

Active Vocabulary

New Vocabulary Label each box with the terms at the left.

-quadratic-function-

-quadratic-term-

-linear-term-

-constant-term-

-parabola

-axis-of-symmetry

-vertex

-maximum-value

-minimum-value

quadratic term
linear term
constant

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

quadratic function

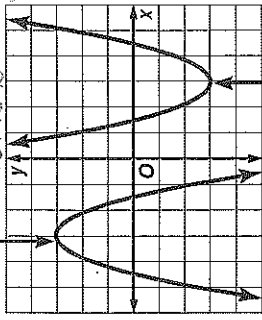
parabola

axis of symmetry
 $x =$

vertex
 (x, y)

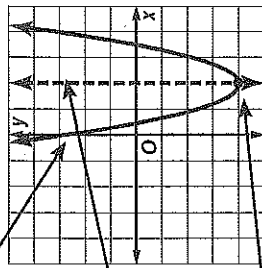
maximum value

vertex $\rightarrow y =$



minimum value

vertex $\rightarrow y =$



Ex @ Determine whether the function has a max or min value!

(b) State the max or min value!

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

a) $a = -1$ so \cap maximum

$$b) x = \frac{-b}{2a} = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2$$

equation of axis of symmetry for vertex

$$f(2) = -(2)^2 + 4(2) - 1$$

$$f(2) = -4 + 8 - 1$$

$$f(2) = 4 - 1 = 3$$

$(2, 3)$

so Maximum value @ $y = 3$

Graph Quadratic Functions

Graph $f(x) = 2x^2 + 2 + 8x$. Fill in the missing verbal and mathematical steps.

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

Write the function in standard form.

$a=2$
 $b=8$ $c=2$

Identify the coefficients.

Min $\begin{cases} \cup & \text{Min} \\ \cap & \text{Max} \end{cases}$

$a > 0$ (positive)
 $a < 0$ (negative)

Determine if max or min

$x = \frac{-b}{2a} = \frac{-8}{2(2)} = -2$

$y = 2$ (c value)

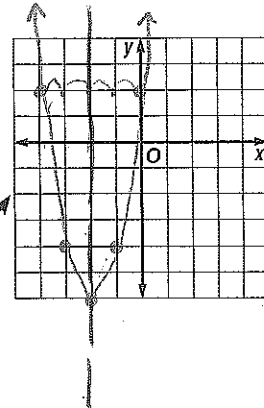
Identify the y-intercept.

34
 $32 + 2 = 32$
 20
 $18 + 2 = 20$
 16
 $8 + 2 = 10$
 4
 $2 + 2 = 4$

x	y
-4	2
-3	-4
-2	-6
-1	-4
0	2

Make a table. Put the vertex in the center.

Graph the ordered pairs. Check the axis of symmetry.



Maximum and Minimum Values

$x = \frac{-b}{2a} = \frac{-12}{2(-2)} = 3$

$f(3) = -2(3)^2 + 12(3) - 5$
 $= -18 + 36 - 5 = 13$

$f(x) = -2x^2 + 12x - 5$

Find x-coordinate of vertex. <u>3</u>	Max/Min = <u>a is neg. → ∩ → max</u>
Find y-coordinate of vertex. <u>13</u>	Value = <u>@ y = 13</u>

Helping You Remember

How can you remember the way to use the x^2 term of a quadratic function to tell whether it has a maximum or a minimum value?

\cup \cap (Look is the first thing you see → a)