

# Integrated Math 2B

## Course Overview

Integrated Math is a comprehensive collection of mathematical concepts designed to give you a deeper understanding of the world around you. It includes ideas from algebra, geometry, probability and statistics, and trigonometry, and teaches them as interrelated disciplines. It's likely that you've been studying some form of integrated math since elementary school.

In Integrated Math 2B, you will study the connections between algebra and geometry. You will learn about functions and use them to solve real-world math problems. You will study data collection methods, and you will use different types of data plots to represent and analyze statistical data. You will learn about geometric theorems and rules and write proofs to support them. You will also explore congruency and similarity of triangles.

## Course Goals

This course will help you meet these goals:

- Solve systems of linear-quadratic equations algebraically and graphically.
- Investigate attributes of the graph of a parabola.
- Graph piecewise and absolute value functions.
- Relate domain to a function based on the given context.
- Find and analyze the inverse of a function.
- Write proofs for various theorems and apply them in geometric relationships.
- Prove similarity and congruence in two geometric figures.
- Use trigonometric ratios and identities to solve problems involving right triangles.
- Write and apply volume formulas.
- Derive the equations of circles and parabolas.
- Divide a line segment in a given ratio.
- Describe relationships among inscribed angles, radii, and chords within a circle.
- Make constructions related to circles.
- Relate length of the arc intercepted by an angle to the radius of the circle.
- Derive the formula for the area of a sector.
- Apply the Addition and Multiplication Rules for probability.
- Distinguish between dependent events and independent events.
- Use counting techniques to compute probabilities for various permutations and combinations of events and to make fair decisions.
- Use a two-way frequency table and find conditional probability of events in a sample space.
- Interpret conditional probability of events.

## General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word-processing software, such as Microsoft Word and Google Docs.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

*For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.*

## Credit Value

Integrated Math 2B is a 0.5-credit course.

## Course Materials

- Notebook
- Computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft Excel or equivalent

## Course Pacing Guide

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

## Unit 1: Graphing Functions

### Summary

In this unit, you will explore and understand the attributes of the graph of a quadratic function. You will also graph absolute value and piecewise functions

Day	Activity/Objective	Type
1 day: 1	<b>Syllabus and Plato Student Orientation</b> <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
1 day: 2	<b>Solving Linear-Quadratic Systems of Equations</b> <i>Solve linear-quadratic equations algebraically and graphically.</i>	Lesson
1 day: 3	<b>Parabola and Its Intercepts</b> <i>Find the x- and y-intercepts of a parabola.</i>	Lesson

1 day: 4	<b>Parabola and Its Vertex</b> <i>Find the vertex of a parabola.</i>	Lesson
2 days: 5–6	<b>Parabola and Its Coefficients</b> <i>Learn how changing the coefficients of a parabola affects its position and shape.</i>	Lesson
1 day: 7	<b>Graphing Piecewise Functions</b> <i>Graph greatest integer and general piecewise functions.</i>	Lesson
1 day: 8	<b>Graphing Absolute Value Functions</b> <i>Graph absolute value functions.</i>	Lesson
3 days: 9–11	<b>Unit Activity/Threaded Discussion—Unit 1</b>	Unit Activity
1 day: 12	<b>Posttest—Unit 1</b>	Assessment

## Unit 2: Properties of Functions

### Summary

In this unit, you will investigate the properties of linear, quadratic, exponential, and logarithmic functions. You will also find the inverse of a function.

Day	Activity/Objective	Type
1 day: 13	<b>Solving Problems with Linear Functions</b> <i>Describe real-world situations as linear functions.</i>	Lesson
1 day: 14	<b>Solving Problems with Quadratic Functions</b> <i>Describe real-world situations as quadratic functions.</i>	Lesson
1 day: 15	<b>Properties of Exponential Functions</b> <i>Study the properties of exponential functions.</i>	Lesson
1 day: 16	<b>Properties of Logarithmic Functions</b> <i>Study the properties of logarithmic functions.</i>	Lesson
2 days: 17–18	<b>Recognizing Graphs of Types of Functions</b> <i>Identify exponential and logarithmic functions by looking at graphs of these functions.</i>	Lesson
1 day: 19	<b>Function Models and Features</b> <i>Relate a domain to a function written in context and compare the growth of different types of functions.</i>	Lesson
1 day: 20	<b>Inverse of a Function</b> <i>Find the inverse of a function.</i>	Lesson

