a given line (53, 55)
Suggested Homework Exercises: 37 – 87 odd

4.2 Modeling with Linear Functions

Topics:
A. Identify steps to model and solve problems (1, 3)
B. Build linear models from verbal descriptions (9 – 43 odd)
C. Build systems of linear models (45 – 57 odd)
Suggested Homework Exercises: 1, 3, 9 – 57 odd

4.3 Fitting Linear Models to Data

Topics:
A. Draw and interpret scatter plots (9 – 17 odd)
B. Find the line of best fit and use it to make predictions (1, 7, 19, 21)
C. Distinguish between linear and nonlinear relations (3, 5, 23)
Suggested Homework Exercises: 1 – 23 odd

SUGGESTED REVIEW: Chapter 4 Review Exercises

Day One of review do review exercises: 1 – 25 odd
Day Two of review do review exercises: 27 – 45 odd

SUGGESTED ASSESSMENT: Chapter 4 Practice Test

Suggested Test: Do 1 – 17 all, 19, 21-29 all, 31, 32 on the Chapter 4 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 5 – POLYNOMIAL AND RATIONAL FUNCTIONS

5.1 Quadratic Functions

Topics:
A. Recognize characteristics of parabolas (1 – 45 odd)
B. Understand how the graph of a parabola is related to its quadratic function (1 – 13 odd, 21 – 33 odd)
C. Graph parabolas using their characteristics (35 – 45 odd)
D. Solve applications involving a quadratic function's minimum or maximum value (15 – 19 odd, 71, 73)

Suggested Homework Exercises: 1 – 45 odd, 71, 73

5.2 Power Functions and Polynomial Functions

Topics:
A. Identify power functions (1, 7 – 11 odd)
B. Identify end behavior of power functions (3, 5, 17 – 23 odd, 47, 49)
C. Identify polynomial functions (7 – 11 odd, 25 – 29 odd)
D. Identify the degree and leading coefficient of polynomial functions (13, 15)
E. Identify the turning points of polynomial functions (31 – 45 odd)

Suggested Homework Exercises: 1 – 49 odd

5.3 Graphs of Polynomial Functions

Topics:
A. Use factoring to find zeros of polynomial functions (1, 7 – 23 odd)
B. Identify zeros and their multiplicities (31 – 41 odd)
C. Use the Intermediate Value Theorem (3, 25 – 29 odd)
D. Graph polynomial functions (5, 43 – 47 odd)
E. Use given information to write the equation of a polynomial (49 – 65 odd)

Suggested Homework Exercises: 1 – 65 odd

5.4 Dividing Polynomials

Topics:
A. Use long division to divide polynomials (1 – 13 odd)
B. Use synthetic division to divide polynomials (15 – 43 odd, 49 – 53 odd)
C. Use polynomial division to divide polynomials (65 – 69 odd)

Suggested Homework Exercises: 1 – 43 odd, 49 – 53 odd, 65 – 69 odd

5.5 Zeros of Polynomial Functions (Part 1)

Topics:
A. Evaluate a polynomial using the Remainder Theorem (1, 7 – 13 odd)
B. Use the Factor Theorem to solve a polynomial equation (15 – 21 odd)
C. Use the Rational Zeros Theorem to find possible rational zeros (3, 5, 57, 59)
D. Use Descartes' Rule of Signs (47 – 55 odd)
E. Find zeros of a polynomial function (23 – 31 odd)

Suggested Homework Exercises: 1 – 31 odd, 47 – 59 odd

5.5 Zeros of Polynomial Functions (Part 2)
Topics:
E. Find zeros of a polynomial function (33 – 45 odd)
F. Use the Fundamental Theorem of Algebra (41 – 45 odd)
G. Use the Conjugate Pairs Theorem (67, 69)
Suggested Homework Exercises: 33 – 45 odd, 67, 69

5.6 Rational Functions (Part 1)
Topics:
A. Find the domain of a rational function (1 – 19 odd)
B. Identify vertical asymptotes (11 – 19 odd, 75 – 79 odd)
C. Identify horizontal and oblique (slant) asymptotes (11 – 19 odd, 31, 33)
D. Identify x- and y-intercepts of rational functions (21, 23)
Suggested Homework Exercises: 1 – 23 odd, 31, 33, 75 – 79 odd

