10-1 Understanding Quadratic Functions

Just like the slope and y-intercept with linear functions, there are certain aspects of the quadratic function (parabola) that we have to become familiar with.

$$y = ax^2 + bx + c$$

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

Axis of Symmetry

The line that cuts the parabola in two equal halves

$$x = \frac{-b}{2a}$$

Vertex or Turning Point

The highest or lowest point on the parabola

Roots or Zeros

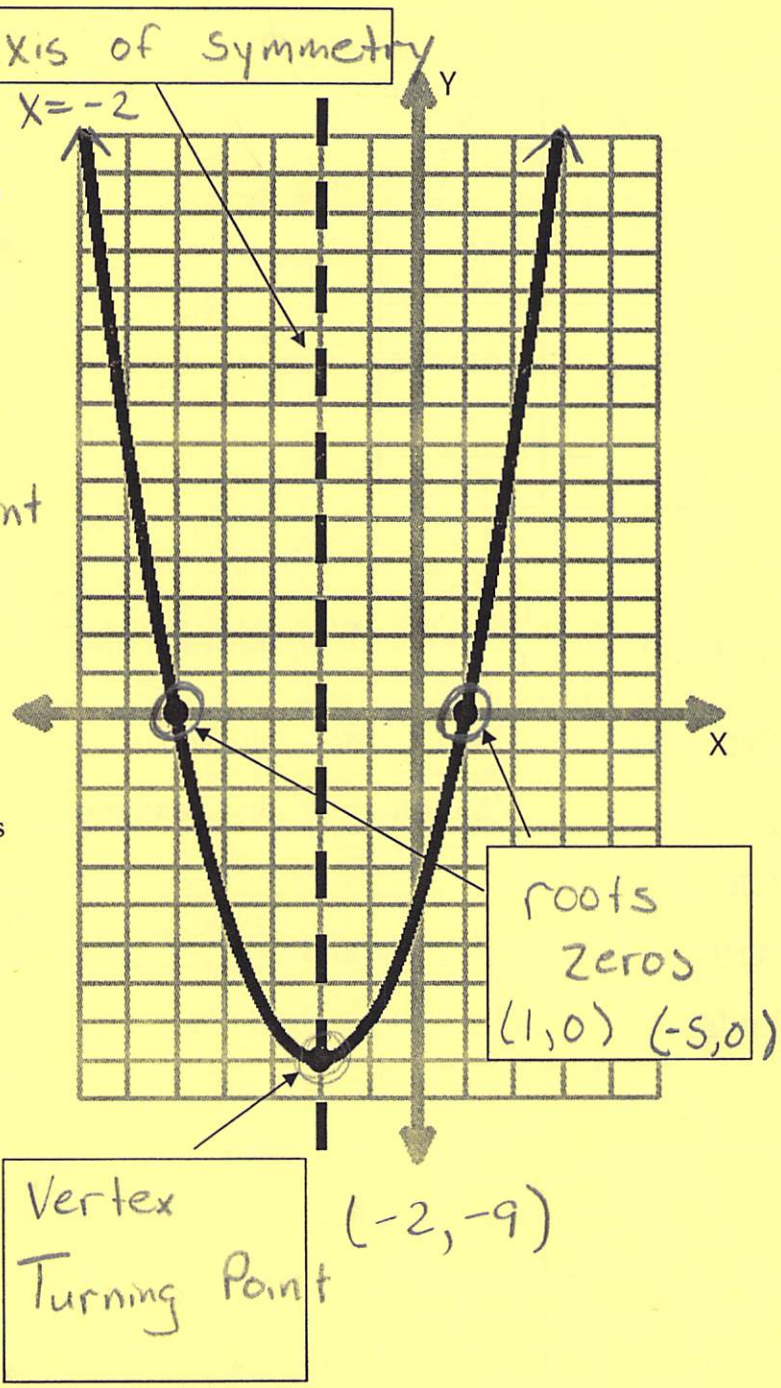
Where the parabola crosses the x-axis

Concave Up –

Minimum Point

Concave Down –

Maximum Point



Examples:

1. Graph $y = -x^2 - 6x$ Determine the:

Concavity Up **or** (Down)

