# Pre-AP Algebra 1 Instructional Planning Guide Teacher Sample

The goal of the instructional planning guide is to help you create a roadmap of the key instructional activities and assessments
you will use to design your course in alignment with the Pre-AP course framework and instructional principles. This sample
illustrates one way in which you might use the guide. Pre-AP National Faculty and educators with experience teaching Pre-AP
provided ideas for additional activities and resources that they might use alongside Pre-AP model lessons and formative
assessment to build their full course.

**Using and Customizing Your Own Instructional Planning Guide:**

* When planning additional lessons, consider how they support the Pre-AP course framework, areas of focus,
and shared principles. These three elements represent the key ingredients of aligning to Pre-AP.
* Take time to capture your reflections as you move through the course.

## Unit 1 Linear Functions and Linear Equations

| **Pacing in min** | **Actual Date(s)** | **Key Concepts** | **Materials/Resources/Tasks***Pre-AP Model Lessons, Additional Lessons, Textbooks, Performance Tasks, Assessments* | **Learning Objectives** | **State Standards** | **Reflections on Areas of Focus & Shared Principles** |
| --- | --- | --- | --- | --- | --- | --- |
| ~90 |  | 1.1: Constant Rate of Change and Slope | Pre-AP Model Lesson 1.1: Direct Variation in Our World | 1.1.1 | A.CED.2F.IF.4, 5F.BF.1F.LE.1 |  |
| ~90 |  | 1.1: Constant Rate of Change and Slope | Pre-AP Model Lesson 1.2: Recognizing Direct Variation | 1.1.1 | A.CED.2F.IF.4, 5F.BF.1F.LE.1 |  |
| ~45 |  | 1.1: Constant Rate of Change and Slope | Pre-AP Model Lesson 1.3: Finding the Constant Rate | 1.1.1, 1.1.2 | A.CED.2F.IF.4, 6S.ID.7 |  |
| ~90 |  | 1.1: Constant Rate of Change and Slope | Pre-AP Model Lesson 1.4: Additive Patterns and Arithmetic Sequences | 1.2.1 | F.IF.3F.IF.5F.BF.1, 2 |  |
| ~75 |  | 1.1: Constant Rate of Change and Slope | Pre-AP Model Lesson 1.5: Exploring Arithmetic Sequences | 1.1.31.2.1, 1.2.2 | A.CED.2F.IF.3, 5F.BF.1, 2F.LE.2 |  |
| ~75 |  | 1.1: Constant Rate of Change and Slope | Pre-AP Model Lesson 1.6: Defining the Slope of a Line | 1.1.2, 1.1.3 | F.IF.6, 7F.BF.1F.LE.2S.ID.7 |  |
| ~75 |  | 1.1: Constant Rate of Change and Slope | Pre-AP Model Lesson 1.7: Slope as a Rate of Change | 1.1.2, 1.1.31.2.4, 1.2.6 | N.Q.1A.CED.2, 3A.REI.10F.IF.4, 6, 7F.BF.1F.LE.2, 5S.ID.7 |  |
| ~45 |  | 1.2: Linear Functions | Pre-AP Model Lesson 1.8: Constant Rate Functions | 1.1.2–1.1.4 | A.CED.2F.IF.4, 6, 7F.BF.1F.LE.1, 2S.ID.7 |  |
| ~60 |  | 1.2: Linear Functions | Pre-AP Model Lesson 1.9: The *y* = *mx* + *b* Equation | 1.2.4, 1.2.6 | A.CED.2, 3A.REI.10F.IF.4F.BF.1F.LE.1, 2, 5S.ID.7 |  |
| ~90 |  | 1.2: Linear Functions | Pre-AP Model Lesson 1.10: Linear Functions | 1.2.31.2.41.2.61.3.1 | A.CED.3A.REI.10F.IF.1, 2, 4, 5, 7F.BF.1F.LE.1, 2, 5S.ID.7 |  |
| ~60 |  | 1.2: Linear Functions | Pre-AP Model Lesson 1.11: Function Notation in Context | 1.2.31.2.41.2.6 | A.CED.2, 3A.REI.10F.IF.1, 2, 4, 5F.BF.1F.LE.1, 2, 5S.ID.7 |  |
| ~90 |  | 1.2: Linear Functions | Pre-AP Model Lesson 1.12: A Geometric Approach to the Point–Slope Formula | 1.2.3–1.2.6 | A.CED.2, 3A.REI.10F.IF.1, 2, 4, 5F.BF.1F.LE.1, 2, 5S.ID.7 |  |
| ~60 |  | 1.2: Linear Functions | Pre-AP Model Lesson 1.13: Point–Slope Versus Slope–Intercept Form | 1.2.4, 1.2.5 | A.REI.10F.IF.4F.BF.1F.LE.2 |  |
| ~90 |  | 1.1 and 1.2 | **Practice Performance Task**Measuring the Wind Speed in a Hurricane*This practice performance task assesses learning objectives and essential knowledge statements addressed up to this point in the unit.* |  | N.Q.1A.SSE.1A.CED.2, 3A.REI.10F.IF.1–6F.BF.1, 2F.LE.1, 2, 5S.ID.7 |  |