5.6 Rational Functions (Part 2)
Topics:
E. Graph rational functions (39 – 49 odd)
F. Write the equation of a rational function (51 – 63 odd)
Suggested Homework Exercises: 39 – 63 odd

5.7 Inverses and Radical Functions
Topics:
A. Find the inverse of a polynomial function (1 – 39 odd)
B. Restrict the domain to find the inverse of a polynomial function (17 – 39 odd)
Suggested Homework Exercises: 1 – 39 odd

5.8 Modeling Using Variation
Topics:
A. Solve direct variation problems (1, 5 – 9 odd, 25, 27)
B. Solve inverse variation problems (11 – 15 odd, 35 – 39 odd)
C. Solve problems involving joint variation (3, 17 – 23 odd, 29 – 33 odd)
D. Solve applications using variation models (51 – 59 odd)
Suggested Homework Exercises: 1 – 39 odd, 51 – 59 odd

SUGGESTED REVIEW: Chapter 5 Review Exercises
Day One of review do review exercises: 1 – 27 odd
Day Two of review do review exercises: 29 – 47 odd

SUGGESTED ASSESSMENT: Chapter 5 Practice Test
Suggested Test: Do 1 – 28 all on the Chapter 5 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 6 – EXPONENTIAL AND LOGARITHMIC FUNCTIONS

6.1 Exponential Functions

Topics:
A. Evaluate exponential functions (1 – 11 odd, 15, 17, 45, 61, 63)
B. Find the equation of an exponential function (19 – 27 odd)
C. Use the compound interest formula (29 – 35 odd)
D. Evaluate exponential functions with base e (39 – 43 odd, 47, 49, 65, 67)
Suggested Homework Exercises: 1 – 11 odd, 15 – 35 odd, 39 – 49 odd, 61 – 67 odd

6.2 Graphs of Exponential Functions

Topics:
A. Graph exponential functions (1, 9, 11)
B. Graph exponential functions using transformations (3 – 7 odd, 23 – 41 odd)
Suggested Homework Exercises: 1 – 11 odd, 23 – 41 odd

6.3 Logarithmic Functions

Topics:
A. Convert from logarithmic form to exponential form (1, 3, 7 – 15 odd, 27 – 35 odd)
B. Convert from exponential form to logarithmic form (17 – 25 odd)
C. Evaluate logarithms (37, 43 – 49 odd, 57)
D. Use natural logarithms (5, 39, 41, 51 – 55 odd)
Suggested Homework Exercises: 1 – 57 odd

6.4 Graphs of Logarithmic Functions

Topics:
A. Identify the domain of a logarithmic function (3, 7 – 25 odd)
B. Graph logarithmic functions using transformations (1, 5, 27 – 45 odd)
Suggested Homework Exercises: 1 – 45 odd

6.5 Logarithmic Properties

Topics:
A. Use the product rule for logarithms (3, 9, 15 – 21 odd)
B. Use the quotient rule for logarithms (5, 7, 11, 15, 21, 23)
C. Use the power rule for logarithms (1, 13, 15 – 23 odd, 31)
D. Expand logarithmic expressions (3 – 7 odd, 15 – 19 odd)
E. Condense logarithmic expressions (9 – 13 odd, 21, 23)
F. Use the change-of-base formula (25 – 29 odd, 33 – 37 odd)
Suggested Homework Exercises: 1 – 37 odd

6.6 Exponential and Logarithmic Equations

Topics:
A. Use like bases to solve exponential equations (1 – 9 odd)
B. Use logarithms to solve exponential equations (11 – 27 odd)
C. Use the definition of a logarithm to solve logarithmic equations (29 – 35 odd)
D. Use the one-to-one property of logarithms to solve logarithmic equations (3, 37 – 49 odd)

Suggested Homework Exercises: 1 – 49 odd

6.7 Exponential and Logarithmic Models

Topics:
A. Model exponential growth and decay (1 – 5, 28 – 33 all, 35 – 39 odd)
B. Use Newton's Law of Cooling (40 – 45 all)
C. Use logistic-growth models (7, 9)
D. Choose an appropriate model for data (11)

