The Vertex Form of a Quadratic Relation

Apr. 28/2010

1. factored form: $y = a(x - s)(x - t)$
2. standard form: $y = ax^2 + bx + c$
3. vertex form: $y = a(x - h)^2 + k$

$y = (x+4)(x+2)$
$0 = (x+4)(x+2)$
$x+4=0$
$x=-4$
$x+2=0$
$x=-2$

a tells us the direction of opening (up or down).

h is the x-coordinate of the vertex.

k is the y-coordinate of the vertex.

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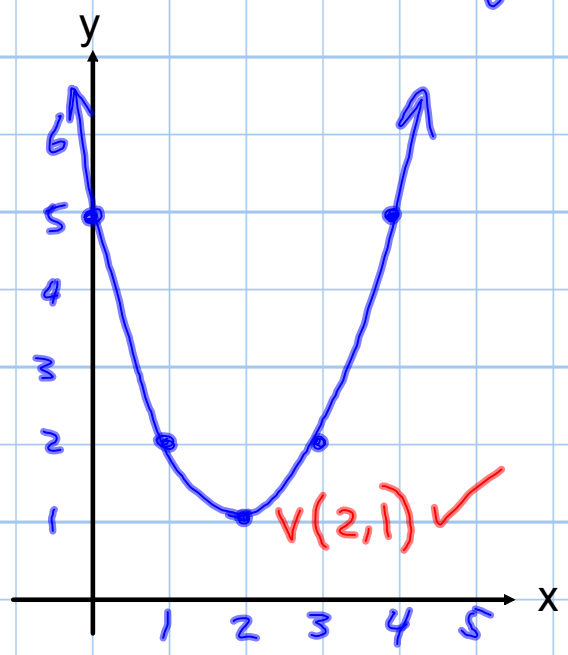
Ex.1 Graph $y = (x - 2)^2 + 1$ using a TOV. (table of values)

Expect vertex at (2, 1)

x	y
0	$(-2)^2+1=5$
1	$(-1)^2+1=2$
2	$(0)^2+1=1$
3	$(1)^2+1=2$
4	$(2)^2+1=5$



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Ex.2 State the coordinates of the vertex and direction of opening.

(a) $y = +(x - 5)^2 + 4$ Vertex (5,4) Opens UP

(b) $y = +(x + 3)^2 + 11$ Vertex (-3,11) Opens UP

(c) $y = -2(x - 6)^2 - 8$ Vertex (6,-8) Opens DOWN

(d) $y = \frac{3}{4}(x + 13)^2 - 2$ Vertex (-13,-2) Opens UP

(e) $y = -(x - 4)^2 + 5$ Vertex (4,5) Opens DOWN

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

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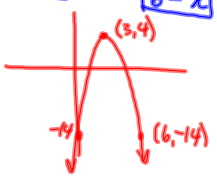
Ex.3 For $y = -2(x - 3)^2 + 4$, determine:
(a) the vertex
(b) axis of symmetry
(c) direction of opening
(d) number of zeroes
(e) y-intercept
(f) another point (using symmetry)
(g) sketch the graph

(a) V(3,4)
(b) $x=3$
(c) DOWN
(d) 
2 zeroes

(e) for y-int, set $x=0$
$y=-2(0-3)^2+4$
$=-2(9)+4$
$=-14$

(f) set $y=-14$
$-14=-2(x-3)^2+4$
$+14 \qquad +14$
$0=-2(x-3)^2+18$
$0=-2(x^2-6x+9)+18$
$0=-2x^2+12x-18+18$
$0=-2x^2+12x$
$0=2x(-x+6)$
$\boxed{x=0}$ $-x+6=0$
$\boxed{6=x}$

matching point (6,-14)



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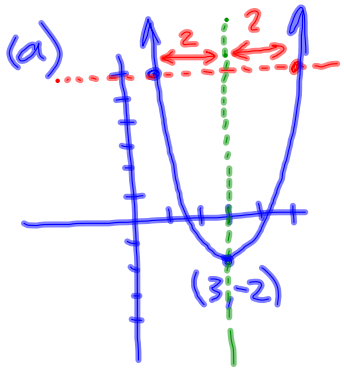
Ex.4 Given V(3, -2) and P(1, 6) on the parabola,

(a) sketch the graph.
(b) determine the equation, in vertex form.
(c) rewrite the equation in standard form.
(d) determine the zeroes.

(a)



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

$y = a(x-3)^2 - 2$

Sub P(1,6)

$6 = a(1-3)^2 - 2$

$6 = a(-2)^2 - 2$

$6 = 4a - 2$

$+2 \qquad +2$

$\frac{8}{4} = \frac{4a}{4}$

$\boxed{a = 2}$

$\boxed{\therefore y = 2(x-3)^2 - 2}$

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$\boxed{\therefore y = 2(x-3)^2 - 2}$

$(x-3)(x-3)$

$=$

(c) $y = 2(x^2 - 6x + 9) - 2$

$= 2x^2 - 12x + 18 - 2$

$\boxed{y = 2x^2 - 12x + 16}$

(d) for zeroes, set $y = 0$

$0 = 2x^2 - 12x + 16$

$0 = 2(x^2 - 6x + 8)$

$0 = 2(x-2)(x-4)$

$x - 2 = 0$ OR $x - 4 = 0$

$\boxed{x = 2}$ $\boxed{x = 4}$

Apr 30-10:41 AM

Assigned Work:

p. 351 # 1, 2, 5ac, 7ac, 10ac, 11

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