$$f(x) = ax^2 + bx + c$$

The graph opens up if

$a > 0$; a is positive (+)

The graph opens down if

$a < 0$; a is negative (-)

The Axis of Symmetry is $x = \frac{-b}{2a}$

The coordinates of the vertex are:

($\frac{-b}{2a}$, Y)

The x - intercepts are at $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

where graph crosses the x-axis

The y - intercept is at (0, C).

where graph crosses the y-axis

NOTES:

Example 3: $f(x) = \frac{1}{2}x^2 - 2x + 5$

A B C

a is (+)

a = ½
b = -2
c = 5

The graph opens __up__.

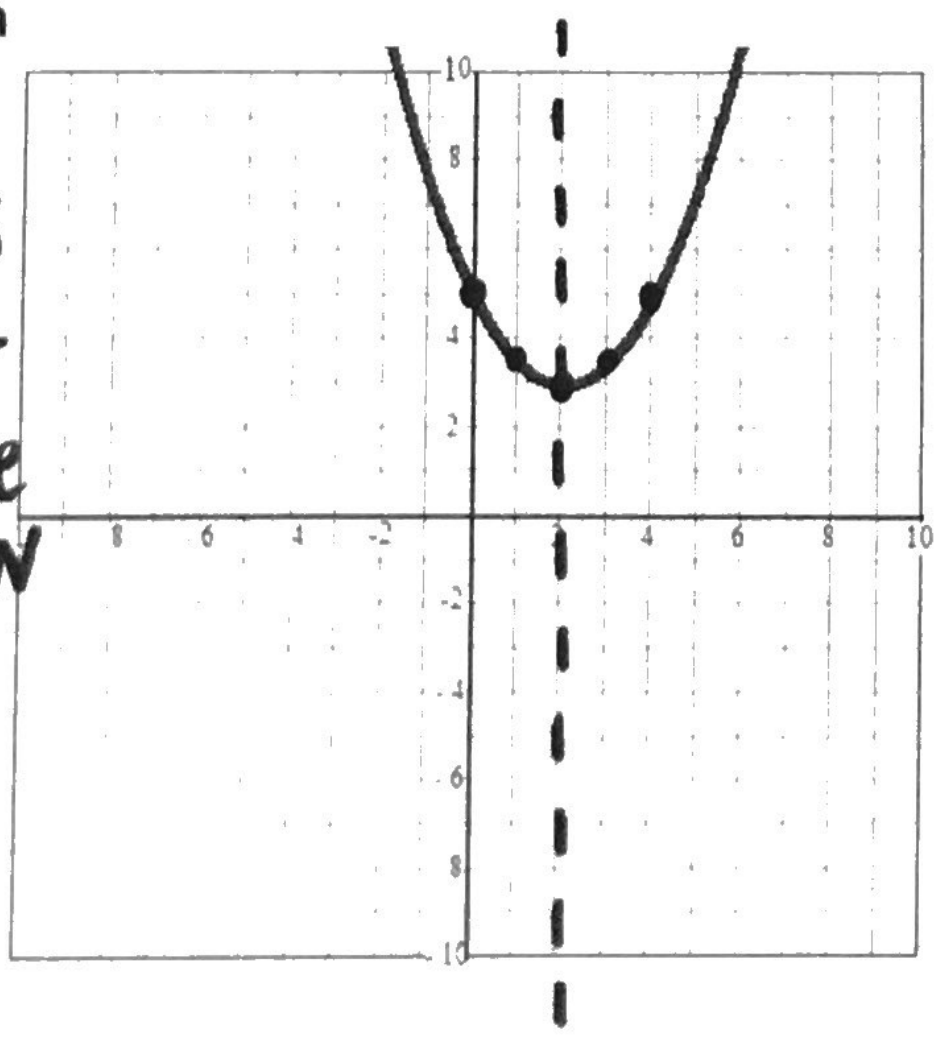
The vertex is __(2, 3)__.

Axis of symmetry: x = __2__

The y - intercept is (0, 5).

