

#### Vertical Progression:

<b>8<sup>th</sup> Grade</b>	<p><b>8.EE.C Analyze and solve pairs of simultaneous linear equations.</b></p> <ul style="list-style-type: none"> <li>○ <b>8.EE.C.8a</b> Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.</li> <li>○ <b>8.EE.C.8b</b> Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, <math>3x + 2y = 5</math> and <math>3x + 2y = 6</math> have no solution because <math>3x + 2y</math> cannot simultaneously be 5 and 6.</i></li> <li>○ <b>8.EE.C.8c</b> Solve real-world and mathematical problems leading to two linear equations in two variables. <i>For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</i></li> </ul>
<b>Algebra 1</b>	<p><b>ELG.MA.HS.A.10 Solve systems of equations.</b></p> <ul style="list-style-type: none"> <li>○ <b>A-REI.5</b> Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.</li> <li>○ <b>A-REI.6</b> Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</li> </ul>
<b>Algebra 2</b>	<p><b>ELG.MA.HS.A.10 Solve systems of equations.</b></p> <ul style="list-style-type: none"> <li>○ <b>A-REI.6</b> Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</li> <li>○ <b>A-REI.7</b> Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. <i>For example, find the points of intersection between the line <math>y = -3x</math> and the circle <math>x^2 + y^2 = 3</math>.</i></li> </ul> <p>Note: students solve 2x2 and 3x3 systems.</p>
	<p><b>ELG.MA.HS.A.10 Solve systems of equations.</b></p> <ul style="list-style-type: none"> <li>○ <b>A-REI.8 (+)</b> Represent a system of linear equations as a single matrix equation in a vector variable.</li> <li>○ <b>A-REI.9 (+)</b> Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension <math>3 \times 3</math> or greater).</li> </ul>

#### Students will demonstrate command of the ELG by:

- Writing a system of two/three linear equations in two/three variables to model a mathematical or real-world situation, solving the system, and interpreting the results in terms of the situation context.
- Solving a system of two linear equations graphically, algebraically, or with a table.
- Solving a system of three linear equations algebraically or with technology.
- Solving a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
- Determining the nature of the solutions (infinite, exactly one, or none).
- Checking the solution to a system by substituting into both equations.
- Writing a solution to a system as an ordered pair, with both an x-value and a y-value.

### Vocabulary:

- elimination
- infinite solutions
- intersection
- linear equation
- no solution
- substitution
- system of equations

### Sample Instructional/Assessment Tasks:

#### 1) Standard(s): A-REI.6

Source: Adapted from PARCC EOY Practice Test Algebra 2

#### Item Prompt:

What is the solution of the system of equations?

$$x - 9y + 4z = 1$$

$$-2x + 9y - 4z = -3$$

$$2x + y - 4z = -3$$

#### Correct Answer:

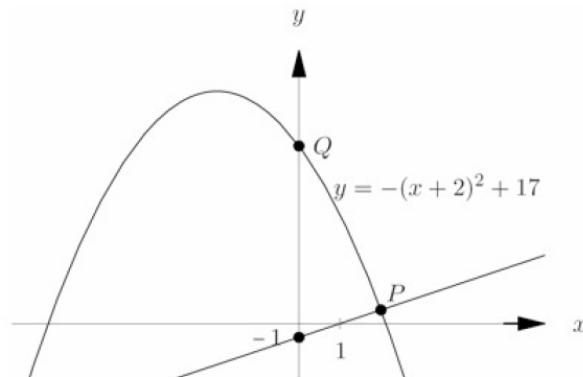
(2,1,2)

#### 2) Standard(s): A-REI.7

Source: <https://www.illustrativemathematics.org/content-standards/HSA/REI/C/7/tasks/576>

#### Item Prompt:

Consider the linear and quadratic functions appearing in the figure below.



- a. What are the coordinates of the point Q? Show step-by-step algebra work.
- b. What are the coordinates of the point P? Show step-by-step algebra work.

**Correct Answer:**

a.  $Q(0,13)$

b.  $P(2,1)$

**3) Standard(s): A-REI.6**

**Source:** <https://www.illustrativemathematics.org/content-standards/HSA/REI/C/6/tasks/763> (Part A only)

**Item Prompt:**

In 1983, the composition of pennies in the United States was changed due, in part, to the rising cost of copper. Pennies minted after 1983 weigh 2.50 grams while the earlier copper pennies, from 1865 through 1983, weigh 3.11 grams. Pennies made between 1859 and 1864 had a different composition, with the same diameter, and weighed 4.67 grams.

a. A roll of pennies contains 50 coins. If a roll of pennies weighs 145 grams (to the nearest hundredth of a gram), how many pennies of each type does the roll contain?

**Correct Answers:**

a. 30 pennies weighing 2.50 grams, 15 pennies weighing 3.11 grams, and 5 pennies weighing 4.67 grams