Suggested Homework Exercises: 1 – 11 odd, 28 – 33 all, 35 – 39 odd, 40 – 45 all

6.8 This section is not covered in this course

SUGGESTED REVIEW: Chapter 6 Review Exercises

Day One of review do review exercises: 1 – 37 odd
Day Two of review do review exercises: 39 – 59 odd

SUGGESTED ASSESSMENT: Chapter 6 Practice Test

Suggested Test: Do all exercises 1 – 29, 31, 32 on the Chapter 6 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 7 – THE UNIT CIRCLE: SINE AND COSINE FUNCTIONS

7.1 Angles

Topics:
A. Draw angles in standard position (1, 3, 7 – 21 odd)
B. Convert between degrees and radians (27 – 39 odd)
C. Find coterminal angles (51 – 57 odd)
D. Find the length of a circular arc (41 – 45 odd)

Suggested Homework Exercises: 1, 3, 7 – 21 odd, 27 – 45 odd, 51 – 57 odd

7.2 Right Triangle Trigonometry

Topics:
A. Use right triangles to evaluate trigonometric functions (11 – 41 odd)
B. Find function values for $30^\circ\left(\frac{\pi}{6}\right), 45^\circ\left(\frac{\pi}{4}\right), and\ 60^\circ\left(\frac{\pi}{3}\right)$ (1, 3)
C. Use cofunctions of complementary angles (5 – 9 odd)
D. Use right triangle trigonometry to solve applied problems (53, 55)

Suggested Homework Exercises: 1 – 41 odd, 53, 55

7.3 Unit Circle

Topics:

A. Define sine and cosine functions using the unit circle (1, 7 – 21 odd, 61 – 71 odd)

B. Find sines and cosines of special angles using the unit circle (7 – 21 odd)

C. Find reference angles (3, 5, 23 – 33 odd)

D. Use reference angles to evaluate trig functions (35 – 53 odd)

Suggested Homework Exercises: 1 – 53 odd, 61 – 71 odd

7.4 The Other Trigonometric Functions

Topics:

A. Find exact values of secant, cosecant, tangent, and cotangent of $30^\circ\left(\frac{\pi}{6}\right), 45^\circ\left(\frac{\pi}{4}\right), and\ 60^\circ\left(\frac{\pi}{3}\right)$ (1, 7 – 17 odd, 49 – 51 odd)

B. Use reference angles to evaluate secant, cosecant, tangent, and cotangent (19 – 41 odd)

C. Use properties of even and odd trig functions (43 – 47 odd)

D. Recognize and use fundamental identities (3, 70, 71)

E. Evaluate trig functions with a calculator (53 – 61 odd)

Suggested Homework Exercises: 1, 3, 7 – 61 odd, 70, 71

SUGGESTED REVIEW: Chapter 7 Review Exercises

Day One of review do review exercises: 1 – 13 odd, 17 – 25 odd

Day Two of review do review exercises: 27 – 35 odd, 39 – 49 odd

SUGGESTED ASSESSMENT: Chapter 7 Practice Test

Suggested Test: Do all exercises 1 – 3, 5 – 8, 10 – 14, 17 – 21, 23 on the Chapter 7 Practice Test

*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 8 – PERIODIC FUNCTIONS

8.1 Graphs of Sine and Cosine Functions

Topics:

A. Graph sine and cosine functions (1)

B. Graph variations of sine and cosine functions (3 – 13 odd, 19 – 39 odd)

Suggested Homework Exercises: 1 – 13 odd, 19 – 39 odd

8.2 Graphs of the Other Trigonometric Functions

Topics:

A. Graph tangent, cotangent, secant, and cosecant functions (1 – 9 odd)

B. Graph variations of tangent, cotangent, secant, and cosecant functions (11 – 15 odd, 19 – 35 odd)

Suggested Homework Exercises: 1 – 15 odd, 19 – 35 odd

8.3 Inverse Trigonometric Functions

Topics:

A. Understand and use the inverse sine, cosine, and tangent functions (1 – 5 odd)

B. Find the exact values of expressions involving the inverse sine, cosine, and tangent functions (9 – 15 odd, 23, 53, 57)

