

Lesson 22 Practice Problems

1. The following quadratic expressions all define the same function.

$$(x + 5)(x + 3)$$

$$x^2 + 8x + 15$$

$$(x + 4)^2 - 1$$

Select **all** of the statements that are true about the graph of this function.

- A. The y -intercept is $(0, -15)$.
- B. The vertex is $(-4, -1)$.
- C. The x -intercepts are $(-5, 0)$ and $(-3, 0)$.
- D. The x -intercepts are $(0, 5)$ and $(0, 3)$.
- E. The x -intercept is $(0, 15)$.
- F. The y -intercept is $(0, 15)$.
- G. The vertex is $(4, -1)$.

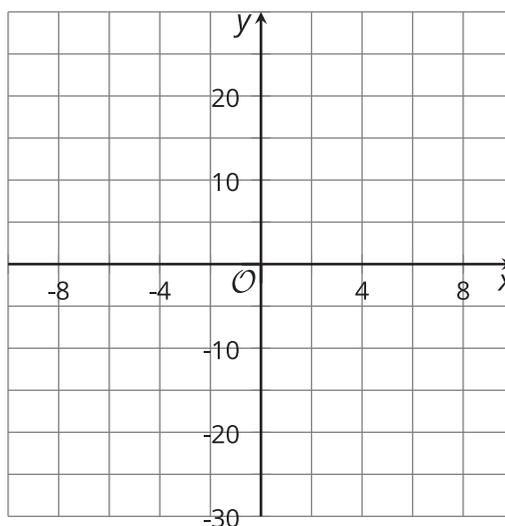
2. The following expressions all define the same quadratic function.

$$(x - 4)(x + 6)$$

$$x^2 + 2x - 24$$

$$(x + 1)^2 - 25$$

- a. What is the y -intercept of the graph of the function?
- b. What are the x -intercepts of the graph?
- c. What is the vertex of the graph?
- d. Sketch a graph of the function without graphing technology. Make sure the x -intercepts, y -intercept, and vertex are plotted accurately.



3. Here is one way an expression in standard form is rewritten into vertex form.

$$x^2 - 7x + 6 \quad \text{original expression}$$

$$x^2 - 7x + \left(-\frac{7}{2}\right)^2 + 6 - \left(-\frac{7}{2}\right)^2 \quad \text{step 1}$$

$$\left(x - \frac{7}{2}\right)^2 + 6 - \frac{49}{4} \quad \text{step 2}$$

$$\left(x - \frac{7}{2}\right)^2 + \frac{24}{4} - \frac{49}{4} \quad \text{step 3}$$

$$\left(x - \frac{7}{2}\right)^2 - \frac{25}{4} \quad \text{step 4}$$

- In step 1, where did the number $-\frac{7}{2}$ come from?
- In step 1, why was $\left(-\frac{7}{2}\right)^2$ added and then subtracted?
- What happened in step 2?
- What happened in step 3?
- What does the last expression tell us about the graph of a function defined by this expression?

4. Rewrite each quadratic expression in vertex form.

a. $d(x) = x^2 + 12x + 36$

b. $f(x) = x^2 + 10x + 21$

c. $g(x) = 2x^2 - 20x + 32$

5. a. Give an example that shows that the sum of two irrational numbers can be rational.
- b. Give an example that shows that the sum of two irrational numbers can be irrational.

(From Unit 7, Lesson 21.)

6. a. Give an example that shows that the product of two irrational numbers can be rational.
- b. Give an example that shows that the product of two irrational numbers can be irrational.

(From Unit 7, Lesson 21.)

7. Select **all** the equations with irrational solutions.

A. $36 = x^2$

B. $x^2 = \frac{1}{4}$

C. $x^2 = 8$

D. $2x^2 = 8$

E. $x^2 = 0$

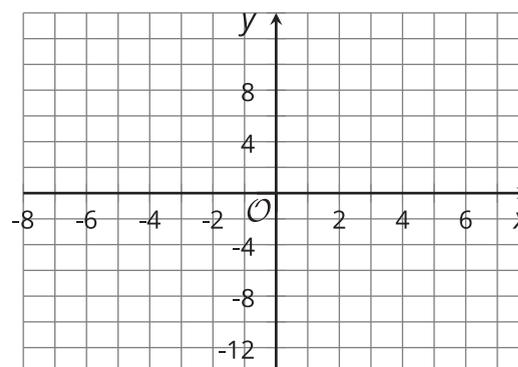
F. $x^2 = 40$

G. $9 = x^2 - 1$

(From Unit 7, Lesson 15.)

8. a. What are the coordinates of the vertex of the graph of the function defined by $f(x) = 2(x + 1)^2 - 4$?
- b. Find the coordinates of two other points on the graph.

c. Sketch the graph of f .



(From Unit 6, Lesson 16.)

9. How is the graph of the equation $y = (x - 1)^2 + 4$ related to the graph of the equation $y = x^2$?

- A. The graph of $y = (x - 1)^2 + 4$ is the same as the graph of $y = x^2$ but is shifted 1 unit to the right and 4 units up.
- B. The graph of $y = (x - 1)^2 + 4$ is the same as the graph of $y = x^2$ but is shifted 1 unit to the left and 4 units up.
- C. The graph of $y = (x - 1)^2 + 4$ is the same as the graph of $y = x^2$ but is shifted 1 unit to the right and 4 units down.
- D. The graph of $y = (x - 1)^2 + 4$ is the same as the graph of $y = x^2$ but is shifted 1 unit to the left and 4 units down.

(From Unit 6, Lesson 17.)