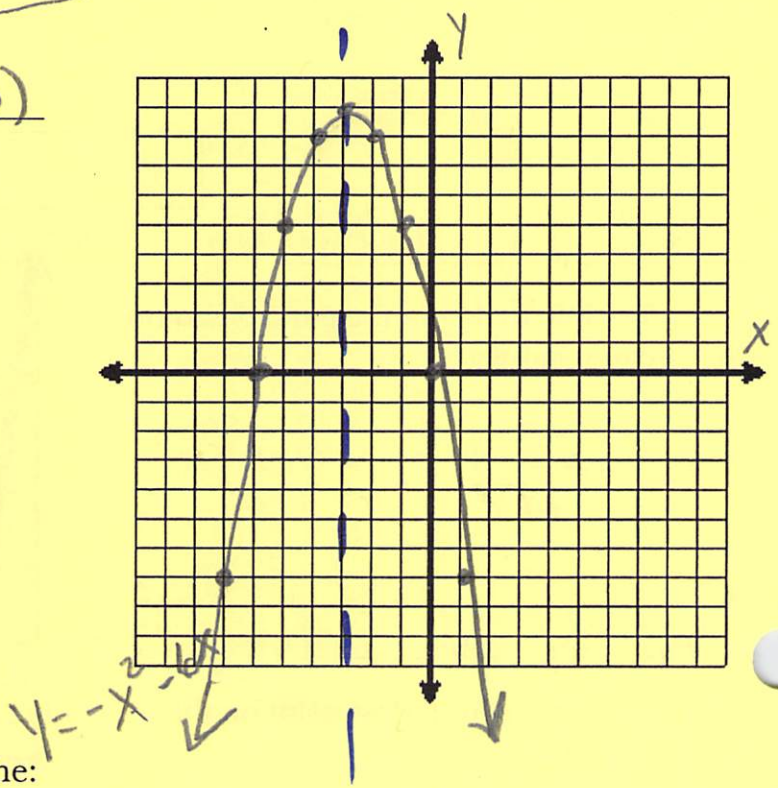
Minimum **or** (Maximum)