C. Use a calculator to evaluate inverse trigonometric functions (17 – 21 odd)

D. Find exact values of composite functions with inverse trigonometric functions (25 – 35 odd)

Suggested Homework Exercises: 1 – 5 odd, 9 – 35 odd, 53, 57

SUGGESTED REVIEW: Chapter 8 Review Exercises

Day One of review do review exercises: 1 – 17 odd

Day Two of review do review exercises: 29 – 37 odd

SUGGESTED ASSESSMENT: Chapter 8 Practice Test

Suggested Test: Do exercises 1, 5, 9, 13, 17, 21 – 25 odd, 33, 37, 39, 46, 47, 49 on the Chapter 8 Practice Test

*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 9 – TRIGONOMETRIC IDENTITIES AND EQUATIONS

9.1 Verifying Trigonometric Identities

Topics:

A. Simplify trigonometric expressions using algebra and the identities (1 – 23 odd)

B. Verify trigonometric identities (29 – 33 odd)

Suggested Homework Exercises: 1 – 23 odd, 29 – 33 odd

9.2 Sum and Difference Identities

Topics:

A. Use sum and difference formulas for sine, cosine, and tangent (3 – 13 odd, 21, 23 43, 45)

B. Use sum and difference formulas for cofunctions (1, 15 – 19 odd)

C. Use sum and difference formulas to verify identities (47 – 51 odd)

Suggested Homework Exercises: 1 – 23 odd, 43 – 51 odd

9.3 Double-Angle, Half-Angle, and Reductions Formulas

Topics:

A. Use double-angle formulas to find exact values (5 – 11 odd, 25, 29 – 33 odd)

B. Use double-angle formulas to verify identities (35, 37)

C. Use reduction formulas to simplify an expression (1, 39, 41)

D. Use half-angle formulas to find exact values (3, 13 – 23 odd, 27)

Suggested Homework Exercises: 1 – 41 odd

9.4 Sum-to-Product and Product-to-Sum Formulas

Topics:

A. Express sine and cosine products as sums
(5 – 9 odd, 17 – 25 odd, 33, 35, 57 – 61 odd)

B. Express sine and cosine sums as products (11 – 15 odd, 27 – 31 odd, 37 – 43 odd)

Suggested Homework Exercises: 5 – 43 odd, 57 – 61 odd

9.5 Solving Trigonometric Equations (Part 1)

Topics:

A. Solve linear trigonometric equations in sine and cosine (1 – 15 odd)

B. Solve equations involving a single trigonometric function (23 – 31 odd)

C. Solve trigonometric equations using a calculator (73, 75)

D. Solve trigonometric equations that are in quadratic form (41, 43)

Suggested Homework Exercises: 1 – 15 odd, 23 – 31 odd, 41, 43, 73, 75

9.5 Solving Trigonometric Equations (Part 2)

Topics:

E. Solve trigonometric equations using fundamental identities (51 – 57 odd, 65)

F. Solve trigonometric equations with multiple angles (17 – 21 odd)

G. Solve right triangle problems (95 – 103 odd)

Suggested Homework Exercises: 17 – 21 odd, 51 – 57 odd, 65, 95 – 103 odd

SUGGESTED REVIEW: Chapter 9 Review Exercises

Day One of review do review exercises: 1 – 25 odd

Day Two of review do review exercises: 27 – 47 odd

SUGGESTED ASSESSMENT: Chapter 9 Practice Test

Suggested Test: Do all exercises 1 – 20, 22 - 29 and 32 on the Chapter 9 Practice Test

*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 10 – FURTHER APPLICATIONS OF TRIGONOMETRY

10.1 Non-right Triangles: Law of Sines

Topics:

A. Use the Law of Sines to solve oblique triangles (1 – 25 odd, 31 – 49 odd)

B. Find the area of an oblique triangle using the sine function (27, 29)

C. Solve applied problems using the Law of Sines (59 – 67 odd)

Suggested Homework Exercises: 1 – 49 odd, 59 – 67 odd

10.2 Non-right Triangles: Law of Cosines

Topics:
A. Use the Law of Cosines to solve oblique triangles (7 – 25 odd, 33, 35, 43, 45)
B. Solve applied problems using the Law of Cosines (63, 67, 69, 71)
C. Use Heron's formula to find the area of a triangle (27 – 31 odd, 47, 49)
Suggested Homework Exercises: 7 – 35 odd, 43 – 49 odd, 63, 67, 69, 71

