

## PROGRAM OVERVIEW

# Suggested Pacing Guide

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### Overview

The sub-lessons in this program are designed to be covered over one, two, or three days, depending on the depth and complexity of the lesson. The pacing guide that follows provides *suggested* pacing, but this should be viewed as a flexible guideline only. If students need an extra day to solidify understanding, a one-day lesson may be spread over two days, or a two-day lesson may be spread over three days. Conversely, if students grasp a concept more quickly than suggested by the pacing guide, it is fine to shorten the duration of the lesson and move on to the next lesson.

Each sub-lesson features several components. The estimated time for each component is given in parentheses. Components include: a Warm-Up, Instruction (including an Introduction, Key Concepts, and Guided Practice), a Problem-Based Task, and Practice.

### Guided Practice, Scaffolded Practice, and Practice

Each Guided Practice set includes student worksheets. Scaffolded Practice worksheets (the first set of “Printable Practice” worksheets in each lesson) are also included to reinforce key prerequisite skills for the lesson. Each lesson also includes two sets of on-level printable Practice problems, along with an interactive Learnosity version of the first practice set. Guided Practice, Scaffolded Practice, and Practice problems may be assigned for in-class work or homework assignments.

### Suggested Progression of One-, Two-, and Three-Day Lessons

#### One Day

- Warm-Up PowerPoint and Debrief (10 minutes)
- Introduction and Key Concepts (10 minutes)
- One or two Guided Practice Examples, including applets for selected examples as appropriate (15 minutes)
- Problem-Based Task and discussion (30 minutes)
- Homework: Practice problems

#### Two Days

##### Day 1

- Warm-Up PowerPoint and Debrief (10 minutes)
- Introduction and Key Concepts (15 minutes)
- Two or three Guided Practice Examples, including applets for selected examples as appropriate (20 minutes)
- In-class practice: selected Practice A problems (20 minutes)
- Homework: the remainder of Practice A

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## **PROGRAM OVERVIEW**

### **Suggested Pacing Guide**

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#### **Day 2**

- Review Practice problems (10 minutes)
- One or two remaining Guided Practice Examples, including applets for selected examples as appropriate (15 minutes)
- Problem-Based Task and discussion (30 minutes)
- In-class practice: selected Practice B problems (15 minutes)
- Homework: the remainder of Practice B

#### **Three Days**

##### **Day 1**

- Warm-Up PowerPoint and Debrief (10 minutes)
- Introduction and Key Concepts (25 minutes)
- One or two Guided Practice Examples, including applets for selected examples as appropriate (15 minutes)
- Homework: selected Practice A problems

##### **Day 2**

- Review Practice problems (15 minutes)
- Two or three remaining Guided Practice Examples, including applets for selected examples as appropriate (15 minutes)
- Problem-Based Task and discussion (20 minutes)
- Homework: the remainder of the Practice A problems

##### **Day 3**

- Review Practice problems (15 minutes)
- In-class practice: selected Practice B problems (35 minutes)
- Homework: the remainder of the Practice B problems

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## **PROGRAM OVERVIEW**

### **Suggested Pacing Guide**

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#### **Assessments, Conceptual Activities, and Station Activities**

Each lesson includes a Pre-Assessment and a Progress Assessment, and each unit concludes with a Unit Assessment. Units also feature sets of Station Activities, along with links to interactive web-based Conceptual Activities, to complement instruction.

Pre-Assessments are short, multiple-choice assessments with five problems, designed to evaluate prior knowledge of the upcoming concepts in the lesson. These are brief and should not factor into a student's grade.

Progress Assessments include 10 multiple-choice problems and one extended-response problem. Progress Assessments may not take an entire class period. The additional time may be used to review before the assessment, work through the Conceptual Activities, or to begin the next lesson after the assessment.

Unit Assessments include 12 multiple-choice problems and three extended-response problems, and generally require a full class period.

Conceptual Activities are digital math resources that allow students to explore mathematical ideas with engaging, real-world problems and interactive games.

Station Activities generally require a full class period for the students to rotate through each station and then to engage in a class discussion at the end.

