Graphing Quadratics in Standard Form Assignment

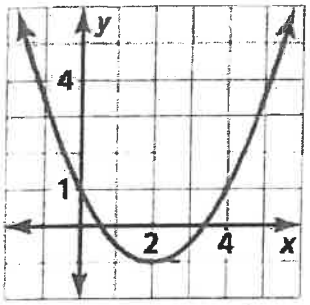
Name: Key

1) Explain how you can tell whether a quadratic function has a maximum value or a minimum value without graphing the function.

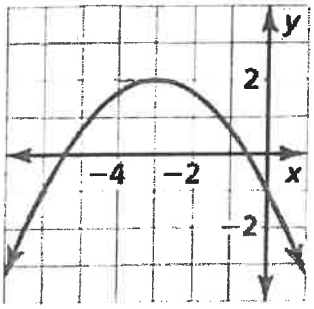
- If the leading coefficient (# in front of x^2) is positive = minimum
  is negative = maximum

For the following problems, find the vertex, the axis of symmetry, and the y-intercept of the graph.

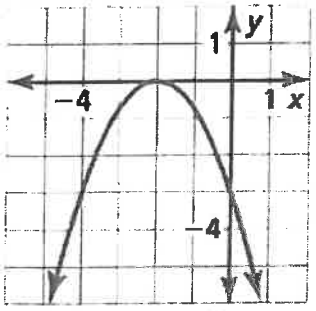
2) **Vertex:** (2, 1) **Axis of symmetry:** $x = 2$ ***y*-intercept:** (0, 1)



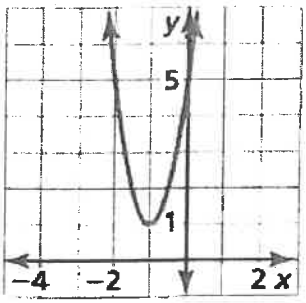
3) **Vertex:** (-3, 2) **Axis of symmetry:** $x = -3$ ***y*-intercept:** (0, -1)



4) **Vertex:** (-2, 0) **Axis of symmetry:** $x = -2$ ***y*-intercept:** (0, -3)



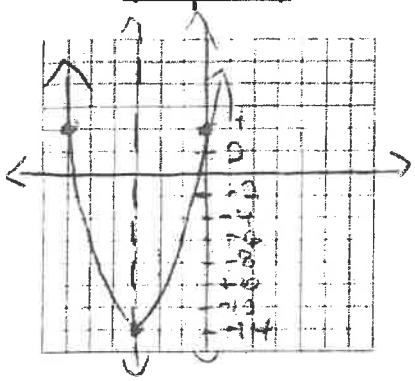
5) **Vertex:** (-1, 1) **Axis of symmetry:** $x = -1$ ***y*-intercept:** (0, 5)



For each problem below, graph the equation, give the vertex, axis of symmetry, y-intercept, and one more point.

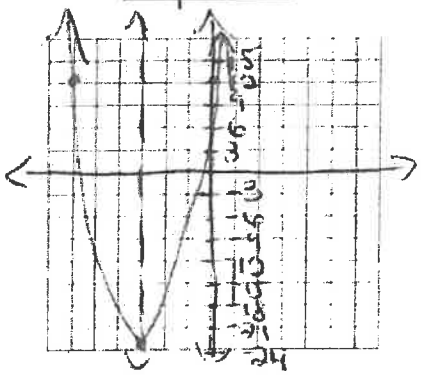
6) $f(x) = 2x^2 + 12x + 4$

Vertex: $(-3, -14)$ **Axis of symmetry:** $x = -3$ **y-intercept:** $(0, 4)$ **One more point:** $(-6, 4)$



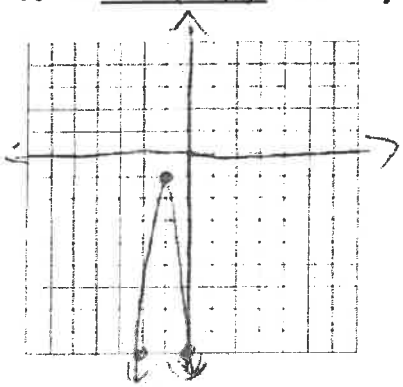
7) $y = 4x^2 + 24x + 13$

Vertex: $(-3, -23)$ **Axis of symmetry:** $x = -3$ **y-intercept:** $(0, 13)$ **One more point:** $(-6, 13)$