Graph

*choose 5 points to graph- two above & two below Vertex

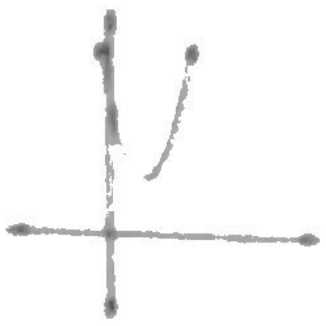


STANDARD FORM $f(x) = ax^2 + bx + c$

$$f(x) = a(x - p)(x - q)$$

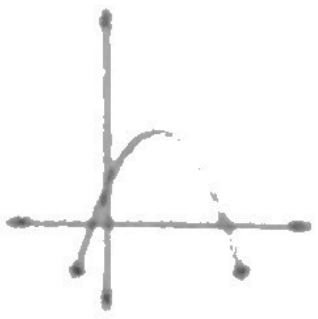
The graph opens up if

$a > 0$



The graph opens down if

$a < 0$

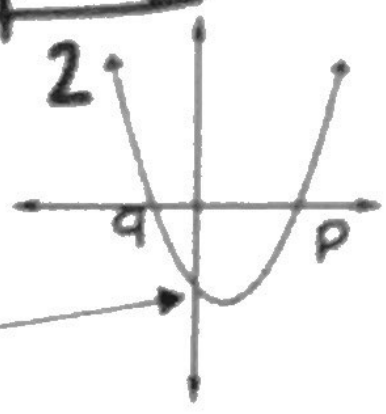


x - intercepts are

$x = p$ and $x = q$

Axis of symmetry is $x = \frac{p+q}{2}$

Vertex $(x, f(x))$



The y - intercept is found by multiplying $a \cdot p \cdot q$

$(0, a \cdot p \cdot q)$

NOTES:

Example 2: $f(x) = -2(x - 3)(x + 1)$

a is (-)