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Unit 1: Extending the Number System (15 Days)

**Unit Overview:** This introductory unit covers many of the foundational skills needed for the rest of the course. Students learn about rational exponents and the properties of rational and irrational numbers. This is followed by operating with polynomials. Finally, students define an imaginary number and learn to operate with complex numbers.

#### Lesson 1: Working with the Number System

Students are introduced to the properties of exponents, including rational exponents. They use these properties to rewrite and evaluate expressions that contain rational exponents. Next, students learn the properties of rational and irrational numbers.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 1	Lesson 1 Pre-Assessment	Practice A or B	N–RN.1
Day 2	1.1.1: Defining, Rewriting, and Evaluating Rational Exponents		N–RN.2
Day 3	1.1.2: Rational and Irrational Numbers and Their Properties	Practice A or B	N–RN.2 N–RN.3
Day 4	Lesson 1 Progress Assessment Lesson 2 Pre-Assessment	Practice A or B	

#### Lesson 2: Operating with Polynomials

Students learn how to add, subtract, and multiply polynomials. These skills help students simplify expressions, and are foundational skills that are used in later units and in future math courses.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 5	1.2.1: Adding and Subtracting Polynomials	Practice A or B	A–APR.1
Day 6	1.2.2: Multiplying Polynomials	Practice A or B	A–APR.1
Day 7	Station Activities Set: Operations with Polynomials	Practice A or B	A–APR.1
Day 8	Lesson 2 Progress Assessment Lesson 3 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 3: Operating with Complex Numbers

Students are introduced to the imaginary unit  $i$  and to the concept of a complex number. Then, students learn to add, subtract, and multiply complex numbers. Students explore how the imaginary unit enables them to solve problems that they would not otherwise be able to solve.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 9 Day 10	1.3.1: Defining Complex Numbers, $i$ , and $i^2$	Practice A or B	N–CN.1
Day 11	1.3.2: Adding and Subtracting Complex Numbers	Practice A or B	N–CN.2
Day 12	1.3.3: Multiplying Complex Numbers	Practice A or B	N–CN.2
Day 13	Station Activities Set: Operations with Complex Numbers	Practice A or B	N–CN.1 N–CN.2 N–CN.3
Day 14	Lesson 3 Progress Assessment	Practice A or B	
<b>Unit Assessment</b>			
Day 15	Unit Assessment		

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Unit 2: Quadratic Functions and Modeling (29 Days)

**Unit Overview:** Students begin by exploring and interpreting the graphs of quadratic functions. Next, they learn how to build quadratic functions from a context and how to carry out operations with functions. This gives way to the exploration of other types of functions, including square root, cube root, absolute value, step, and piecewise functions. The unit progresses to analyzing exponential functions and comparing linear, quadratic, and exponential models given in different forms. The unit ends with transforming functions and finding the inverse of functions.

#### Lesson 1: Analyzing Quadratic Functions

Students learn what a quadratic function is and how to graph one. They learn how to find the vertex and the intercepts of the graph of a quadratic function, and they discover the various forms of a quadratic function and how each form helps identify key features of the graph. This lesson lays the foundation for the more in-depth examination of quadratic functions in the next lesson.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 1	Lesson 1 Pre-Assessment	Practice A or B	F-IF.7a★
Day 2	2.1.1: Graphing Quadratic Functions		
Day 3	2.1.2: Interpreting Various Forms of Quadratic Functions	Practice A or B	F-IF.7a★ F-IF.8a
Day 4	Lesson 1 Progress Assessment Lesson 2 Pre-Assessment	Practice A or B	

#### Lesson 2: Interpreting Quadratic Functions

This lesson delves deeper into the analysis of quadratic functions, giving students an opportunity to use equations, graphs, tables, and verbal descriptions to identify and apply the key features of the function's graph. Students also learn how to identify the domain and range of a quadratic function and how to calculate the average rate of change. The skills learned in this lesson prepare students to apply this knowledge to real contexts in the next lesson.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 5	2.2.1: Interpreting Key Features of Quadratic Functions	Practice A or B	F-IF.4★
Day 6			
Day 7	2.2.2: Identifying the Domain of a Quadratic Function	Practice A or B	F-IF.5★
Day 8	Station Activities Set: Graphing Quadratic Equations	Practice A or B	F-IF.7a★
Day 9	2.2.3: Identifying the Average Rate of Change	Practice A or B	F-IF.6★
Day 10	Lesson 2 Progress Assessment Lesson 3 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 3: Building Functions