10.3 Polar Coordinates

Topics:
A. Plot points using polar coordinates (1 – 5 odd, 41 – 53 odd)
B. Convert from polar coordinates to rectangular coordinates (7, 9)
C. Convert from rectangular coordinates to polar coordinates (11 – 15 odd)
D. Convert a rectangular equation to a polar equation (17 – 27 odd)
E. Convert a polar equation to a rectangular equation (29 – 39 odd)
Suggested Homework Exercises: 1 – 53 odd

10.4 Polar Coordinates: Graphs

Topics:
A. Test polar equations for symmetry (1, 7 – 11 odd, 15)
B. Graph polar equations by plotting points (3, 5, 17 – 43 odd)
Suggested Homework Exercises: 1 – 11 odd, 15 – 43 odd

10.5 Polar Form of Complex Numbers

Topics:
A. Plot complex numbers in the complex plane (1, 47 – 55 odd)
B. Find the absolute value of a complex number (7 – 11 odd)
C. Write complex numbers in polar form (3, 13, 15)
D. Convert a complex number from polar to rectangular form (17 – 21 odd)
E. Find products and quotients of complex numbers in polar form (23 – 33 odd)
F. Find powers of complex numbers in polar form (5, 35 – 39 odd)
G. Find roots of complex numbers in polar form (41 – 45 odd)
Suggested Homework Exercises: 1 – 55 odd

10.6 & 10.7 Parametric Equations

Topics:
A. Graph parametric equations (10.7: 13 – 19 odd, 23 – 31 odd)
B. Find an equivalent rectangular equation for parametric equations (10.6: 1 – 25 odd)
C. Determine parametric equations for a rectangular equation (10.6: 31 – 37 odd)
D. Solve applied problems involving projectile motion (10.7: 63 – 69 odd)
Suggested Homework Exercises for 10.6: 1 – 25 odd, 31 – 37 odd
Suggested Homework Exercises for 10.7: 13 – 19 odd, 23 – 31 odd, 63 – 69 odd

10.8 Vectors

Topics:

A. Properties of vectors (1, 9 – 15 odd, 29, 31)
B. Perform vector addition and scalar multiplication (17 – 21 odd, 37 – 45 odd)
C. Find the unit vector in the direction of **v** (23 – 27 odd)
D. Perform operations with vectors in terms of **i** and **j** (3, 5, 19, 21, 33, 35)
E. Find the dot product of two vectors (33, 35)

Suggested Homework Exercises: 1 – 45 odd

SUGGESTED REVIEW: Chapter 10 Review Exercises

Day One of review do review exercises: 1 – 27 odd
Day Two of review do review exercises: 29 – 63 odd

SUGGESTED ASSESSMENT: Chapter 10 Practice Test

Suggested Test: Do all exercises 1 – 26 on the Chapter 10 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 11 – SYSTEMS OF EQUATIONS AND INEQUALITIES

11.1 Systems of Linear Equations: Two Variables

Topics:

A. Solve systems of equations by graphing (41 – 45 odd)
B. Solve systems of equations by substitution (1 – 19 odd)
C. Solve systems of equations by addition (elimination) (21 – 39 odd)
D. Use systems of equations to investigate profits (57 – 77 odd)

Suggested Homework Exercises: 1 – 45 odd, 57 – 77 odd

11.2 Systems of Linear Equations: Three Variables

Topics:

A. Solve systems of three equations in three variables (1 – 29 odd, 37, 51 – 59 odd)
B. Identify inconsistent systems of equations containing three variables (1 – 29 odd, 37, 51 – 59 odd)
C. Express the solution of a system of dependent equations containing three variables (1 – 29 odd, 37, 51 – 59 odd)

Suggested Homework Exercises: 1 – 29 odd, 37, 51 – 59 odd

11.3 Systems of Nonlinear Equations and Inequalities: Two Variables

Topics:

A. Solve a system of nonlinear equations using substitution (7, 9, 17, 21, 25 – 35 odd)
B. Solve a system of nonlinear equations using elimination (11 – 15 odd, 17, 21, 25 – 35 odd)
C. Graph a nonlinear inequality (39)
D. Graph a system of nonlinear inequalities (41)

