A.REI.D.11 Quadratic-Linear Systems 1
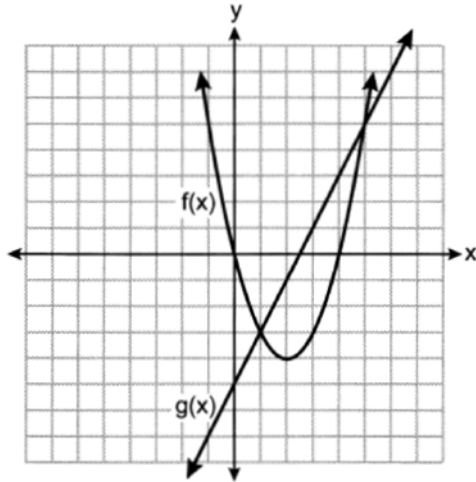
1 The functions $f(x)$ and $g(x)$ are graphed on the set of axes below.

What is the solution to the equation $f(x) = g(x)$?
1)   1 and 5
2)   −5 and 0
3)   −3 and 5
4)   0 and 4

2 If $f(x) = x^2 + 2x + 1$ and $g(x) = 7x - 5$, for which values of x is $f(x) = g(x)$?
1)   −1 and 6
2)   −6 and −1
3)   −3 and −2
4)   2 and 3

3 The functions $f(x) = x^2 - 5x - 14$ and $g(x) = x + 2$ are graphed on the same set of axes. What are the solutions to the equation $f(x) = g(x)$?
1)   −14 and 0
2)   0 and 2
3)   −2 and 8
4)   −2 and 7

4 If $f(x) = x^2 - 2x - 8$ and $g(x) = \frac{1}{4}x - 1$, for which value of x is $f(x) = g(x)$?
1)   −1.75 and −1.438
2)   −1.75 and 4
3)   −1.438 and 0
4)   4 and 0

5 If $f(x) = x^2$ and $g(x) = x$, determine the value(s) of x that satisfy the equation $f(x) = g(x)$.

6 John and Sarah are each saving money for a car. The total amount of money John will save is given by the function $f(x) = 60 + 5x$. The total amount of money Sarah will save is given by the function $g(x) = x^2 + 46$. After how many weeks, x, will they have the same amount of money saved? Explain how you arrived at your answer.

7 Given: $g(x) = 2x^2 + 3x + 10$

  $k(x) = 2x + 16$

Solve the equation $g(x) = 2k(x)$ algebraically for x, to the *nearest tenth*. Explain why you chose the method you used to solve this quadratic equation.

8 Let $f(x) = -2x^2$ and $g(x) = 2x - 4$. On the set of axes below, draw the graphs of $y = f(x)$ and $y = g(x)$.
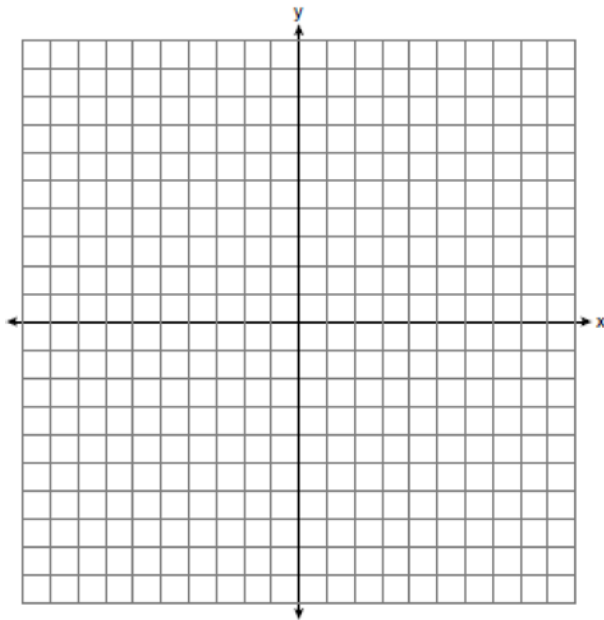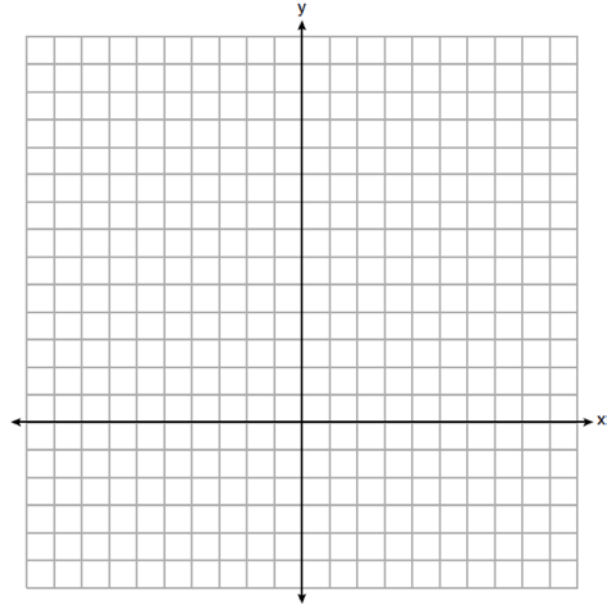