This lesson provides students with the opportunity to apply their knowledge of quadratic functions to real-world contexts. By modeling scenarios with quadratic equations and graphs, students discover the usefulness of being able to identify key features such as the maximum, minimum, and intercepts to solve problems.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 11 Day 12	2.3.1: Building Functions from Context	Practice A or B	F–BF.1a★
Day 13	2.3.2: Operating on Functions	Practice A or B	F–BF.1b★
Day 14	Lesson 3 Progress Assessment Lesson 4 Pre-Assessment	Practice A or B	

#### Lesson 4: Graphing Other Functions

Students are introduced to several new types of functions that they probably have not seen before. They explore the graphs of square root functions, cube root functions, absolute value functions, step functions, and piecewise functions. The material in this lesson allows students to move beyond the three types of functions they have already studied (linear, exponential, and quadratic) to see that there are many more types of functions.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 15 Day 16	2.4.1: Square Root and Cube Root Functions	Practice A or B	F–IF.7b★
Day 17	2.4.2: Absolute Value and Step Functions	Practice A or B	F–IF.7b★
Day 18	2.4.3: Piecewise Functions	Practice A or B	F–IF.7b★
Day 19	Lesson 4 Progress Assessment Lesson 5 Pre-Assessment	Practice A or B	

#### Lesson 5: Analyzing Functions

This lesson begins with an in-depth look at exponential functions. Then, students learn to compare linear, quadratic, and exponential functions that are presented in various forms—tables, equations, graphs, and words. This allows students to see the similarities and differences between these different categories of functions, and prepares them for the more in-depth study of functions that they will encounter in future math courses.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 20 Day 21	2.5.1: Analyzing Exponential Functions	Practice A or B	F–IF.8b

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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Day 22	2.5.2: Comparing Properties of Functions Given in Different Forms	Practice A or B	F–IF.9 F–LE.3★
Day 23	Lesson 5 Progress Assessment Lesson 6 Pre-Assessment	Practice A or B	

#### Lesson 6: Transforming Functions

Students learn how to vary the shape and position of a function by multiplying by a number or adding a constant to various parts of the function. These operations are called transformations. The study of transformations helps students see the connection between the algebraic equation for a function and the graphical representation of the function.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 24	2.6.1: Replacing $f(x)$ with $f(x) + k$ and $f(x + k)$	Practice A or B	F–BF.3
Day 25	2.6.2: Replacing $f(x)$ with $k \cdot f(x)$ and $f(k \cdot x)$	Practice A or B	F–BF.3
Day 26	Lesson 6 Progress Assessment Lesson 7 Pre-Assessment	Practice A or B	

#### Lesson 7: Finding Inverse Functions

Students are introduced to the concept of an inverse and how to determine the equation for the inverse of a given function. Students also learn how to use inverse functions to solve real-world problems.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 27	2.7.1: Finding Inverse Functions	Practice A or B	F–BF.4a
Day 28	Lesson 7 Progress Assessment	Practice A or B	
<b>Unit Assessment</b>			
Day 29	Unit Assessment		

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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### Unit 3: Expressions and Equations (38 Days)

**Unit Overview:** Students reexamine the basic structures of expressions, but this time these structures are applied to quadratic expressions. Then, students learn to solve quadratic equations using various methods. Next, students create quadratic equations in various forms and learn how to rearrange formulas to solve for a variable that is being squared. The unit builds on previous units by introducing the Fundamental Theorem of Algebra and showing students how complex numbers are solutions to some quadratic equations. At this point, students are introduced to rational functions. Again, students learn to write exponentially structured expressions in equivalent forms. The unit ends by returning to a familiar topic—solving systems of equations—but now complex solutions can be determined.