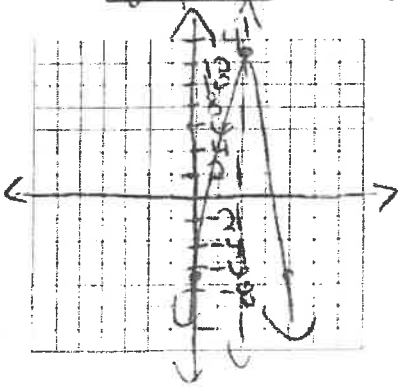
8) $y = -8x^2 - 16x - 9$

Vertex: $(-1, -1)$ **Axis of symmetry:** $x = -1$ **Y-intercept:** $(0, -9)$ **Pt:** $(-2, -9)$



9) $f(x) = -5x^2 + 20x - 7$

Vertex: $(2, 13)$ **Axis of symmetry:** $x = 2$ **Y-intercept:** $(0, -7)$ **Pt:** $(4, -7)$



For the problems below, tell whether the function has a minimum value or a maximum value. Then find the value.

10) $y = 3x^2 - 18x + 15$ Minimum/Maximum Value: -12

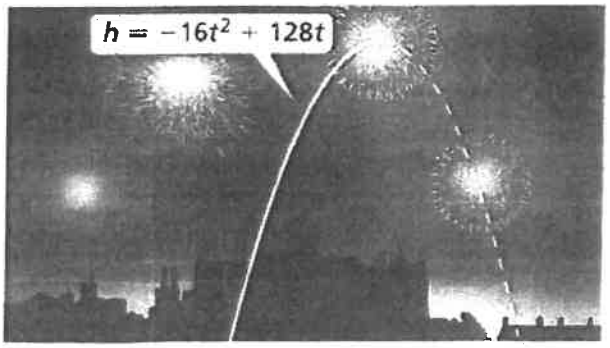
11) $f(x) = -5x^2 + 10x + 7$ Minimum/Maximum Value: 12

12) $f(x) = -4x^2 + 4x - 2$ Minimum/Maximum Value: -1

13) $y = 2x^2 - 10x + 13$ Minimum/Maximum Value: $\frac{1}{2}$

14)

MODELING WITH MATHEMATICS The function shown represents the height h (in feet) of a firework t seconds after it is launched. The firework explodes at its highest point. *(See Example 4.)*



a. When does the firework explode? 4 seconds after it's launched

b. At what height does the firework explode? 256 ft.

15)

MODELING WITH MATHEMATICS The function $h(t) = -16t^2 + 16t$ represents the height (in feet) of a horse t seconds after it jumps during a steeplechase.

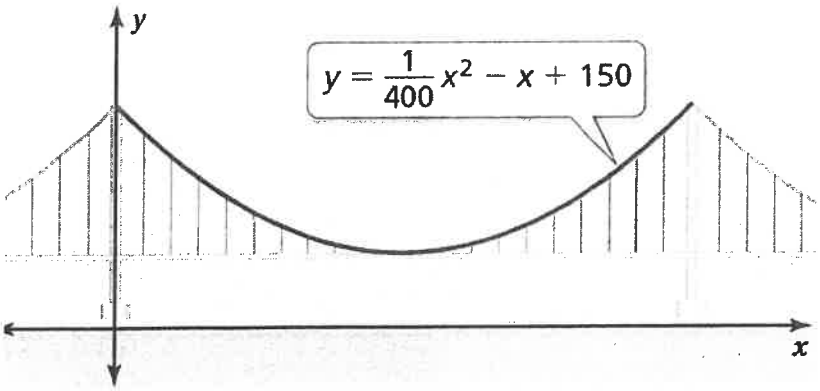
a. When does the horse reach its maximum height? 0.5 sec after it jumps

b. Can the horse clear a fence that is 3.5 feet tall? The horse reaches a maximum height of 4 ft, so yes it can clear a fence 3.5 ft tall by 0.5 of a foot.
If so, by how much?

c. How long is the horse in the air? 1 second.

16)

MODELING WITH MATHEMATICS The cable between two towers of a suspension bridge can be modeled by the function shown, where x and y are measured in feet. The cable is at road level midway between the towers.



a. How far from each tower shown is the lowest point of the cable? 200ft.

b. How high is the road above the water? 50ft.