| ~45 |  | 1.1 and 1.2 | **Learning Checkpoint 1***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~60 |  | 1.3: Linear Equations | Pre-AP Model Lesson 1.14: Writing Standard Form Equations from Context | 1.3.1 | A.CED.3A.REI.10F.IF.7F.BF.1F.LE.2 |  |
| ~75 |  | 1.3: Linear Equations | Pre-AP Model Lesson 1.15: Converting from Standard Form to Slope–Intercept Form | 1.2.51.3.2, 1.3.3 | A.CED.2–4A.REI.1 |  |
| ~75 |  | 1.3: Linear Equations | Pre-AP Model Lesson 1.16: Solutions to the Standard Form Equation | 1.3.1–1.3.3 | N.Q.1A.CED.2–4A.REI.1, 10F.IF.7 F.BF.1F.LE.2 |  |
| ~45 |  | 1.3: Linear Equations | Parallel and Perpendicular Slope RelationshipsGive students access to a graph with pairs of parallel lines already drawn. Ask students to find the slopes of all lines. Which lines are parallel and what pattern do you see with their slopes?Have students do a few problems of predicting equations of lines parallel to a given equation. Also have them do a few problems with horizontal and vertical lines. Have students graph a few lines given one point and the slope. Determine which lines are parallel and which are perpendicular. What pattern do you see with the slopes of perpendicular lines? Have students write a sentence to describe the relationship between slopes of parallel lines and slopes of perpendicular lines. Have students practice writing equations for a line parallel or perpendicular to a given line and a point not on the given line.  | 1.3.4 | F.LE.2 |  |
| ~45 |  | 1.4: Linear Models of Nonlinear Scenarios | Piecewise Defined FunctionsThere is a great document currently on the platform but not in the student materials. It is located in Unit 1, Lesson Set 6, Student Handouts, and is titled “Modeling with Piecewise Linear Functions.” | 1.4.1–1.4.2 | F.IF.5, 7 |  |
| ~90 |  | 1.4: Linear Models of Nonlinear Scenarios | Scatterplots and Trend LinesHave students gather linear data. One idea is to time how long it takes to pass a textbook. Start with a few students and increase the number of students each time to gather data. Create a scatterplot of the data. Have students describe what happened to the time when the number of students increased. Describe the trend that they see on the scatterplot. Find the trend line by selecting two points from the graph that are not outliers and go through the process of calculating the slope and *y*-intercept in order to write the equation of a trend line. Use the trend line to predict the time to pass a book for *x* values outside of the dataset.  | 1.4.3- 1.4.5 | S.ID.6 |  |
| ~45 |  | 1.3 and 1.4 | **Learning Checkpoint 2***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~60 |  | 1.5: Two-Variable Linear Inequalities | Write and Graph Two-Variable Inequalities to Solve a ProblemIntroduce a real-world problem such as cell phone or data plans. Have students create a two-variable inequality to represent the information. Practice isolating the dependent variable of the inequality in order to write the inequality in slope–intercept form. Graph the linear inequality and introduce solid or dashed lines and shading the solutions. Have students practice identifying ordered pairs within the solution region and describing what it means in context. Also have students identify non-solutions and what they mean in context.  | 1.5.1-3 | A.CED.3A.REI.12 |  |
| ~45 |  | 1.1–1.5 | **Performance Task**Electric Car Sales*This performance task assesses learning objectives and essential knowledge statements addressed in the unit.* |  | N.Q.1A.SSE.1A.CED.2, 3, 4A.REI.1, 10, 12F.IF.1–7F.BF.1, 2F.LE.1, 2, 5S.ID.6, 7 |  |

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### Reflections

What went well in this unit?

When were students most engaged during this unit?

How have students grown? What opportunities for growth stand out at this time?

What needs modification or differentiation next time?