#### Lesson 1: Interpreting Structure in Expressions

Students begin by reviewing algebraic vocabulary, such as *term*, *factor*, and *coefficient*. Next, they analyze algebraic expressions to see how each term of an expression affects the value of the expression. Understanding how all the parts of algebraic expressions and equations work together will make the process of creating equations easier when encountered in Lesson 3.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 1	Lesson 1 Pre-Assessment 3.1.1: Identifying Terms, Factors, and Coefficients	Practice A or B	A–SSE.1a★
Day 2 Day 3	3.1.2: Interpreting Complicated Expressions	Practice A or B	A–SSE.1b★
Day 4	Lesson 1 Progress Assessment Lesson 2 Pre-Assessment	Practice A or B	

#### Lesson 2: Creating and Solving Quadratic Equations in One Variable

Students learn to create quadratic equations based on real-world scenarios, and to solve quadratic equations by taking the square root of both sides. Then, students learn how to factor quadratic equations and use the factored form to solve equations. The lesson includes factoring by grouping and completing the square. Next, students learn how to apply the quadratic formula to solve equations, and finally they solve quadratic inequalities.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 5	3.2.1: Taking the Square Root of Both Sides	Practice A or B	A–CED.1★ A–REI.4b
Day 6 Day 7	3.2.2: Factoring	Practice A or B	A–SSE.2 A–CED.1★ A–REI.4b

## PROGRAM OVERVIEW

### Suggested Pacing Guide

Day 8	Station Activities Set: Factoring	Practice A or B	A–SSE.3a★
Day 9	3.2.3: Completing the Square	Practice A or B	A–SSE.2 A–CED.1★ A–REI.4a A–REI.4b
Day 10	3.2.4: Applying the Quadratic Formula	Practice A or B	A–CED.1★ A–REI.4a A–REI.4b
Day 11 Day 12	3.2.5: Solving Quadratic Inequalities	Practice A or B	A–SSE.2 A–CED.1★ A–REI.4b
Day 13	Lesson 2 Progress Assessment Lesson 3 Pre-Assessment	Practice A or B	

### Lesson 3: Creating Quadratic Equations in Two or More Variables

Students solidify previously learned skills by applying them to problem solving. Students create and graph quadratic equations, both with and without a real-world context, and practice using standard form, factored form, and vertex form. Students also learn how to rearrange formulas in which the variable that is being solved for is squared.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 14 Day 15	3.3.1: Creating and Graphing Equations Using Standard Form	Practice A or B	A–SSE.3a★ A–CED.2★
Day 16	3.3.2: Creating and Graphing Equations Using the $x$ -intercepts	Practice A or B	A–SSE.3a★ A–CED.2★
Day 17	3.3.3: Creating and Graphing Equations Using Vertex Form	Practice A or B	A–SSE.3b★ A–CED.2★
Day 18	Station Activities Set: Quadratic Transformations in Vertex Form	Practice A or B	A–SSE.3b★ F–IF.7a★ F–IF.8a F–BF.3
Day 19	3.3.4: Rearranging Formulas	Practice A or B	A–CED.4★
Day 20	Lesson 3 Progress Assessment Lesson 4 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 4: Fundamental Theorem of Algebra

Students gain more practice with polynomial identities by exploring those that contain complex numbers. Next, students learn one of the most useful algebraic theorems, the Fundamental Theorem of Algebra, which tells the number of solutions, both real and complex, that a polynomial can have. Students apply this theorem when solving quadratic equations that have complex solutions.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 21 Day 22	3.4.1: Extending Polynomial Identities to Include Complex Numbers	Practice A or B	N–CN.8 (+)
Day 23	3.4.2: Solving Quadratic Equations with Complex Solutions	Practice A or B	N–CN.7 N–CN.9 (+)
Day 24	Station Activities Set: Solving Quadratics	Practice A or B	N–CN.7 A–SSE.3a★ A–REI.4b
Day 25	Lesson 4 Progress Assessment Lesson 5 Pre-Assessment	Practice A or B	

#### Lesson 5: Rational Equations

Students further develop their problem-solving skills by learning how to create and solve rational equations from context. Next, they learn how to graph rational functions and use these graphs to solve real-world problems.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 26 Day 27	3.5.1: Creating Rational Equations	Practice A or B	A–CED.1★
Day 28	3.5.2: Graphing Rational Equations	Practice A or B	A–CED.2★
Day 29	3.5.3: Creating Rational Inequalities	Practice A or B	A–CED.1★
Day 30	Lesson 5 Progress Assessment Lesson 6 Pre-Assessment	Practice A or B	

