

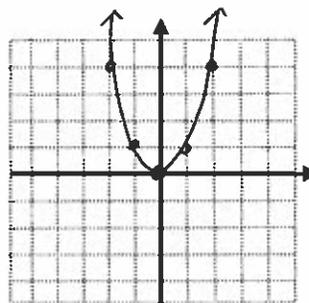
Transformations of Quadratics

- A quadratic function in the form $y = a(x - h)^2 + k$ is said to be in vertex form, where the vertex is (h, k) . For a basic quadratic, $y = x^2$, the vertex is $(0, 0)$.

Ex/ Graph $y = x^2$ using a table of values.

Pick 5 values

x	y
-2	4
-1	1
0	0
1	1
2	4



The Effect of a

- The basic quadratic, $y = x^2$, uses a step pattern of 1, 3, 5.
- Starting at the vertex: go over 1, up 1
go over 1, up 3
go over 1, up 5
- When the a value is changed, multiply the "up part".

Ex/ Each of the following transformed quadratic has a vertex of $(0, 0)$. Use the step pattern to graph the transformed parabola, then describe the transformation:

a) $y = 3x^2$

$3(1, 3, 5) = 3, 9, 15$

over 1, up 3
over 1, up 9

stretched
by
3

b) $y = \frac{1}{2}x^2$

$0.5(1, 3, 5) = 0.5, 1.5, 2.5$

over 1, up 0.5
over 1, up 1.5

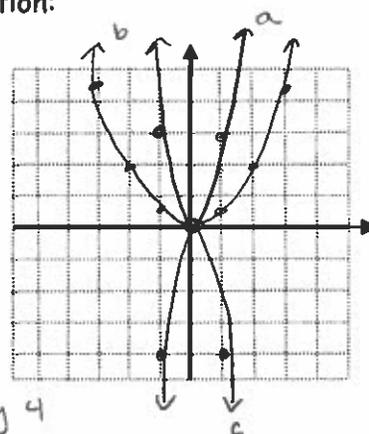
compressed
by
1/2

c) $y = -4x^2$

$-4(1, 3, 5) = -4, -12, -20$

over 1, down 4

-reflected
-stretched by 4

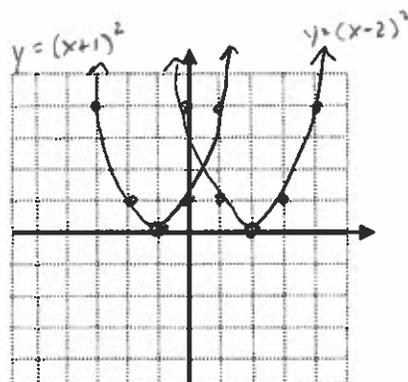


Ex/ Sketch $y = (x - 2)^2$ and $y = (x + 1)^2$ using the zeros.

$y = (x - 2)(x - 2)$
same zero twice
 $(2, 0)$

step 1, 3, 5

$(-1, 0)$



The Effect of h

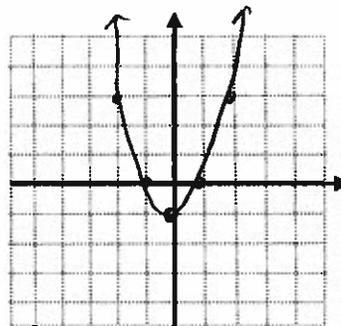
- Determines the horizontal translation.
 - $(x+h)$ results in a translation to the left h units.
 - $(x-h)$ results in a translation to the right h units.

Ex/ Use a table of values to graph $y = x^2 - 1$.

$y = x^2$ then subtract 1 from each y-value

x	y
-2	4
-1	1
0	0
1	1
2	4

x	y
-2	3
-1	0
0	-1
1	0
2	3



The Effect of k

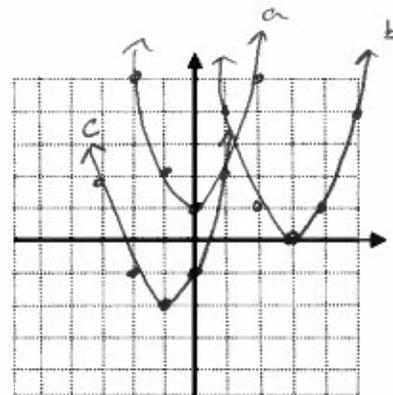
- Determines the vertical translation
 - Positive k: results in a translation upwards k units.
 - Negative k: results in a translation downwards k units.

Ex/ For each of the following, describe the transformations, identify the vertex, then sketch the graph:

a) $y = x^2 + 1$ up 1 $V(0,1)$ step: 1,3,5

b) $y = (x-3)^2$ right 3 $V(3,0)$ step: 1,3,5

c) $y = (x+1)^2 - 2$ left 1 $V(-1,-2)$ step: 1,3,5
down 2

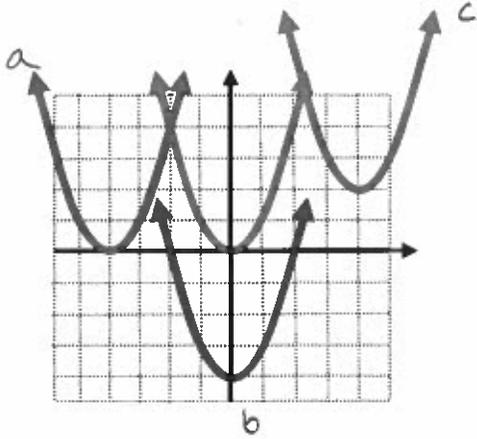


Ex/ Write the new equation for $y = x^2$ if it has been transformed by:

- A vertical compression of $\frac{1}{5}$.
- A left translation of 2, and a downwards translation of 3.
- A reflection across the x-axis, a vertical stretch of 4.

a) $y = \frac{1}{5}x^2$ $y = (x+2)^2 - 3$ $y = -4x^2$

Ex/ The graph of $y = x^2$ is shown in blue. Identify the equations of the other graphs.



Blue : $y = x^2$

a) $y = (x+4)^2$ left 4

b) $y = x^2 - 4$ down 4

c) $y = (x-4)^2 + 2$ right 4, up 2

Homework: Pg. 256
Pg. 262

#'s: 1,3,4ab,11
#'s: 1,2,4