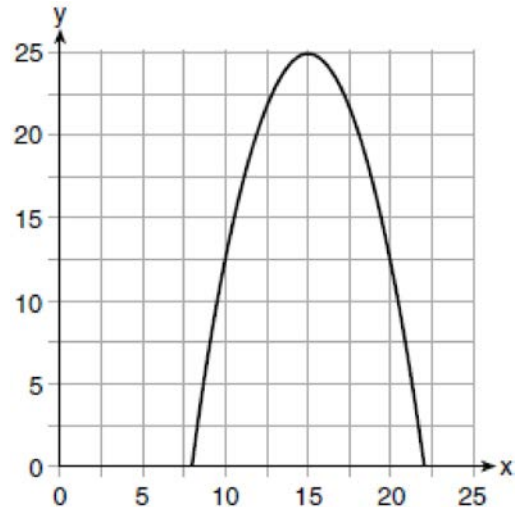## F.IF.C.8: Graphing Quadratic Functions

1 In the function $f(x) = (x - 2)^2 + 4$, the minimum value occurs when x is
   1) −2
   2) 2
   3) −4
   4) 4

2 If Lylah completes the square for $f(x) = x^2 - 12x + 7$ in order to find the minimum, she must write $f(x)$ in the general form $f(x) = (x - a)^2 + b$. What is the value of a for $f(x)$?
   1) 6
   2) −6
   3) 12
   4) −12

3 Which equation is equivalent to $y = x^2 + 24x - 18$?
   1) $y = (x + 12)^2 - 162$
   2) $y = (x + 12)^2 + 126$
   3) $y = (x - 12)^2 - 162$
   4) $y = (x - 12)^2 + 126$

4 The function $f(x) = 3x^2 + 12x + 11$ can be written in vertex form as
   1) $f(x) = (3x + 6)^2 - 25$
   2) $f(x) = 3(x + 6)^2 - 25$
   3) $f(x) = 3(x + 2)^2 - 1$
   4) $f(x) = 3(x + 2)^2 + 7$

5 Which equation is equivalent to $y - 34 = x(x - 12)$?
   1) $y = (x - 17)(x + 2)$
   2) $y = (x - 17)(x - 2)$
   3) $y = (x - 6)^2 + 2$
   4) $y = (x - 6)^2 - 2$

6 Which equation and ordered pair represent the correct vertex form and vertex for $j(x) = x^2 - 12x + 7$?
   1) $j(x) = (x - 6)^2 + 43$, $(6,43)$
   2) $j(x) = (x - 6)^2 + 43$, $(-6,43)$
   3) $j(x) = (x - 6)^2 - 29$, $(6,-29)$
   4) $j(x) = (x - 6)^2 - 29$, $(-6,-29)$

7 The graph of a quadratic function is shown below.

An equation that represents the function could be
   1) $q(x) = \frac{1}{2}(x + 15)^2 - 25$
   2) $q(x) = -\frac{1}{2}(x + 15)^2 - 25$
   3) $q(x) = \frac{1}{2}(x - 15)^2 + 25$
   4) $q(x) = -\frac{1}{2}(x - 15)^2 + 25$

8 Determine and state the vertex of $f(x) = x^2 - 2x - 8$ using the method of completing the square.

9 Use the method of completing the square to determine the vertex of $f(x) = x^2 - 14x - 15$. State the coordinates of the vertex.

10 a) Given the function $f(x) = -x^2 + 8x + 9$, state whether the vertex represents a maximum or minimum point for the function. Explain your answer.
    b) Rewrite $f(x)$ in vertex form by completing the square.

F.IF.C.8: Graphing Quadratic Functions
Answer Section

1 ANS: 2   REF: 011601ai
2 ANS: 1

$x^2 - 12x + 7$

$x^2 - 12x + 36 - 29$

$(x - 6)^2 - 29$

REF: 081520ai
3 ANS: 1

$y = x^2 + 24x + 144 - 18 - 144$

$y = (x + 12)^2 - 162$

REF: 081911ai
4 ANS: 3

$3(x^2 + 4x + 4) - 12 + 11$

$3(x + 2)^2 - 1$

REF: 081621ai
5 ANS: 4

$y - 34 = x^2 - 12x$

$y = x^2 - 12x + 34$

$y = x^2 - 12x + 36 - 2$

$y = (x - 6)^2 - 2$

REF: 011607ai
6 ANS: 3

$j(x) = x^2 - 12x + 36 + 7 - 36$

$= (x - 6)^2 - 29$

REF: 061616ai
7 ANS: 4

Vertex $(15, 25)$, point $(10, 12.5)$ $12.5 = a(10 - 15)^2 + 25$

$-12.5 = 25a$

$-\dfrac{1}{2} = a$

REF: 061716ai

8 ANS:

$f(x) = \left(x^2 - 2x + 1\right) - 8 - 1 = (x - 1)^2 - 9 \ \ (1,-9)$

REF: 061932ai

9 ANS:

$f(x) = x^2 - 14x + 49 - 15 - 49 = (x - 7)^2 - 64 \ \ (7,-64)$

REF: 062130ai

10 ANS:

The vertex represents a maximum since $a < 0$. $f(x) = -x^2 + 8x + 9$

$$= -(x^2 - 8x - 9)$$
$$= -(x^2 - 8x + 16) + 9 + 16$$
$$= -(x - 4)^2 + 25$$

REF: 011536ai