## Unit 2 Systems of Linear Equations and Inequalities

| **Pacing in min** | **Actual Date(s)** | **Key Concepts** | **Materials/Resources/Tasks***Pre-AP Model Lessons, Additional Lessons, Textbooks,* *Performance Tasks, Assessments* | **Learning Objectives** | **State Standards** | **Reflections on Areas of Focus & Shared Principles** |
| --- | --- | --- | --- | --- | --- | --- |
| ~90 |  | 2.1: The Solution to a System of Equations | Pre-AP Model Lesson 2.1: A Geometric Approach to Systems of Linear Equations | 2.1.1 | A.REI.6, 11 |  |
| ~45 |  | 2.1: The Solution to a System of Equations | Pre-AP Model Lesson 2.2: Understanding Solutions to Systems of Equations | 2.1.1 | A.REI.6, 11 |  |
| ~60 |  | 2.1: The Solution to a System of Equations | Pre-AP Model Lesson 2.3: How Many Solutions? | 2.1.1, 2.1.22.3.1 | N.Q.1A.CED.3A.REI.6, 11 |  |
| ~45 |  | 2.1: The Solution to a System of Equations | Pre-AP Model Lesson 2.4: Analyzing Systems Using Graphing Technology | 2.1.1, 2.1.32.3.1 | N.Q.1A.CED.3A.REI.6, 11 |  |
| ~45 |  | 2.1 | **Practice Performance Task**Determining the Best Deal in Movie Streaming Services*This practice performance task assesses learning objectives and essential knowledge statements addressed up to this point in the unit.* |  | N.Q.1A.CED.3A.REI.6, 11 |  |
| ~90 |  | 2.2: Solving a System of Linear Equations Algebraically | Solving Systems with SubstitutionDiscuss the question “What does it mean to substitute?”Use the method of “I do, we do, you do” to go through examples of the substitution method. Pause for peer discussion and questioning after each example. Ask “What do you notice, what do you wonder?”Distribute an exit ticket to check for understanding. Make sure to choose problems that include rational numbers, not just integers.  | 2.2.1, 2.2.2 | A.REI.5, 6 |  |
| ~90 |  | 2.2: Solving a System of Linear Equations Algebraically | Solving Systems with EliminationDiscuss the question “What does it mean to eliminate?”Use the method of “I do, we do, you do” to go through examples of the substitution method. Pause for peer discussion and questioning after each example. Ask “What do you notice, what do you wonder?” Distribute an exit ticket to check for understanding. Make sure to choose problems that include rational numbers, not just integers. | 2.2.1, 2.2.2 | A.REI.6 |  |
| ~90 |  | 2.3: Modeling with Systems of Linear Equations Algebraically | Model with Systems of EquationsUse the rates of change of the equations in a system to predict if there will be one solution, no solutions, or infinite solutions. | 2.3.1, 2.3.2 | N.Q.1A.CED.2,3 |  |
| ~45 |  | 2.1–2.3 | **Learning Checkpoint 1***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~135 |  | 2.4: Systems of Linear inequalities | Pre-AP Model Lesson 2.5: Modeling with Systems of Inequalities | 2.4.1–2.4.3 | N.Q.1A.CED.3A.REI.12 |  |
| ~45 |  | 2.4 | **Practice Performance Task**Part-Time Jobs*This practice performance task assesses learning objectives and essential knowledge statements addressed up to this point in the unit.* |  | N.Q.1A.CED.2, 3A.REI.5, 6, 11, 12 |  |
| ~45 |  | 2.4 | **Learning Checkpoint 2***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~45 |  | 2.1–2.4 | **Performance Task**Packing Flower Pots *This performance task assesses learning objectives and essential knowledge statements addressed in the unit.* |  | N.Q.1A.CED.2, 3A.REI.5, 6, 11, 12 |  |

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### Reflections

What went well in this unit?

When were students most engaged during this unit?

How have students grown? What opportunities for growth stand out at this time?

What needs modification or differentiation next time?