a = -2
p = 3
q = -1

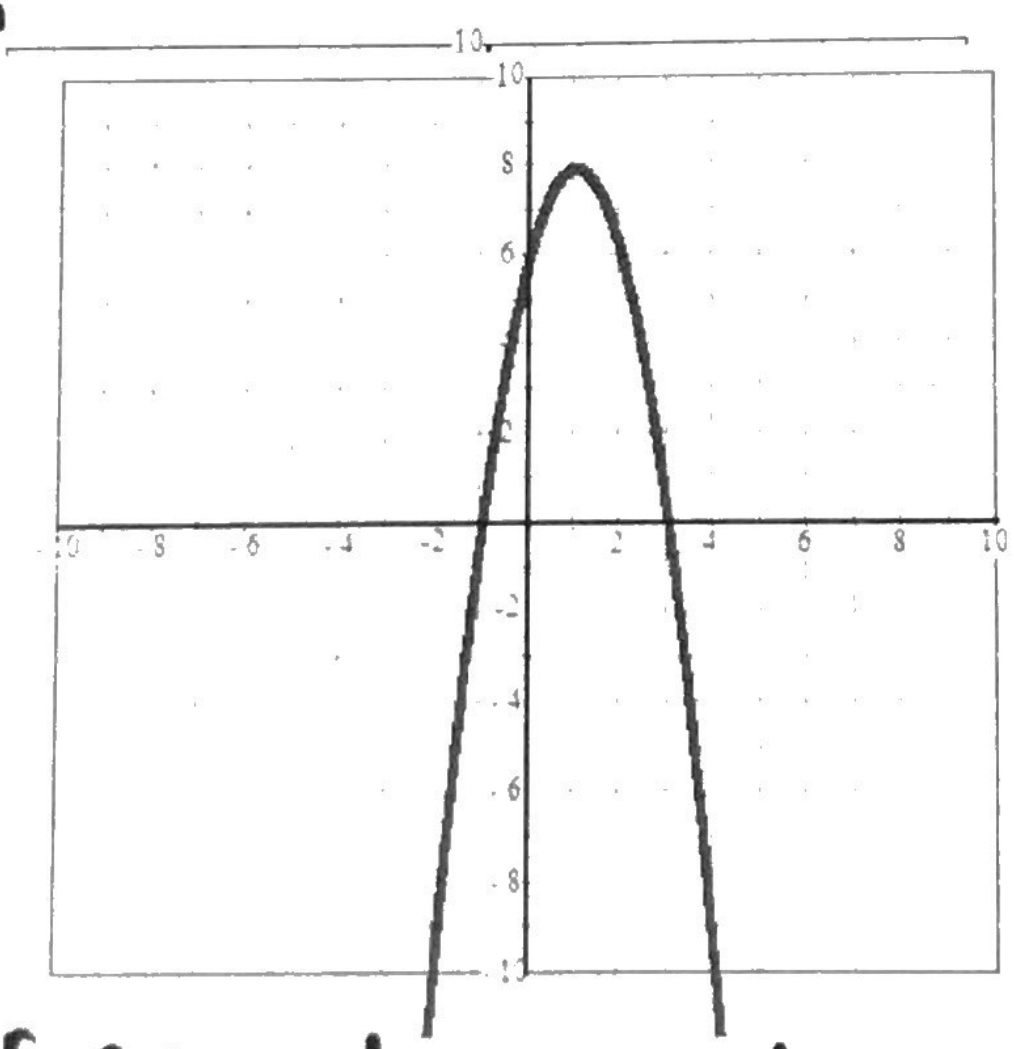
The graph opens down

The x - intercepts are

$x = 3$ and $x = -1$.

The y - intercept is $(0, 6)$.

Graph

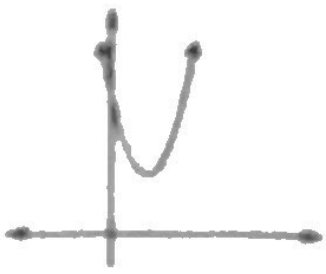


Axis of symmetry: $x = 1$

INTERCEPT FORM $f(x) = a(x - p)(x - q)$

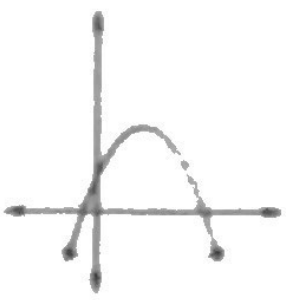
The vertex is $(1, 8)$

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



The graph opens up if

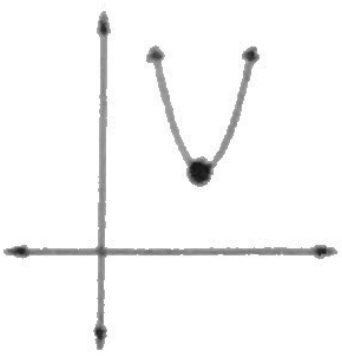
a > 0



The graph opens down if

a < 0

The Axis of symmetry is x = h



The Vertex = (h, k)

NOTES:

