Name ~~Answer Key~~

PreCalculus; Sec 2.1b – Quadratic Functions

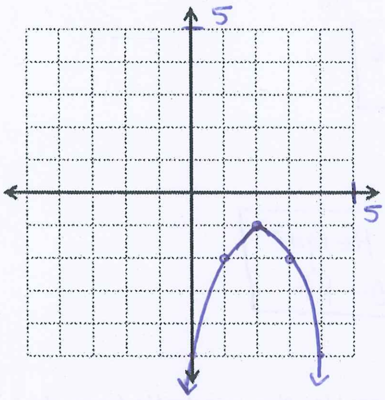
1. A(n) QUADRATIC function is a second-degree polynomial function, and its graph is called a(n) PARABOLA.

2. Is the quadratic function $f(x) = (x-2)^2 + 3$ written in standard form? If so, identify the vertex of the graph of f. Yes, the vertex is (2, 3).

3. Does the graph of the quadratic function $f(x) = -3x^2 + 5x + 2$ have a relative minimum value at its vertex? How can you tell? NO, A RELATIVE MAXIMUM. LEADING COEFFICIENT IS -3

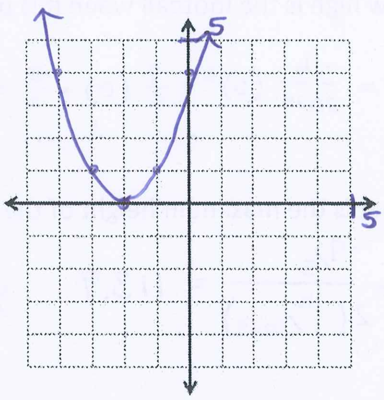
Find the vertex of the following functions, then SKETCH a GRAPH.

4. $f(x) = -(x-2)^2 - 1$



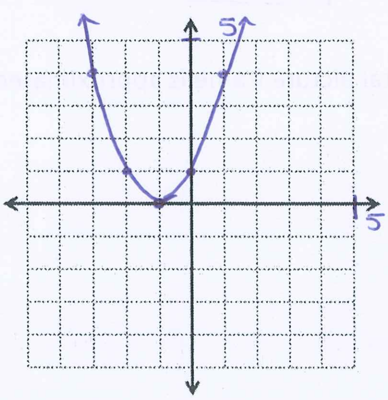
VERTEX (2, -1)

5. $f(x) = (x+2)^2$



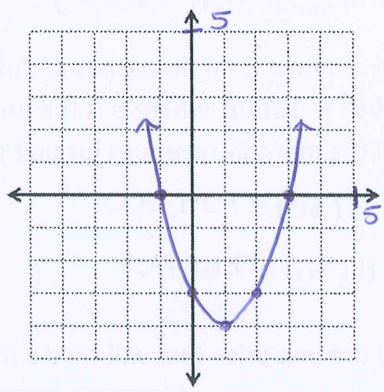
VERTEX (-2, 0)

6. $h(x) = x^2 + 2x + 1$ $= (x+1)^2$



VERTEX (-1, 0)

7. $h(x) = x^2 - 2x - 3$ $= (x+1)(x-3)$



VERTEX (1, -4)

Describe the graph of the quadratic function by identifying the vertex and x-intercept(s).

8. $f(x) = -(x^2 + x - 30)$

$= -(x+6)(x-5)$

X-INTERCEPTS
(-6,0) (5,0)

$x = \frac{-6+5}{2} = \frac{-1}{2}$

VERTEX
(-0.5, 30.25)

Write the standard form of the quadratic function passing through the given point with the indicated vertex.

9. Vertex: $(4, 1)$; Point: $(6, -7)$

$y = a(x-h)^2 + k$

$-7 = a(6-4)^2 + 1$

$-7 = 4a + 1$

$a = -2$

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

10. The height y (in feet) of a punted football is approximated by $y = -\frac{16}{2025}x^2 + \frac{9}{5}x + \frac{3}{2}$ where x is the horizontal distance (in feet) from where the football is punted.

a. How high is the football when it is punted? (*Hint:* Find y when $x = 0$.)

$y = \frac{-16}{2025}(0)^2 + \frac{9}{5}(0) + \frac{3}{2} = \frac{3}{2}$

$\boxed{\text{1.5 ft ABOVE THE GROUND}}$

b. What is the maximum height of the football?

$x = \frac{-9/5}{2(-16/2025)} = 113.9$ $y = 104.01$

$\boxed{\text{MAX HEIGHT is 104 ft}}$

c. How far from the punter does the football strike the ground? (*Hint:* Use the quadratic formula.)

$x = \frac{-9/5 \pm \sqrt{81/25 - 4(-16/2025)(3/2)}}{2(-16/2025)} =$ 228.64 OR -0.83

$\boxed{\text{229 FT AWAY}}$

11. The monthly revenue R (in thousands of dollars) from the sales of a digital picture frame is approximated by $R(p) = -10p^2 + 1580p$, where p is the price per unit (in dollars).

a. Find the monthly revenues for unit prices of $\$50$, $\$70$, and $\$90$.

R(50) = \$54,000 R(90) = \$61,200

R(70) = \$61,600

b. Find the unit price that will yield a maximum monthly revenue.

$x = \frac{-1580}{2(-10)} = \boxed{\$79/\text{UNIT}}$

c. What is the maximum monthly revenue?

$R(79) = \boxed{\$62,410}$