## Unit 3 Quadratic Functions

| **Pacing in min** | **Actual Date(s)** | **Key Concepts** | **Materials/Resources/Tasks***Pre-AP Model Lessons, Additional Lessons, Textbooks, Performance Tasks, Assessments* | **Learning Objectives** | **State Standards** | **Reflections on Areas of Focus & Shared Principles** |
| --- | --- | --- | --- | --- | --- | --- |
| ~90 |  | 3.1: Functions with a Linear Rate of Change | Pre-AP Model Lesson 3.1: Introducing Quadratic Functions | 3.1.1, 3.1.2 | A.REI.10A.CED.2F.IF.4, 7 |  |
| ~90 |  | 3.1: Functions with a Linear Rate of Change | Pre-AP Model Lesson 3.2: Area Models for QuadraticFunctions | 3.1.1, 3.1.23.4.1 | A.REI.10A.CED.2F.IF.4, 5, 7F.BF.1 |  |
| ~135 |  | 3.1: Functions with a Linear Rate of Change | Pre-AP Model Lesson 3.3: Revenue and Profit | 3.1.23.4.1, 3.4.3 | A.REI.10A.CED.2F.IF.4, 5, 7, 8F.BF.1 |  |
| ~90 |  | 3.2: The Algebra and Geometry of Quadratic Functions | Pre-AP Model Lesson 3.4: The Factored Form of a Quadratic | 3.2.1–3.2.3 | A.SSE.2A.CED.2F.IF.4, 8 |  |
| ~60 |  | 3.2: The Algebra and Geometry of Quadratic Functions | Pre-AP Model Lesson 3.5: Graphs and the Factored Form of a Quadratic | 3.2.2–3.2.4 | A.SSE.2, 3A.CED.2F.IF.4, 8F.BF.1 |  |
| ~45 |  | 3.1 and 3.2 | **Practice Performance Task**The Catapult*This practice performance task assesses learning objectives and essential knowledge statements addressed up to this point in the unit.* |  | A.REI.10A.SSE.1–3A.CED.2F.IF.4, 5, 7, 8F.BF.1 |  |
| ~45 |  | 3.1 and 3.2 | **Learning Checkpoint 1***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~55 |  | 3.3: Solving Quadratic Equations | Pre-AP Model Lesson 3.6: Connecting Standard Form to Vertex Form | 3.2.2, 3.2.3 | A.SSE.2, 3A.CED.2F.IF.4, 8 |  |
| ~75 |  | 3.3: Solving Quadratic Equations | Pre-AP Model Lesson 3.7: Quadratic Formula | 3.2.23.3.5 | A.SSE.2, 3A.CED.2A.REI.7F.IF.4 |  |
| ~45 |  | 3.3: Solving Quadratic Equations | Pre-AP Model Lesson 3.8: The Symmetry of the Parabola | 3.2.33.3.13.4.3 | A.SSE.3A.CED.2F.IF.4, 7, 8 |  |
| ~60 |  | 3.3: Solving Quadratic Equations | Pre-AP Model Lesson 3.9: Interpreting the DiscriminantConclude the lesson with “the value of the discriminant of the quadratic equation can be used to determine whether the quadratic equation has two distinct real solutions (D > 0), one real solution (D = 0), or no real solutions (D < 0).”  | 3.3.2, 3.3.5, 3.3.6 | A.REI.4, 7 |  |
| ~60 |  | 3.4: Modeling with Quadratic Functions | Pre-AP Model Lesson 3.10 Pursuit Problems | 3.3.53.4.1, 3.4.2 | A.SSE.1A.CED.2A.REI.4, 7F.IF.4, 5F.BF.1 |  |
| ~45 |  | 3.4: Modeling with Quadratic Functions | Pre-AP Model Lesson 3.11: Gravity and Free-Fall Investigations | 3.2.43.4.1, 3.4.2 | A.SSE.1A.CED.2A.REI.4F.IF.5F.BF.1 |  |
| ~60 |  | 3.4: Modeling with Quadratic Functions | Pre-AP Model Lesson 3.12: The Golden Ratio | 3.3.53.4.1 | A.SSE.1A.CED.2A.REI.4, 7F.IF.4, 5F.BF.1 |  |
| ~60 |  | 3.4: Modeling with Quadratic Functions | Pre-AP Model Lesson 3.13 Finding a Formula for Triangular Numbers | 3.1.13.2.43.3.5 | A.REI.4, 7F.IF.4 |  |
| ~45 |  | 3.1–3.4 | **Practice Performance Task**Weaving a Rug*This practice performance task assesses learning objectives and essential knowledge statements addressed up to this point in the unit.* |  | A.REI.10A.SSE.1–3A.CED.2A.REI.4, 7F.IF.4, 5, 7, 8F.BF.1 |  |
| ~45 |  | 3.3 and 3.4 | **Learning Checkpoint 2***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~45 |  | 3.1–3.4 | **Performance Task**The Path of a Football*This performance task assesses learning objectives and essential knowledge statements addressed in the unit.* |  | A.REI.10A.SSE.1, 3A.CED.2A.REI.4, 7F.IF.4, 5, 7, 8F.BF.1 |  |

[add or remove rows as needed]

### Reflections

What went well in this unit?

When were students most engaged during this unit?

How have students grown? What opportunities for growth stand out at this time?

What needs modification or differentiation next time?

