

Translations of a Quadratic Relation

Nov. 14/2011

1. factored form: $y = a(x - s)(x - t)$

2. standard form: $y = ax^2 + bx + c$

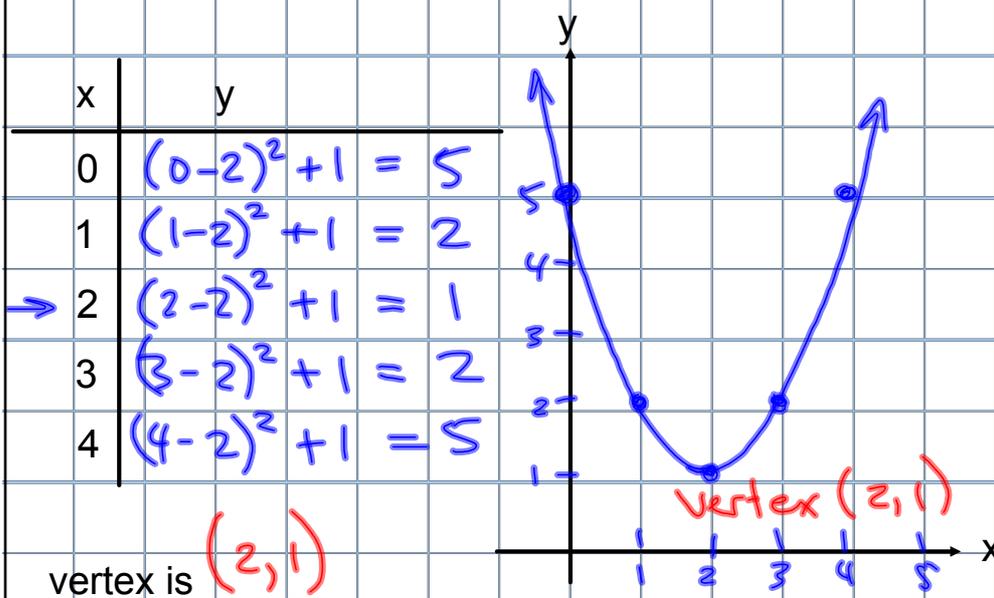
3. vertex form: $y = a(x - h)^2 + k$

a tells us the **direction of opening** (up or down),
and any **vertical scaling** (stretch or compression)

h is the **x-coordinate** of the vertex.

k is the **y-coordinate** of the vertex.

Mar 20 - 4:17 PM

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

Apr 14-7:45 PM

The vertex of the parent function, $y = x^2$, is (0, 0).

If the vertex has moved from (0, 0) to (h, k) then the graph has been

translated vertically by k (up or down)
and horizontally by h (left or right)

What about the signs of h and k?

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

opposite sign
(same as factored form)

no change in sign

Apr 12-1:36 PM

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

Apr 27-8:34 PM

See Geogebra quadratic translation demo
(click here for link)

Nov 10-8:19 AM

Ex. 3. Identify the transformations (in the correct order), the vertex, axis of symmetry, and the direction of opening.

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

vertex: $(2, -3)$



correct order \rightarrow read from L to R

~~horizontal~~ shift right by 2

~~vertical~~ shift down by 3

Axis of Symmetry: $x = 2$

opens up

Nov 10-8:38 AM

b) $y = 2(x + 4)^2 + 0$

v. stretch by 2

h. shift left by 4

vertex: $(-4, 0)$ axis of symmetry: $x = -4$

opens up

Apr 12-1:48 PM

c) $y = -0.5x^2 + 4$

$$y = -0.5(x - 0)^2 + 4$$

v. reflection

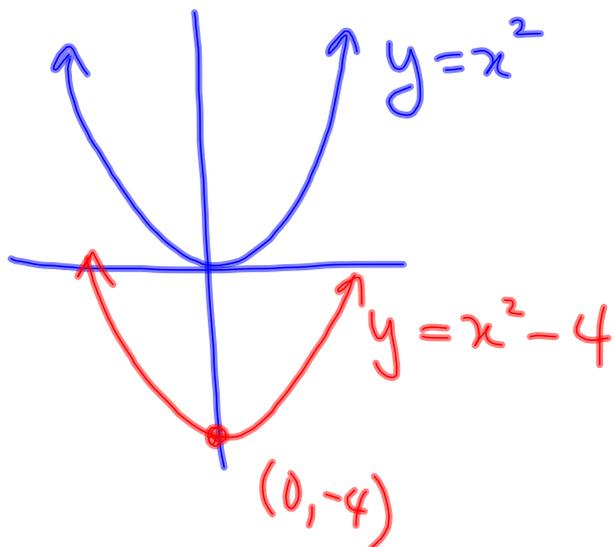
v. compression by 0.5
or $2 = \frac{1}{0.5}$

v. shift up by 4

Apr 12-1:49 PM

Assigned Work:

p. 262 # 1 - 5



Nov 10-8:41 AM