Axis of Symmetry $X = -3$

Roots $(0,0)$ and $(-6,0)$

Vertex $(-3,9)$

X	Y
-7	-7
-6	0
-5	5
-4	8
-3	9
-2	8
-1	5
0	0
1	-7



2. Graph $y = \frac{1}{4}x^2 + 2x + 1$ Determine the:

Concavity (Up) **or** Down

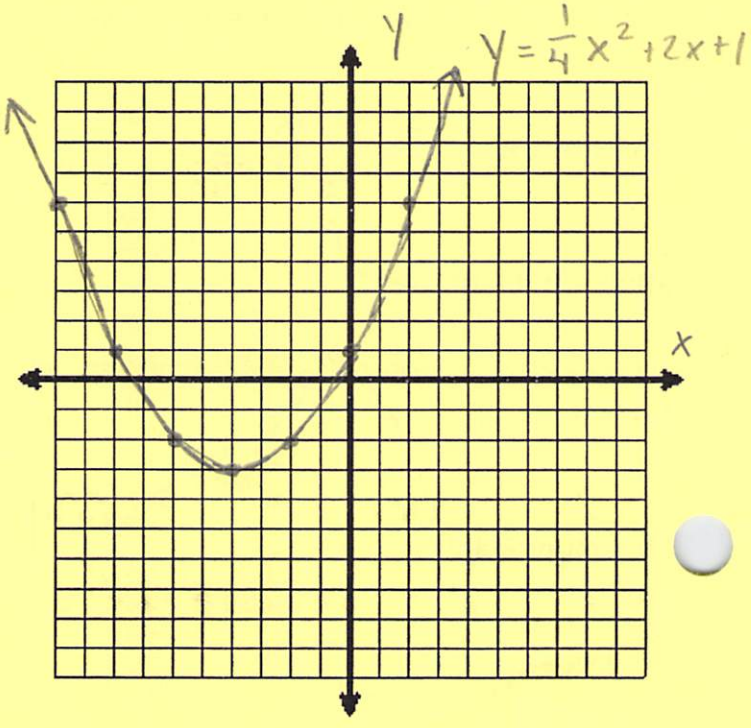
(Minimum) **or** Maximum

Axis of Symmetry $X = -4$

Roots $(-7.46, 0)$ and $(-0.54, 0)$

Vertex $(-4, -3)$

X	Y
-10	6
-8	1
-6	-2
-4	-3
-2	-2
0	1
2	6



Understanding Parabolas Practice Name_____

1 Graph $y = 2x^2 + 4x - 5$ Determine the:

Concavity Up **or** Down

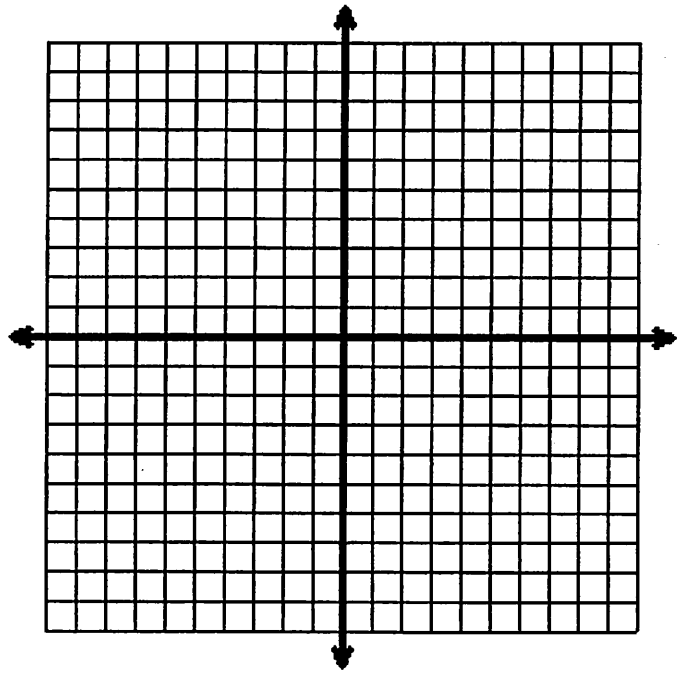
Minimum **or** Maximum

Axis of Symmetry _____

Roots _____ and _____

Vertex _____

X	Y



2. Graph $y = -x^2 + 4$ Determine the:

Concavity Up **or** Down

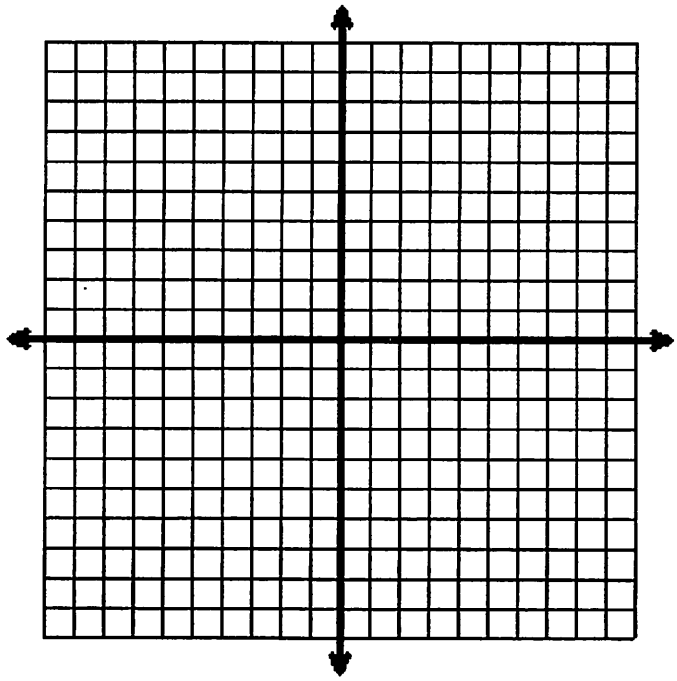
Minimum **or** Maximum

Axis of Symmetry _____

Roots _____ and _____

Vertex _____

X	Y



Multiple Choice:

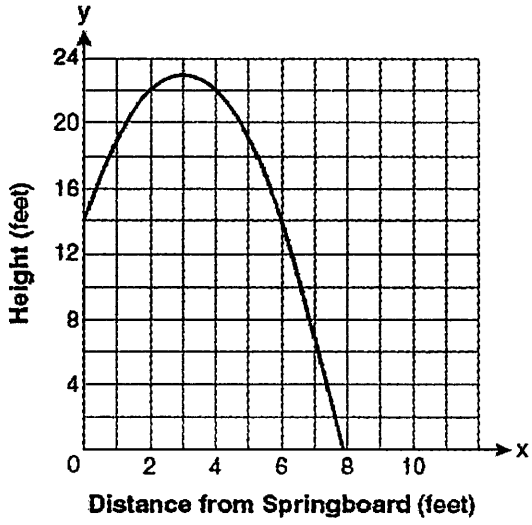
1. What are the coordinates of the turning point of the parabola whose equation is $y = -x^2 + 4x + 1$?

(1) (-2, -11) (2) (-2, -3) (3) (2, 5) (4) (2, 13)

2. The height, y, of a ball tossed into the air can be represented by the equation $y = -x^2 + 10x + 3$, where x is the elapsed time. What is the equation of the axis of symmetry of this parabola?

(1) $y = 5$ (2) $y = -5$ (3) $x = 5$ (4) $x = -5$

3. A swim team member performs a dive from a 14-foot-high springboard. The parabola below shows the path of her dive.



Which equation represents the axis of symmetry?

(1) $y = 3$ (2) $x = 3$ (3) $y = 23$ (4) $x = 23$

4. What are the roots of the following function: $y = x^2 + 3x - 18$?

(1) 3 and 6 (2) -3 and -6 (3) -3 and 6 (4) 3 and -6