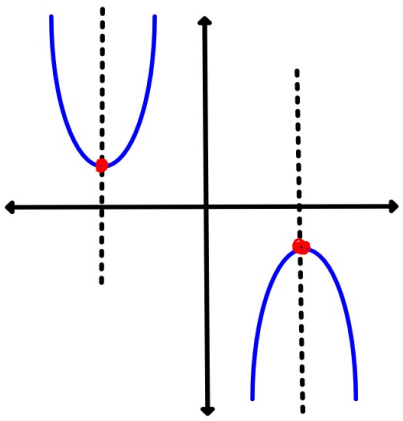
5-1 Parabolas



Vertex: max / min

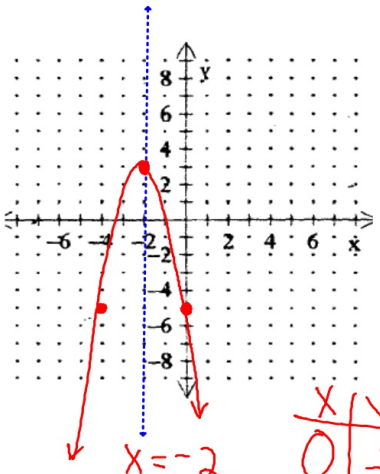
Axis of symmetry: thru vertex

Direction of opening:

$a > 0$

$a < 0$

EXAMPLE 1: STANDARD FORM $y = ax^2 + bx + c$



vertex: $\left(\frac{-b}{2a}, y\right)$

axis of symmetry: $x = \frac{-b}{2a}$

Graph $y = \overset{a}{-2}x^2 \overset{b}{-8}x \overset{c}{-5}$

$x = \frac{-b}{2a} = \frac{8}{-4}$ vertex $(-2, 3)$

$y = -2(4) + 16 - 5$

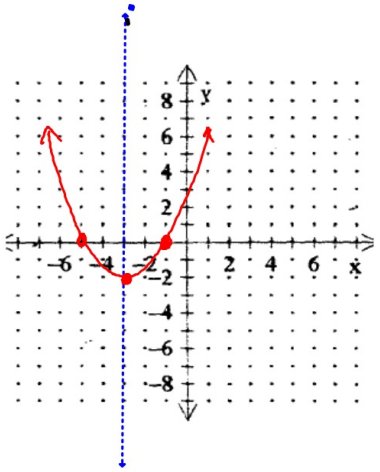
axis of symmetry $x = -2$

$x = -2$

x	y
0	-5
-4	-5

EXAMPLE 2: VERTEX FORM

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



vertex: (h, k)

axis of symmetry: $x = h$

Graph $y = \frac{1}{2}(x+3)^2 - 2$

$(x-(-3))^2$

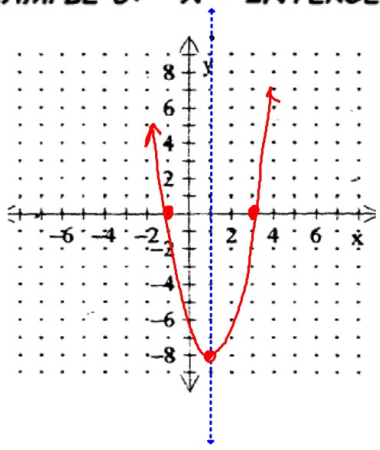
vertex $(-3, -2)$

axis of symmetry $x = -3$

x	y
−1	0
−5	0

EXAMPLE 3: X - INTERCEPT FORM

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



$0 = a(x-p)(x-q)$

$0 = (x-p)(x-q)$

$x = p, q$

x-intercepts: $(p, 0)\ (q, 0)$

Graph $y = 2(x - 3)(x+1)$

x intercepts $(3, 0)(-1, 0)$

vertex $(1, -8)$

$y = 2(-2)(2) = -8$