Using this graph, determine and state *all* values of x for which $f(x) = g(x)$.

9 Graph $y = f(x)$ and $y = g(x)$ on the set of axes below.
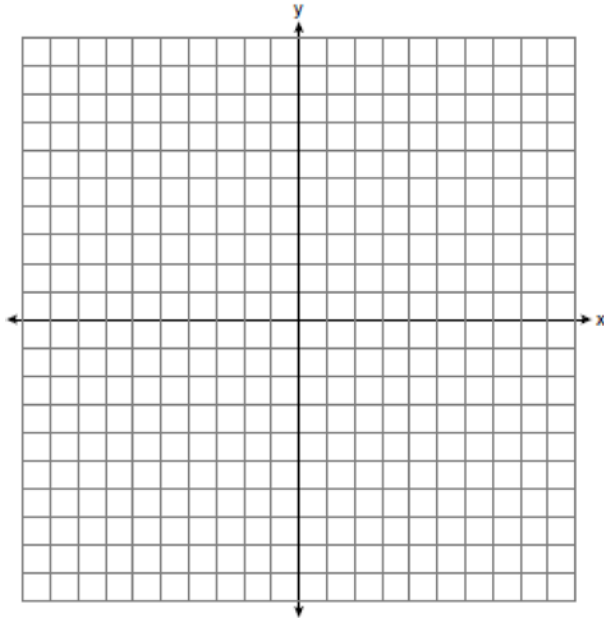
  $f(x) = 2x^2 - 8x + 3$

  $g(x) = -2x + 3$

Determine and state all values of x for which $f(x) = g(x)$.

10 Graph $f(x)$ and $g(x)$ on the set of axes below.

$$f(x) = x^2 - 4x + 3$$

$$g(x) = \frac{1}{2}x + 1$$

Based on your graph, state *one* value of x that satisfies $f(x) = g(x)$. Explain your reasoning.

11 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*. Graph the production cost functions on the set of axes below and label them site A and site B.
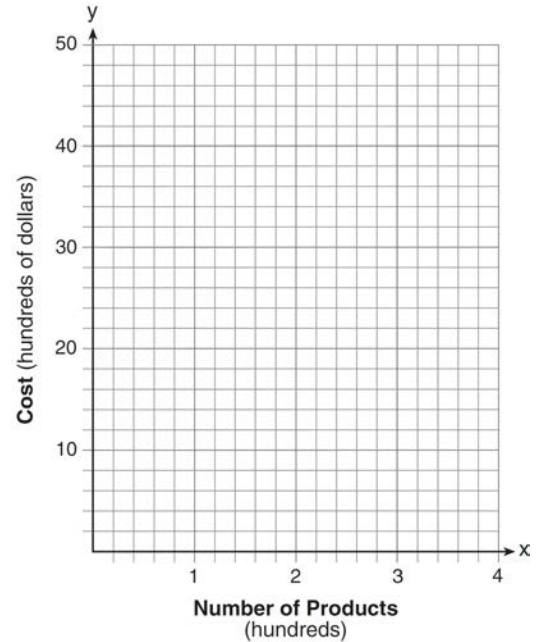
State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer. If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