1 day: 21	<b>Determining if a Function Has an Inverse</b> <i>Determine whether a function has an inverse by looking at a mapping diagram or by inspecting a graph.</i>	Lesson
3 days: 22–24	<b>Unit Activity/Threaded Discussion—Unit 2</b>	Unit Activity
1 day: 25	<b>Posttest—Unit 2</b>	Assessment

## Unit 3: Congruence, Similarity, and Proof

### Summary

In this unit, you will be introduced to geometrical proofs based on congruence and symmetry. You will investigate proofs for theorems related to lines and angles, triangles, and parallelograms. You will examine the properties of similarity transformations and use them to prove congruence and similarity of triangles.

Day	Activity/Objective	Type
1 day: 26	<b>Lines, Angles, and Mathematical Proofs</b> <i>Write mathematical proofs and apply that knowledge to simple geometric relationships.</i>	Lesson
2 days: 27–28	<b>Proving Theorems about Lines and Angles</b> <i>Prove theorems about lines and angles.</i>	Lesson
2 days: 29–30	<b>Proving Theorems about Triangles</b> <i>Prove theorems about triangles.</i>	Lesson
2 days: 31–32	<b>Proving Theorems about Parallelograms</b> <i>Prove theorems about parallelograms.</i>	Lesson
1 day: 33	<b>Properties of Dilations</b> <i>Verify experimentally the properties of dilations given by a center and a scale factor.</i>	Lesson
1 day: 34	<b>Similarity and Similarity Transformations</b> <i>Use the definition of similarity in terms of similarity transformations to decide whether two given figures are similar.</i>	Lesson
2 days: 35–36	<b>AA, SAS, and SSS Criteria for Similar Triangles</b> <i>Use the properties of similarity transformations to establish the AA, SAS, and SSS criteria for two triangles to be similar.</i>	Course Activity
1 day: 37	<b>Similarity, Proportion, and Triangle Proofs</b> <i>Prove theorems about triangles using similarity relationships.</i>	Lesson
1 day: 38	<b>Using Congruence and Similarity with Triangles</b> <i>Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</i>	Lesson

3 days: 39–41	<b>Unit Activity/Threaded Discussion—Unit 3</b>	Unit Activity
1 day: 42	<b>Posttest—Unit 3</b>	Assessment

## Unit 4: Trigonometry, Coordinate Geometry, and Extending to Three Dimensions

### Summary

In this unit, you will study trigonometric ratios and identities and apply them to solve problems. You will also use formulas to find the volumes of different 3-D shapes and use them to solve word problems. You will write the equation of a circle or a parabola using its attributes. Finally, you will divide a line segment in a given ratio.

Day	Activity/Objective	Type
1 day: 43	<b>Trigonometric Ratios</b> <i>Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.</i>	Lesson
2 days: 44–45	<b>Sine and Cosine of Complementary Angles</b> <i>Explain and use the relationship between the sine and cosine of complementary angles.</i>	Lesson
2 days: 46–47	<b>Solving Problems with Right Triangles</b> <i>Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.</i>	Lesson
1 day: 48	<b>Basic Trigonometric Identities</b> <i>Examine and apply the basic trigonometric identities.</i>	Lesson
1 day: 49	<b>Explaining Volume Formulas</b> <i>Give an informal argument for the formulas for the circumference of a circle, the area of a circle, and the volumes of a cylinder, pyramid, and cone.</i>	Lesson
1 day: 50	<b>Using Volume Formulas</b> <i>Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.</i>	Lesson
1 day: 51	<b>Equation of a Circle</b> <i>Derive the equation of a circle of given center and radius, and complete the square to find the center and radius of a circle given by an equation.</i>	Lesson
1 day: 52	<b>Equation of a Parabola Based on Its Focus and Directrix</b> <i>Derive the equation of a parabola given a focus and directrix.</i>	Course Activity

1 day: 53	<b>Dividing a Line Segment Based on a Ratio</b> <i>Find the point on a directed line segment between two given points that partitions the segment in a given ratio.</i>	Lesson
3 days: 54–56	<b>Unit Activity/Threaded Discussion—Unit 4</b>	Unit Activity
1 day: 57	<b>Posttest—Unit 4</b>	Assessment

## Unit 5: Circles

### Summary

In this unit, you will explore the properties of a circle and constructions involving circles. You will investigate the relationships between different components of a circle, and you will apply the concept of similarity to write proofs and derive formulas related to circles.