Suggested Homework Exercises: 7 – 17 odd, 21, 25 – 35 odd, 39, 41

11.4 Partial Fractions (Part 1)

Topics:

A. Decompose $\frac{P(x)}{Q(x)}$, where Q(x) has only non-repeated linear factors (1, 7 – 19 odd)

B. Decompose $\frac{P(x)}{Q(x)}$, where Q(x) has repeated linear factors (21 – 27 odd)

Suggested Homework Exercises: 1, 7 – 27 odd

11.4 Partial Fractions (Part 2)

Topics:

C. Decompose $\frac{P(x)}{Q(x)}$, where Q(x) has a non-repeated irreducible quadratic factor (31 – 41 odd)

D. Decompose $\frac{P(x)}{Q(x)}$, where Q(x) has a repeated irreducible quadratic factor (45 – 51 odd)

Suggested Homework Exercises: 31 – 41 odd, 45 – 51 odd

11.5 Matrices and Matrix Operations

Topics:

A. Find the sum and differences of two matrices (1, 7 – 11 odd, 25 – 29 odd)

B. Find scalar multiples of a matrix (13 – 17 odd, 25 – 29 odd)

C. Find the product of two matrices (3, 5, 19 – 45 odd)

Suggested Homework Exercises: 1 – 45 odd

11.6 Solving Systems with Gaussian Elimination

Topics:

A. Write the augmented matrix of a system of equations (1, 7, 9)

B. Write the system of equations from an augmented matrix (11 – 15 odd)

C. Perform row operations on a matrix (17 – 43 odd)

D. Solve a system of linear equations using matrices (17 – 43 odd)

Suggested Homework Exercises: 1, 7 – 43 odd

11.7 Solving Systems with Inverses

Topics:

A. Find the inverse of a matrix (1 – 23 odd)

B. Solve a system of linear equations using an inverse matrix (27 – 39 odd)

Suggested Homework Exercises: 1 – 23 odd, 27 – 39 odd

11.8 Solving Systems with Cramer's Rule

Topics:

A. Evaluate 2 X 2 determinants (1 – 13 odd)

B. Use Cramer's Rule to solve a system of equations in two variables (25 – 33 odd, 49)

C. Evaluate 3 X 3 determinants (15 – 21 odd)

D. Use Cramer's Rule to solve a system of three equations in three variables (37 – 43 odd, 51)

Suggested Homework Exercises: 1 – 21 odd, 25 – 43 odd, 49, 51

SUGGESTED REVIEW: Chapter 11 Review Exercises

Day One of review do review exercises: 1 – 37 odd
Day Two of review do review exercises: 39 – 79 odd

SUGGESTED ASSESSMENT: Chapter 11 Practice Test

Suggested Test: Do all exercises 1 – 4, 6 – 19, 21 – 28, and 30 on the Chapter 11 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 12 – ANALYTIC GEOMETRY

12.1 The Ellipse (Part 1)
Topics:
A. Write equations of ellipses in standard form (1 – 25 odd, 47 – 55 odd)
Suggested Homework Exercises: 1 – 25 odd, 47 – 55 odd

12.1 The Ellipse (Part 2)
Topics:
B. Graph ellipses centered at the origin (33, 35)
C. Graph ellipses not centered at the origin (37 – 45 odd)
D. Solve applied problems involving ellipses (65, 67)
Suggested Homework Exercises: 33 – 45 odd, 65, 67

12.2 The Hyperbola
Topics:
A. Write equations of hyperbolas in standard form (1 – 25 odd, 45 – 55 odd)
B. Graph hyperbolas centered at the origin (31, 33)
C. Graph hyperbolas not centered at the origin (35 – 43 odd)
Suggested Homework Exercises: 1 – 25 odd, 31 – 55 odd

12.3 The Parabola
Topics:
A. Write equations of parabolas in standard form (1 – 29 odd, 45 – 55 odd)
B. Graph parabolas with vertices at the origin (31, 33)
C. Graph parabolas with vertices not at the origin (35 – 43 odd)
D. Solve applied problems involving parabolas (63 – 67 odd)
Suggested Homework Exercises: 1 – 55 odd, 63 – 67 odd

12.4 This section is not covered in this course

12.5 This section is not covered in this course

SUGGESTED REVIEW: Chapter 12 Review Exercises

Day One of review do review exercises: 1 – 15 odd
Day Two of review do review exercises: 17 – 31 odd

SUGGESTED ASSESSMENT: Chapter 12 Practice Test

Suggested Test: Do all exercises 1 – 17 on the Chapter 12 Practice Test
*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.