#### Lesson 6: Writing Exponential Expressions in Equivalent Forms

Students explore the usefulness of rewriting exponential expressions in equivalent forms in order to solve real-world problems involving exponential growth and decay.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 31 Day 32	3.6.1: Writing Exponential Expressions in Equivalent Forms	Practice A or B	A–SSE.3c★
Day 33	Lesson 6 Progress Assessment Lesson 7 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 7: Solving Systems of Equations

Students build on their prior knowledge of systems of linear equations from previous courses by extending the concept to include quadratic equations. Students learn to solve systems made up of a linear and a quadratic equation by graphing, and then by using algebraic methods. The quadratic equations involved are for both parabolas and circles.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 34	3.7.1: Solving Systems Graphically	Practice A or B	A-REI.7
Day 35 Day 36	3.7.2: Solving Systems Algebraically	Practice A or B	A-REI.7
Day 37	Lesson 7 Progress Assessment	Practice A or B	
<b>Unit Assessment</b>			
Day 38	Unit Assessment		

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Unit 4: Applications of Probability (21 Days)

**Unit Overview:** Students begin by defining events, applying the Addition Rule, and learning about independence. Then, they progress toward conditional probabilities and the Multiplication Rule. This builds into using combinatorics to count and calculate probabilities. Finally, students learn to make and analyze decisions based on probability.

##### Lesson 1: Events

This introductory lesson defines probability and provides students with the opportunity to learn the many vocabulary words associated with probability, including the concepts of experiments, outcomes, sample spaces, events, and set notation. Then, students learn how to solve probability problems with the Addition Rule. Finally, students learn the difference between independent and dependent events.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 1	Lesson 1 Pre-Assessment	Practice A or B	S-CP.1★
Day 2	4.1.1: Describing Events		
Day 3	4.1.2: The Addition Rule	Practice A or B	S-CP.7★
Day 4	4.1.3: Understanding Independent Events	Practice A or B	S-CP.2★
Day 5	Lesson 1 Progress Assessment Lesson 2 Pre-Assessment	Practice A or B	

##### Lesson 2: Conditional Probability

Students learn what conditional probability is, and how to solve problems in which conditional probability exists. Then, the concept is expanded to using two-way frequency tables to organize information and solve problems. Lastly, students learn how to solve conditional probability problems using the Multiplication Rule.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 6	4.2.1: Introducing Conditional Probability	Practice A or B	S-CP.3★
Day 7			S-CP.5★ S-CP.6★
Day 8	4.2.2: Using Two-Way Frequency Tables	Practice A or B	S-CP.4★
Day 9			S-CP.5★ S-CP.6★
Day 10	4.2.3: The Multiplication Rule	Practice A or B	S-CP.8★ (+)
Day 11	Station Activities Set: Probability	Practice A or B	S-CP.1★ S-CP.2★ S-CP.3★
Day 12	Lesson 2 Progress Assessment Lesson 3 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 3: Combinatorics

Students are introduced to combinations and permutations and how to calculate both. They use these powerful concepts to solve a variety of problems. Then, students combine the probability skills developed earlier in this unit with combinatorics to solve more real-world problems.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 13 Day 14	4.3.1: Combinations and Permutations	Practice A or B	S-CP.9* (+)
Day 15	4.3.2: Probability with Combinatorics	Practice A or B	S-CP.9* (+)
Day 16	Lesson 3 Progress Assessment Lesson 4 Pre-Assessment	Practice A or B	

#### Lesson 4: Making and Analyzing Decisions

Students apply skills gained from previous lessons in this unit to decide whether a situation is fair by analyzing the probabilities of the possible outcomes. Then, they analyze the probabilities associated with various situations in order to make decisions, calculate estimates, and determine which choice is most likely to result in the desired outcome.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 17 Day 18	4.4.1: Making Decisions	Practice A or B	S-MD.6* (+)
Day 19	4.4.2: Analyzing Decisions	Practice A or B	S-MD.7* (+)
Day 20	Lesson 4 Progress Assessment	Practice A or B	
<b>Unit Assessment</b>			
Day 21	Unit Assessment		

