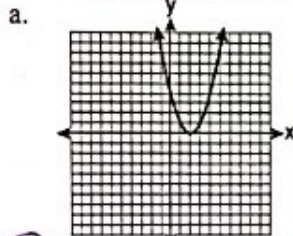Multiple Choice -*Identify the choice that best completes the statement or answers the question. Make sure to show ALL work to receive full credit.*
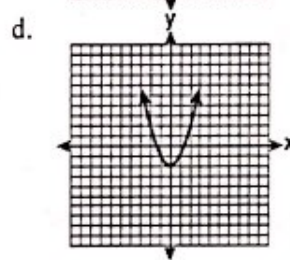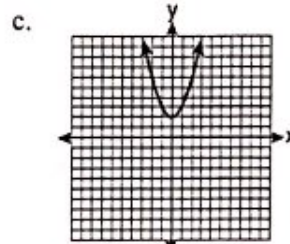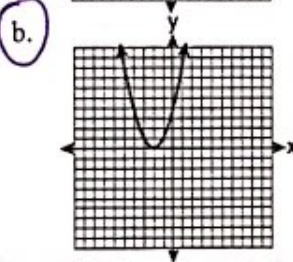
1. The graph below shows the function $f(x)$.

   c.

   d.
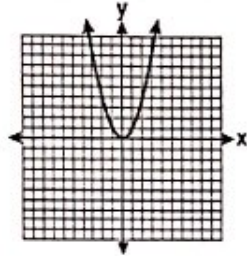
   Which graph represents the function $f(x+2)$?

   a.

   Left 2

   b.

2. When factored completely, $x^3 - 13x^2 - 30x$ is
   a. $x(x+3)(x-10)$
   b. $x(x-3)(x-10)$
   c. $x(x+2)(x-15)$
   d. $x(x-2)(x+15)$

   $X(x^2-13x-30)$ -15×2
   $X(x-15)(x+2)$ -13
   -30

3. Factored completely, the expression $2x^2 + 10x - 12$ is equivalent to
   a. $2(x-6)(x+1)$
   b. $2(x+6)(x-1)$
   c. $2(x+2)(x+3)$
   d. $2(x-2)(x-3)$

   $2(x^2+5x-6)$
   $2(x+6)(x-1)$

Short Answer- Show *ALL* work to receive full credit.

4. Rewrite each of these quadratic expressions in an equivalent factored form.

   a. $x^2 + 13x - 30$

   15×-2 -30 13
   $(x+15)(x-2)$

   b. $9x^2 - 25$

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

   c. $28x^2 + 4x$

   $4x(7x+1)$

   d. $x^2 - 18x + 81$

   $(x-9)(x-9)$
   or
   $(x-9)^2$

   -9×-9 81 -18

8. *(top margin work)*

$$x = \frac{-b}{2a} \qquad \begin{aligned} y &= 3(-1)^2 + 6(-1) + 1 \\ &= 3 - 6 + 1 = -2 \end{aligned}$$

5. Rewrite each sum or difference in standard polynomial form.

a. $(5x^3 + 3x^2 - 4) + (x^4 - 3x^2 + 10)$

$$x^4 + 5x^3 + 6$$

b. $(15 - 3x^3 + 4x) - (5x^3 + 8)$

$$-8x^3 + 4x + 7$$

6. Consider the quadratic function $f(x) = x^2 - 12x + 27$.

a. Find the value of $f(8)$.

$$f(8) = 8^2 - 12(8) + 27$$
$$= 64 - 96 + 27 = \boxed{-5}$$

b. Find the y-intercept of the graph of $f(x)$.

$$\textcircled{0} \quad y = 0 - 12(0) + 27$$
$$\boxed{y = 27} \to c \text{ value}$$

7. Write a rule for a quadratic function with a graph that has x-intercepts $(2, 0)$ and $(-6, 0)$ and a maximum point of $(-2, 4)$.

$$y = a(x-2)(x+6)$$
$$4 = a(-2-2)(-2+6)$$
$$4 = a(-4)(4)$$
$$-\tfrac{1}{4} = a$$

$$\boxed{y = -\tfrac{1}{4}(x-2)(x+6)}$$

8. What is the vertex of the graph of the equation $y = 3x^2 + 6x + 1$? Solve algebraically.

$$x = \frac{-6}{2(3)} = \frac{-6}{6} = -1 \qquad (-1, -2)$$

9. a. Find a rule for a quadratic function that opens up and has x-intercepts of $(-3, 0)$ and $(5, 0)$.

$$y = (x+3)(x-5)$$

b. Without using your calculator, find the coordinates of the minimum point of the graph of your function in Part a.

$$y = x^2 - 2x - 15 \qquad \boxed{(1, -16)}$$
$$x = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1$$
$$y = 1^2 - 2(1) - 15$$
$$= 1 - 2 - 15 = -16$$

11. Write a rule for a quadratic function with a graph that has x-intercepts $(-2, 0)$ and $(8, 0)$ and y-intercept $(0, 8)$.

$$y = a(x+2)(x-8)$$
$$8 = a(0+2)(0-8)$$
$$8 = a(-16)$$
$$-\tfrac{1}{2} = a$$

$$\boxed{y = -\tfrac{1}{2}(x+2)(x-8)}$$

12. Rewrite each of these quadratic expressions in equivalent standard form.

a. $(x - 8)(x + 8)$

$$x^2 + 8x - 8x - 64$$
$$= \boxed{x^2 - 64}$$

b. $(2x + 7)(x + 3)$

$$2x^2 + 6x + 7x + 21$$
$$= \boxed{2x^2 + 13x + 21}$$

c. $(x+3)(x+3)$

$x^2 + 3x + 3x + 9$

$= \boxed{x^2 + 6x + 9}$

d. $(x-4)(x+11)$

$x^2 + 11x - 4x - 44$

$= \boxed{x^2 + 7x - 44}$

13. Describe the transformations occurring from the parent function $y = x^2$ to each of the following functions.

a. $y = (x+2)^2$

Left 2

b. $y = -4x^2$

- Reflect x-axis
- V. Stretch by 4

c. $y = (x+2)^2 - 3$

Left 2
↓3

d. $y = \frac{2}{5}(x+2)^2 + 1$

- V. comp by ⅖
- Left 2   - up 1

14. Given the parent function f(x), write an equation given the following transformations.

a. Reflection across the y-axis, up four units, and vertical stretch by 2

$y = 2f(-x) + 4$

b. Reflection across the x-axis, left 7 units

$y = -f(x+7)$

c. Vertical compression by 1/3, right 2 units, and down 5 units

$y = \frac{1}{3}f(x-2) - 5$