Example 1: $f(x) = 2(x - 4)^2 - 3$

a = 2

h = 4

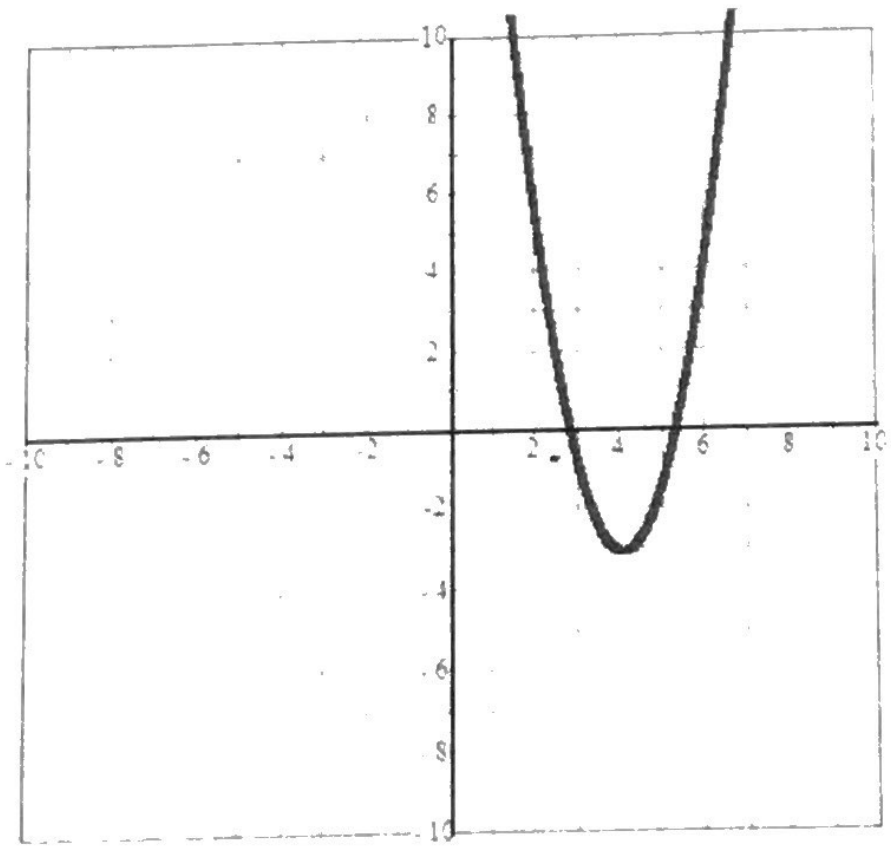
k = -3

The graph opens Up

AOS: 4

The vertex is (4 , -3)

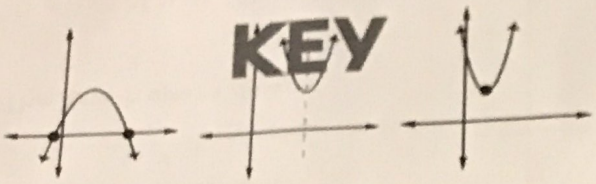
Graph



VERTEX FORM $f(x) = a(x - h)^2 + k$

Graphing Quadratic Functions

KEY



VERTEX FORM $f(x) = a(x-h)^2 + k$

INTERCEPT FORM $f(x) = a(x-p)(x-q)$

The vertex is $(1, 8)$

STANDARD FORM $f(x) = ax^2 + bx + c$

STANDARD FORM: $f(x) = ax^2 + bx + c$

Example 3:

Axis of symmetry: $x = -\frac{b}{2a} = -\frac{(-2)}{2(\frac{1}{2})} = \boxed{\frac{2}{1}}$

Vertex: $(x, f(x)) \rightarrow (2, f(2)) \rightarrow \boxed{(2,3)}$

$f(2) = \frac{1}{2}(2)^2 - 2(2) + 5$ * Plug in calc

$f(2) = 3$

y-Intercept: $(0, c) \rightarrow \boxed{(0,5)}$

x	f(x)	y
0	$f(0) = \frac{1}{2}(0)^2 - 2(0) + 5$	5
1	$f(1) = \frac{1}{2}(1)^2 - 2(1) + 5$	3.5
2	* See above vertex	3
3	$f(3) = \frac{1}{2}(3)^2 - 2(3) + 5$	3.5
4	$f(4) = \frac{1}{2}(4)^2 - 2(4) + 5$	5

INTERCEPT FORM: $f(x) = a(x-p)(x-q)$

Example 2: $f(x) = -2(x-3)(x+1)$

Axis of symmetry: $x = \frac{p+q}{2}$

$x = \frac{3 + -1}{2} = \frac{2}{2} = \boxed{1}$

Vertex: $(x, f(x)) \rightarrow (1, f(1)) \rightarrow \boxed{(1,8)}$

$f(1) = -2(1-3)(1+1)$ * plug in calc

$f(1) = 8$

y-Intercept:

$(0, a \cdot p \cdot q) \rightarrow (0, -2 \cdot 3 \cdot -1) \rightarrow \boxed{(0,6)}$

VERTEX FORM: $a(x-h)^2 + K$

Example 1: $f(x) = 2(x-4)^2 - 3$

Find additional points:

x	f(x)	y
2	$f(2) = 2(2-4)^2 - 3 =$	5
3	$f(3) = 2(3-4)^2 - 3 =$	-1
4	———	-3
5		-1
6		5