CHAPTER 13 – SEQUENCES, PROBABILITY, and COUNTING THEORY

13.1 Sequences and Their Notations

Topics:
A. Write the terms of a sequence defined by an explicit formula (1, 3, 7 – 25 odd)
B. Write the terms of a sequence defined by a recursive formula (27 – 37 odd)
C. Use factorial notation (5, 39 – 45 odd)
Suggested Homework Exercises: 1 – 45 odd

13.2 Arithmetic Sequences

Topics:
A. Find the common difference for an arithmetic sequence (1 – 9 odd)
B. Write terms of an arithmetic sequence (11, 13)
C. Use a recursive formula for an arithmetic sequence (27 – 39 odd)
D. Use an explicit formula for an arithmetic sequence (15 – 25 odd, 41 – 55 odd)
Suggested Homework Exercises: 1 – 55 odd

13.3 Geometric Sequences

Topics:
A. Find the common ratio for a geometric sequence (1 – 13 odd)
B. Write the terms of a geometric sequence (15)
C. Use a recursive formula for a geometric sequence (19 – 31 odd, 45)
D. Use an explicit formula for a geometric sequence (33 – 43 odd)
Suggested Homework Exercises: 1 – 15 odd, 19 – 45 odd

13.4 Series and Their Notations

Topics:
A. Use summation notation (1, 7, 9)
B. Use the formula for the sum of the first n terms of an arithmetic series (13, 15, 31, 35, 37)
C. Use the formula for the sum of the first n terms of a geometric series (19, 21, 33, 39, 41)
D. Use the formula for the sum of an infinite geometric series (23, 25, 43, 45)
Suggested Homework Exercises: 1, 7, 9, 13, 15, 19 – 25 odd, 31 – 45 odd

13.5 Counting Principles (Part 1)

Topics:

A. Solve counting problems using the Addition Principle (1, 3, 7 – 13 odd)

B. Solve counting problems using the Multiplication Principle (3, 7 – 13 odd, 41 – 45 odd)

C. Solve counting problems using permutations involving n distinct objects (15 – 19 odd, 47)

D. Solve counting problems. using permutations involving n non-distinct objects (31, 33, 53)

Suggested Homework Exercises: 1, 3, 7 – 19 odd, 31, 33, 41 – 47 odd, 53

13.5 Counting Principles (Part 2)

Topics:

E. Solve counting problems using combinations (5, 49, 51)

F. Find the number of subsets of a given set (21 – 29 odd)

G. Mixed Practice (49, 51)

Suggested Homework Exercises: 5, 21 – 29 odd, 49, 51

13.6 The Binomial Theorem

Topics:

A. Identify binomial coefficients (1, 5 – 11 odd)

B. Use the Binomial Theorem (3, 13 – 19 odd, 23 – 27 odd)

C. Use the Binomial Theorem to find a single term (31 – 37 odd)

Suggested Homework Exercises: 1 – 19 odd, 23 – 27 odd, 31 – 37 odd

13.7 Probability

Topics:

A. Construct probability models (1 – 5 odd)

B. Compute the probability of equally likely outcomes (7, 15, 17, 19, 27 – 33 odd)

C. Compute the probability of the union of two events (21, 35)

D. Compute the probability of mutually exclusive events (9 – 13 odd, 25, 37 – 45 odd)

E. Use the complement rule to find probabilities (13, 23)

Suggested Homework Exercises: 1 – 45 odd

SUGGESTED REVIEW: Chapter 13 Review Exercises

Day One of review do review exercises: 1 – 13 odd, 17 – 27 odd

Day Two of review do review exercises: 31 – 53 odd

SUGGESTED ASSESSMENT: Chapter 13 Practice Test

Suggested Test: Do all exercises 1 - 14, 17 - 28 on the Chapter 13 Practice Test

*Note: Grade your test using the Practice Test Answer Key posted on the course homepage.