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Unit 5: Similarity, Right Triangle Trigonometry, and Proof (46 Days)

**Unit Overview:** Students begin by learning about midpoints and other points of interest in a line segment. Then, they work with dilations and similarity, which builds into learning about and proving the various similarity statements. Next, students learn about special angles in intersecting lines and about relationships among the angles formed by a set of parallel lines intersected by a transversal. Students then return to working with triangles and proving theorems about them, including the Interior Angle Sum Theorem, as well as theorems about isosceles triangles, midsegments, and centers of triangles. Next, students will explore proofs involving parallelograms and other quadrilaterals. The unit ends with an introduction to trigonometric ratios and solving problems using those ratios and the Pythagorean Theorem.

#### Lesson 1: Line Segments

Students learn how to find the length of a segment in the coordinate plane by using the distance formula, and they calculate the coordinates of the midpoints of segments. The distance and midpoint formulas are then used to solve problems. These formulas are used for several proofs later in the unit.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 1	Lesson 1 Pre-Assessment 5.1.1: Midpoints and Other Points on Line Segments	Practice A or B	G–GPE.6
Day 2	Lesson 1 Progress Assessment	Practice A or B	

#### Lesson 2: Investigating Properties of Dilations

Students explore the properties of dilations, the difference between rigid and non-rigid motions, and the meaning of a scale factor. These skills are first explored in isolation and then through the context of applications.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 3 Day 4	Lesson 2 Pre-Assessment 5.2.1: Investigating Properties of Parallelism and the Center	Practice A or B	G–SRT.1a
Day 5	5.2.2: Investigating Scale Factors	Practice A or B	G–SRT.1b
Day 6	Lesson 2 Progress Assessment Lesson 3 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 3: Defining and Applying Similarity

Students study the properties of similarity, and they explore the Angle-Angle Similarity Statement as a way to prove that two triangles are similar. The lesson focuses on similar triangles, while the Station Activities set extends the concept to other figures.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 7 Day 8	5.3.1: Defining Similarity	Practice A or B	G–SRT.2
Day 9	5.3.2: Applying Similarity Using the Angle-Angle (AA) Criterion	Practice A or B	G–SRT.3
Day 10	Station Activities Set: Similarity and Scale Factor	Practice A or B	G–SRT.1b G–SRT.2
Day 11	Lesson 3 Progress Assessment Lesson 4 Pre-Assessment	Practice A or B	

#### Lesson 4: Proving Similarity

Students extend their knowledge of triangle similarity statements to include Side-Angle-Side (SAS) and Side-Side-Side (SSS). Note that these statements, which rely on the ratios of the sides and not the lengths of the sides, should not be confused with the SAS and SSS methods of proving congruence. These similarity statements are then used to prove the Pythagorean Theorem.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 12 Day 13	5.4.1: Proving Triangle Similarity Using Side-Angle-Side (SAS) and Side-Side-Side (SSS) Similarity	Practice A or B	G–SRT.4
Day 14	5.4.2: Working with Ratio Segments	Practice A or B	G–SRT.4
Day 15	5.4.3: Proving the Pythagorean Theorem Using Similarity	Practice A or B	G–SRT.4
Day 16	5.4.4: Solving Problems Using Similarity and Congruence	Practice A or B	G–SRT.5
Day 17	Lesson 4 Progress Assessment Lesson 5 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 5: Proving Theorems About Lines and Angles

This lesson continues the exploration of proofs. Students discover a proof for the Vertical Angles Theorem, as well as proofs of theorems concerning the angles that are formed when parallel lines are cut by a transversal.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 18 Day 19	5.5.1: Proving the Vertical Angles Theorem	Practice A or B	G–CO.9
Day 20 Day 21	5.5.2: Proving Theorems About Angles in Parallel Lines Cut by a Transversal	Practice A or B	G–CO.9
Day 22	Station Activities Set: Parallel Lines and Transversals	Practice A or B	G–CO.9
Day 23	Lesson 5 Progress Assessment Lesson 6 Pre-Assessment	Practice A or B	