3

A.REI.D.11 Quadratic-Linear Systems 1
Answer Section

1 ANS: 1   REF: 062420ai

2 ANS: 4

$$x^2 + 2x + 1 = 7x - 5$$

$$x^2 - 5x + 6 = 0$$

$$(x - 3)(x - 2) = 0$$

$$x = 3, 2$$

REF: 012312ai

3 ANS: 3

$$x^2 - 5x - 14 = x + 2$$

$$x^2 - 6x - 16 = 0$$

$$(x - 8)(x + 2) = 0$$

$$x = 8, -2$$

REF: 082416ai

4 ANS: 2

$$x^2 - 2x - 8 = \frac{1}{4}x - 1$$

$$4x^2 - 8x - 32 = x - 4$$

$$4x^2 - 9x - 28 = 0$$

$$(4x + 7)(x - 4) = 0$$

$$x = -\frac{7}{4}, 4$$

REF: 081517ai

5 ANS:

$$x^2 = x$$

$$x^2 - x = 0$$

$$x(x - 1) = 0$$

$$x = 0, 1$$

REF: 061731ai

6 ANS:

$x^2 + 46 = 60 + 5x$ John and Sarah will have the same amount of money saved at 7 weeks. I set the

$x^2 - 5x - 14 = 0$

$(x - 7)(x + 2) = 0$

$x = 7$

expressions representing their savings equal to each other and solved for the positive value of x by factoring.
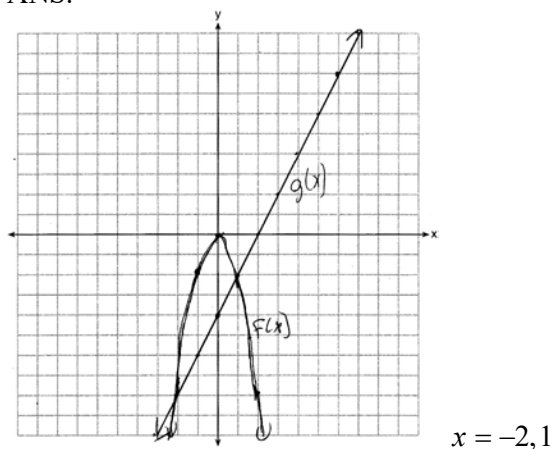
REF: 061527ai

7 ANS:

$2x^2 + 3x + 10 = 4x + 32$ $x = \dfrac{1 \pm \sqrt{(-1)^2 - 4(2)(-22)}}{2(2)} \approx -3.1, 3.6.$ Quadratic formula, because the answer must be

$2x^2 - x - 22 = 0$

to the nearest tenth.

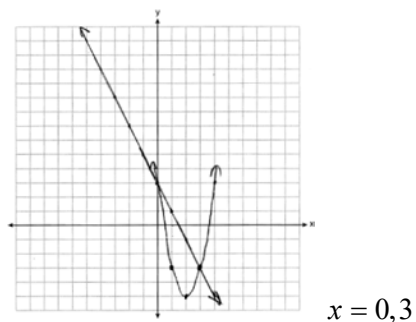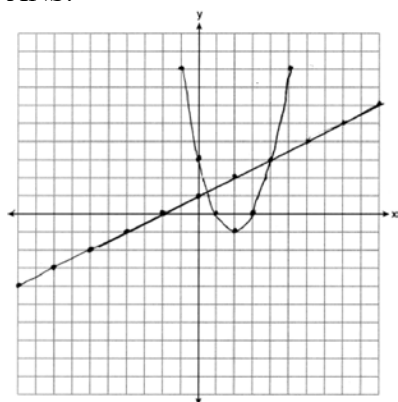REF: 061735ai

8 ANS:

$x = -2, 1$

REF: 081435ai

9 ANS:

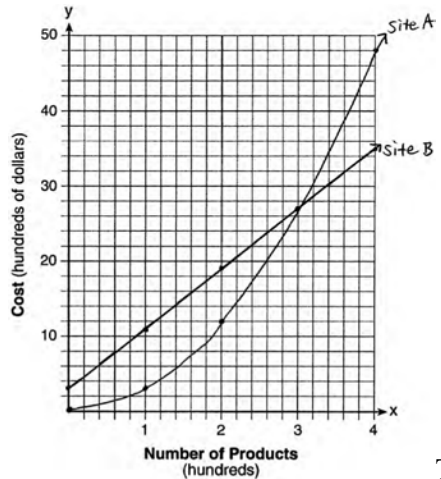$x = 0, 3$

REF: 061934ai

10 ANS:

At $x = \dfrac{1}{2}$, f intersects g.

REF: 082234ai

11 ANS:

The graphs of the production costs intersect at $x = 3$. The company should use Site A, because the cost of Site A is lower at $x = 2$.

REF: 061437ai