## Unit 4 Exponent Properties and Exponential Functions

| **Pacing in min** | **Actual Date(s)** | **Key Concepts** | **Materials/Resources/Tasks***Pre-AP Model Lessons, Additional Lessons, Textbooks, Performance Tasks, Assessments* | **Learning Objectives** | **State Standards** | **Reflections on Areas of Focus & Shared Principles** |
| --- | --- | --- | --- | --- | --- | --- |
| ~120 |  | 4.1: Exponent Rules and Properties | Product Rule, Quotient Rule, Power Rule, Power of a Product Rule, Power of a Quotient Rule, Zero Exponent, Negative Exponent, Fractional ExponentHave students develop the rules/properties of exponents by first working with expanded form and then simplified from. After completing 3–4 problems this way, have students discuss any patterns they notice. Then, define the rule/property and then use it to simplify. Repeat this process for each rule/property. Follow with practice simplifying expressions using 2 or more properties.  | 4.1.1, 4.1.2 | A.SSE.3N.RN.2 |  |
| ~45 |  | 4.1: Exponent Rules and Properties | **Practice Performance Task**Exponent Properties*This practice performance task assesses learning objectives and essential knowledge statements addressed up to this point in the unit.* |  | N.RN.2A.SSE.3 |  |
| ~90 |  | 4.2: Roots of Real Numbers | Radical Expressions and OperationsHave students recognize when the radicand is a multiple of a perfect square. For example, $\sqrt{75}= \sqrt{25∙3}=\sqrt{25}∙\sqrt{3}=5\sqrt{3}$.After students master simplifying radicals, practice procedures to add, subtract, multiply, and divide radicals. Include rationalizing the denominator.  | 4.2.1–4.2.3 | N.RN.2, 3A.SSE.3 |  |
| ~45 |  | 4.1 and 4.2 | **Learning Checkpoint 1***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~45 |  | 4.3: Sequences with Multiplicative Patterns | Pre-AP Model Lesson 4.1: Counting Binary Strings | 4.3.1 | F.IF.3, 5F.BF.1, 2F.LE.1, 2 |  |
| ~90 |  | 4.3: Sequences with Multiplicative Patterns | Pre-AP Model Lesson 4.2: Multiplicative PatternsAnalyzing graphical representations is not a part of this model lesson but can be introduced in the investigation part of this lesson. Students should start to discover and recognize that the points will lie on a curve, but not a parabola.  | 4.3.1, 4.3.2 | F.IF.3, 5F.BF.1, 2F.LE.1, 2 |  |
| ~120 |  | 4.3: Sequences with Multiplicative Patterns | Pre-AP Model Lesson 4.3: Finding Terms in a Geometric Sequence | 4.3.1, 4.3.2 | F.IF.3, 5F.BF.1, 2F.LE.2 |  |
| ~135 |  | 4.4: Exponential Growth and Decay | Pre-AP Model Lesson 4.4: Graphing Exponential FunctionStudents are expected to know how to determine if an exponential relationship has a growth factor (ratio of any two output values greater than 1) or decay factor (ratio of any two values between 0 and 1). Additionally, students should know how to use a table of values to determine approximate output for a specified input and input for a specified output. Be sure to include additional instruction to address the information above which is not included within Pre-AP Model Lesson 4.4.  | 4.3.3,4.4.1–4.4.3 | A.CED.2A.REI.10F.IF.4, F.BF.1F.LE.1, 2 |  |
| ~60 |  | 4.4: Exponential Growth and Decay | Pre-AP Model Lesson 4.5: Modeling with Exponential FunctionsStudents are expected to generate a table of values, construct a graph, and write an algebraic representation of an exponential function. Students should not solve problems involving formulas relating to geometric sequences, compound interest, or logarithms as these topics are beyond the scope of the course. | 4.4.3–4.4.5 | A.CED.2A.REI.10F.IF. 2, 4, 7F.BF.1F.LE.2 |  |
| ~45 |  | 4.4 | **Learning Checkpoint 2***This learning checkpoint can assess any of the learning objectives from its associated Key Concepts.* |  |  |  |
| ~45 |  | 4.1–4.4 | **Performance Task**Computer-Aided Drawing*This performance task assesses learning objectives and essential knowledge statements addressed in the unit.* |   | N.Q.1A.SSE.1N.RN.1, 2A.REI.10F.IF.2–7F.BF.1, 2F.LE.1, 2, 5A.SSE.3N.RN.3 |  |

[add or remove rows as needed]

### Reflections

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When were students most engaged during this unit?

How have students grown? What opportunities for growth stand out at this time?

What needs modification or differentiation next time?