#### Lesson 6: Proving Theorems About Triangles

Students explored proofs involving similarity of triangles in previous lessons in this unit. In this lesson, they return to triangles to discover several more proofs of some of the properties of triangles.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 24 Day 25	5.6.1: Proving the Interior Angle Sum Theorem	Practice A or B	G–CO.10
Day 26	5.6.2: Proving Theorems About Isosceles Triangles	Practice A or B	G–CO.10
Day 27	5.6.3: Proving the Midsegment of a Triangle	Practice A or B	G–CO.10
Day 28 Day 29	5.6.4: Proving Centers of Triangles	Practice A or B	G–CO.10
Day 30	Lesson 6 Progress Assessment Lesson 7 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 7: Proving Theorems About Parallelograms

Many of the geometrical proofs that students have seen are brought together in this lesson, which explores the theorems for parallelograms and other special quadrilaterals.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 31 Day 32	5.7.1: Proving Properties of Parallelograms	Practice A or B	G–CO.11
Day 33	5.7.2: Proving Properties of Special Quadrilaterals	Practice A or B	G–CO.11
Day 34	Station Activities Set: Rhombi, Squares, Kites, and Trapezoids	Practice A or B	G–CO.11
Day 35	Lesson 7 Progress Assessment Lesson 8 Pre-Assessment	Practice A or B	

#### Lesson 8: Exploring Trigonometric Ratios

Students are introduced to trigonometric ratios. Students learn how to calculate these ratios, and explore sine and cosine as complements. This introduction to trigonometry prepares students for the next lesson, in which trigonometric ratios are used to solve problems, as well as for the much deeper study of trigonometry in later courses.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 36 Day 37	5.8.1: Defining Trigonometric Ratios	Practice A or B	G–SRT.6
Day 38	5.8.2: Exploring Sine and Cosine As Complements	Practice A or B	G–SRT.7
Day 39	Lesson 8 Progress Assessment Lesson 9 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 9: Applying Trigonometric Ratios

Students use the trigonometric ratios learned in the previous lesson and the Pythagorean Theorem to solve problems.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 40	5.9.1: Calculating Sine, Cosine, and Tangent	Practice A or B	G–SRT.8★
Day 41	5.9.2: Calculating Cosecant, Secant, and Cotangent	Practice A or B	G–SRT.8★
Day 42	5.9.3: Problem Solving with the Pythagorean Theorem and Trigonometry	Practice A or B	G–SRT.8★
Day 43	5.9.4: Proving the Pythagorean Identity	Practice A or B	F–TF.8
Day 44	Station Activities Set: Sine, Cosine, and Tangent Ratios, and Angles of Elevation and Depression	Practice A or B	G–SRT.6 G–SRT.7 G–SRT.8★
Day 45	Lesson 9 Progress Assessment	Practice A or B	
<b>Unit Assessment</b>			
Day 46	Unit Assessment		

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Unit 6: Circles With and Without Coordinates (30 Days)

**Unit Overview:** Students study the properties of circles, including central and inscribed angles, chords of a circle, and tangents to a circle. Then, they build on this knowledge to explore polygons circumscribed by or inscribed in a circle. Next, students move on to the properties of tangent lines and their construction. Students are introduced to radians, and they use radians to find the area of a sector and the circumference and area of a circle. Students build from one- and two-dimensional arenas to a three-dimensional one by exploring more deeply the volume formulas for cylinders, pyramids, cones, and spheres. The links between algebra and geometry are explored through deriving the equations for circles and parabolas. Finally, students use coordinates to prove geometric theorems about circles and parabolas.

#### Lesson 1: Introducing Circles

This lesson begins by introducing circles and vocabulary related to circles, including central and inscribed angles. Next, students explore the relationship between chords and the angles and arcs they create. Then, students learn the definitions of a tangent line and a secant line, and the properties associated with each.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 1	Lesson 1 Pre-Assessment	Practice A or B	G–C.1
Day 2	6.1.1: Similar Circles and Central and Inscribed Angles		G–C.2
Day 3	6.1.2: Chord Central Angles Conjecture	Practice A or B	G–C.2
Day 4	6.1.3: Properties of Tangents of a Circle	Practice A or B	G–C.2
Day 5	Lesson 1 Progress Assessment Lesson 2 Pre-Assessment	Practice A or B	

