College Algebra
Section 3.1
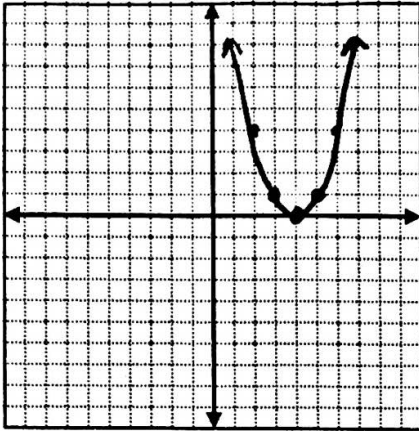Write the quadratic in vertex form and identify the key parts of each quadratic and graph.

1) $f(x) = x^2 - 8x + 16$

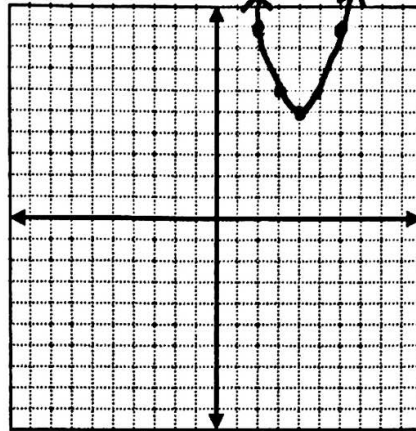Vertex Form:

$$y = (x-4)^2$$

Vertex: $(4, 0)$

Axis of Symmetry: $X = 4$

Min/Max: min @ 0

y-intercept: 16

x-intercept: 4

2) $f(x) = x^2 - 8x + 21$

Vertex Form:

$$y = (x-4)^2 + 5$$

Vertex: $(4, 5)$
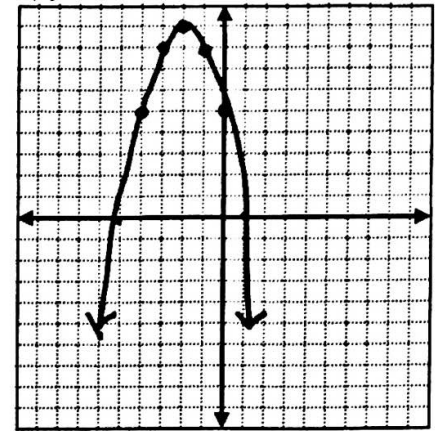
Axis of Symmetry: $X = 4$

Min/Max: min @ 5

y-intercept: 21

x-intercept: NA

3) $f(x) = -x^2 - 4x + 5$

Vertex Form:

$$y = (x+2)^2 + 9$$

Vertex: $(-2, 9)$

Axis of Symmetry: $X = -2$

Min/Max: max @ 9

y-intercept: 5

x-intercept: $-5, 1$

Convert each equation to vertex form and identify key parts.

4) $f(x) = 2x^2 - 4x + 1$
Vertex Form:

$$y = 2(x-1)^2 - 1$$

Vertex: $(1, -1)$

Axis of Symmetry: $X = 1$

Min/Max: min @ -1

y-intercept: 1

x-intercept: $1 \pm \frac{\sqrt{2}}{2}$

5) $f(x) = x^2 - 8x + 11$
Vertex Form:

$$y = (x-4)^2 - 5$$

Vertex: $(4, -5)$

Axis of Symmetry: $X = 4$

Min/Max: min @ -5

y-intercept: 11

x-intercept: $4 \pm \sqrt{5}$

6) $f(x) = -x^2 - 2x + 3$
Vertex Form:

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

Vertex: $(-1, 4)$

Axis of Symmetry: $X = -1$

Min/Max: max @ 4

y-intercept: 3

x-intercept: $-3, 1$

Write the vertex form of the quadratic function with the given vertex and passes through the point.

7) Vertex: (2, 5)	8) Vertex: (1, − 2)	9) Vertex: (− 2, − 3)
Point: (0, 9)	Point: (− 1, 14)	Point: (-3, 7)

$$y = (x-2)^2 + 5 \qquad y = 4(x-1)^2 - 2 \qquad y = 10(x+2)^2 - 3$$

Find the roots of the function.

10) $5n^2 + 19n + 12 = f(n)$ 11) $h(v) = 2v^2 + 11v + 5$ 12) $g(x) = 3x^2 - 8x + 4$

$$n = -3, \frac{-4}{5} \qquad v = -5, -\frac{1}{2} \qquad x = \frac{2}{3}, 2$$

13) The path of a diver is modeled by $f(x) = -\frac{4}{9}x^2 + \frac{24}{9}x + 12$ where f(x) is the height (in feet) and x is the horizontal distance (in feet) from the end of the diving board. What is the maximum height of the diver?

16 feet

14) The height of a punted football is modeled by $f(x) = -\frac{16}{2025}x^2 + \frac{9}{5}x + 1.5$.
a. How high is the ball when it is punted?
b. What is the maximum height of the punt?
c. How long is the punt?

a.) 1.5 units high   **c.) 228.75 units long**

b.) 104.06 units high

15) A manufacturer of lighting fixtures has daily production costs of C = 800 − 10x + 0.25x², where C is the total cost (in dollars) and x is the number of units produced. What daily production number yields a minimum cost?

20 units yields a minimum cost

16) The total revenue R earned (in thousands of dollars) from manufacturing handheld video games is given by
$R(p) = -25p^2 + 1200p$, where p is the price per unit (in dollars).
a. Find the revenues when the prices per unit are $20, $25, and $30.
b. Find the unit price that yields the maximum revenue. What is the maximum revenue?

a.) $20 ⟹ $14,000 $25 ⟹ $14,375 $30 ⟹ $13,500

b.) $24 yields max revenue