Day	Activity/Objective	Type
1 day: 58	<b>Proving That All Circles Are Similar</b> <i>Prove that all circles are similar.</i>	Course Activity
2 days: 59–60	<b>Relationships Among Inscribed Angles, Radii, and Chords</b> <i>Identify and describe relationships among inscribed angles, radii, and chords.</i>	Lesson
1 day: 61	<b>Inscribed and Circumscribed Circles</b> <i>Construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle.</i>	Lesson
1 day: 62	<b>Constructing a Tangent Line to a Circle</b> <i>Construct a tangent line from a point outside a given circle to the circle.</i>	Course Activity
2 days: 63–64	<b>Relating Arc Length and Area to Radius</b> <i>Use similarity to derive the fact that the length of the arc intercepted by an angle is proportional to the radius. You will also derive the formula for the area of a sector.</i>	Lesson
3 days: 65–67	<b>Unit Activity/Threaded Discussion—Unit 5</b>	Unit Activity
1 day: 68	<b>Posttest—Unit 5</b>	Assessment

## Unit 6: Independent and Conditional Probability

### Summary

In this unit, you will apply the Addition and Multiplication Rules of probability to calculate probabilities using a uniform model. You will understand that an event is a set of outcomes that can be related to other events or independent of them. You will use permutations and combinations to find the probabilities of compound events.

Day	Activity/Objective	Type
1 day: 69	<b>Sample Space</b> <i>Describe events as subsets of a sample space (the set of outcomes).</i>	Lesson
1 day: 70	<b>Applying the Addition Rule for Probability</b> <i>Apply the Addition Rule, <math>P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)</math>, and interpret the answer in terms of the model.</i>	Lesson
1 day: 71	<b>Applying the Multiplication Rule for Probability</b> <i>Apply the general Multiplication Rule in a uniform probability model and interpret the answer in terms of the model.</i>	Lesson
1 day: 72	<b>Independent Events</b> <i>Understand how to determine if two events are independent of each other.</i>	Lesson
1 day: 73	<b>Using Counting Techniques to Determine Probabilities</b> <i>Use permutations and combinations to compute probabilities of compound events and to solve problems.</i>	Lesson
2 days: 74–75	<b>Conditional Probability</b> <i>Understand the conditional probability of event A given event B and interpret the independence of events A and B.</i>	Lesson
3 days: 76–78	<b>Unit Activity/Threaded Discussion—Unit 6</b>	Unit Activity
1 day: 79	<b>Posttest—Unit 6</b>	Assessment

## Unit 7: Applying Probability

### Summary

In this unit, you will use probability models to assess situations that arise in the real world. You will apply counting rules to determine probabilities and use them to make fair decisions and analyze strategies. You will also find and interpret the conditional probability of an event as it relates to other events.

Day	Activity/Objective	Type
1 day: 80	<b>Interpreting Two-Way Frequency Tables</b> <i>Use a two-way table as a sample space to decide whether events are independent and to approximate conditional probabilities.</i>	Lesson
1 day: 81	<b>Using Probability to Make Fair Decisions</b> <i>Apply counting rules to determine probabilities and use them to make fair decisions.</i>	Lesson
1 day: 82	<b>Using Probability to Analyze Decisions and Strategies</b> <i>Apply counting rules to analyze decisions and strategies using probability concepts.</i>	Lesson
1 day: 83	<b>Applying Conditional Probability and Independence</b> <i>Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.</i>	Lesson
1 day: 84	<b>Interpreting Conditional Probability</b> <i>Find the conditional probability of event A as it relates to event B and interpret the answer in terms of the model.</i>	Lesson
3 days: 85–87	<b>Unit Activity/Threaded Discussion—Unit 7</b>	Unit Activity
1 day: 88	<b>Posttest—Unit 7</b>	Assessment
1 day: 89	<b>Semester Review</b>	
1 day: 90	<b>End-of-Semester Test</b>	Assessment