#### Lesson 2: Inscribed Polygons and Circumscribed Triangles

Students learn how to construct a circle that is inscribed in a triangle by first finding the point of concurrency of the angle bisectors (the incenter). Then, students move on to the construction of circumscribed circles, which requires them to first find the point of concurrency for the perpendicular bisectors (the circumcenter). Finally, students explore the properties of inscribed quadrilaterals.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 6	6.2.1: Constructing Inscribed Circles	Practice A or B	G–C.3
Day 7	6.2.2: Constructing Circumscribed Circles	Practice A or B	G–C.3
Day 8	6.2.3: Proving Properties of Inscribed Quadrilaterals	Practice A or B	G–C.3

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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Day 9	Station Activities Set: Circumcenter, Incenter, Orthocenter, and Centroid	Practice A or B	G–CO.12 G–CO.13 G–C.3
Day 10	Lesson 2 Progress Assessment Lesson 3 Pre-Assessment	Practice A or B	

### Lesson 3: Constructing Tangent Lines

This brief lesson shows how to construct a tangent line through a given point on a circle, and how to construct a tangent line through a point that is not on the circle.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 11	6.3.1: Constructing Tangent Lines	Practice A or B	G–C.4 (+)
Day 12	Lesson 3 Progress Assessment	Practice A or B	

### Lesson 4: Finding Arc Lengths and Areas of Sectors

Students continue their study of circles by learning how to calculate arc length based on the relationship between the arc length, the radian measure of the central angle, and the length of the radius. Then, students learn how to calculate the area of a sector, again using the length of the radius and the measure of the central angle in radians.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 13	Lesson 4 Pre-Assessment 6.4.1: Defining Radians	Practice A or B	G–C.5
Day 14 Day 15	6.4.2: Deriving the Formula for the Area of a Sector	Practice A or B	G–C.5
Day 16	Station Activities Set: Circumference, Angles, Arcs, Chords, and Inscribed Angles	Practice A or B	G–C.2 G–C.5
Day 17	Lesson 4 Progress Assessment Lesson 5 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 5: Explaining and Applying Area and Volume Formulas

Students have seen the formulas for circumference and area of a circle in previous math courses. In this lesson, students prove why these formulas work, and they also see a proof of the ratio  $\pi$ . Then, students move on to explore the formulas for calculating the volumes of cylinders, pyramids, cones, and spheres. Through the study of volume, students are exposed to Cavalieri's Principle.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 18	6.5.1: Circumference and Area of a Circle	Practice A or B	G–GMD.1
Day 19 Day 20	6.5.2: Volumes of Cylinders, Pyramids, Cones, and Spheres	Practice A or B	G–GMD.1 G–GMD.3★
Day 21	Lesson 5 Progress Assessment Lesson 6 Pre-Assessment	Practice A or B	

#### Lesson 6: Deriving Equations

Students discover two of the four conic sections, the circle and the parabola. The study of the circle continues, this time combining circles with algebra as students discover the algebraic equation for a circle. Then, students learn how to create equations for parabolas using the geometric definition of a parabola.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 22 Day 23	6.6.1: Deriving the Equation of a Circle	Practice A or B	G–GPE.1
Day 24	Station Activities Set: Special Segments, Angle Measurements, and Equations of Circles	Practice A or B	G–C.1 G–C.2 G–C.4 G–C.5 G–GPE.1
Day 25	6.6.2: Deriving the Equation of a Parabola	Practice A or B	G–GPE.2
Day 26	Lesson 6 Progress Assessment Lesson 7 Pre-Assessment	Practice A or B	

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## PROGRAM OVERVIEW

### Suggested Pacing Guide

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#### Lesson 7: Using Coordinates to Prove Geometric Theorems About Circles and Parabolas

Students further expand their understanding of the connection between geometric definition of circles and parabolas and the algebraic equations for these shapes. Students use figures in the coordinate plane to illustrate and prove theorems about circles and parabolas algebraically.

Day	Area of study/content	Homework/Practice	Standard(s)
Day 27 Day 28	6.7.1: Using Coordinates to Prove Geometric Theorems About Circles and Parabolas	Practice A or B	G–GPE.4
Day 29	Lesson 7 Progress Assessment	Practice A or B	
<b>Unit Assessment</b>			
Day 30	Unit Assessment		