

11.1/11.2 Graphing Quadratics with Transformations

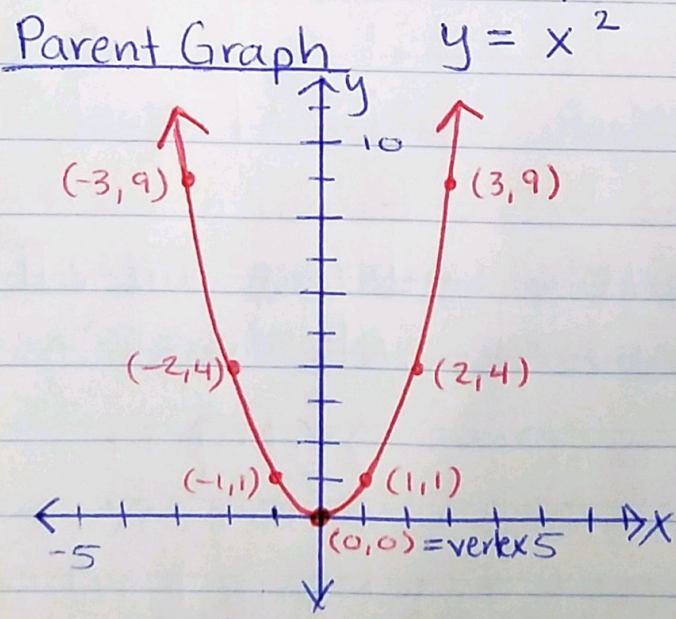
if negative, reflect over x-axis

$$f(x) = \pm A \left(\pm B(x-c) \right)^2 + D$$

if negative, reflect over y-axis

do in this order

	What you do to parent graph	What you write for transformations
A	multiply y-values by $\pm A$	$ A > 1$ vertical stretch by factor of A $ A < 1$ vertical shrink by factor of A
B	multiply x-values by $\pm \frac{1}{B}$	$ \frac{1}{B} > 1$ horizontal stretch by a factor of $\frac{1}{B}$ $ \frac{1}{B} < 1$ horizontal shrink by a factor of $\frac{1}{B}$
C	add/move opposite of C to x-values	+C move C units left -C move C units right
D	add/move D to y-values	+D move D units up -D move D units down



vertex: (0,0) ↖ always the same ↗
 axis of symmetry: $x = 0$
 parabola: shape of the graph

minimum of 3 points to graph, but 5 is better

Transformations: Equations

Ex #1 What are the transformations of the following based on $f(x) = x^2$?

- a) $g(x) = x^2 - 6$ moves 6 units down
b) $h(x) = (x+5)^2$ moves 5 units left
c) $j(x) = (x-2)^2 + 8$ moves 2 units right & 8 up
d) $k(x) = (x+6)^2 - 4$ moves 6 units left & 4 down
e) $g(x) = -5x^2$ reflect over x-axis & vertical stretch by a factor of 5
f) $h(x) = (8x)^2$ horizontal shrink by a factor of $\frac{1}{8}$

Ex #2 Write the equation for the following:

- a) vertex at $(-1, -2) \rightarrow$ left 1 & down 2

$$l(x) = (x+1)^2 - 2$$

- b) horizontal stretch by a factor of 7

$$h(x) = \left(\frac{1}{7}x\right)^2$$

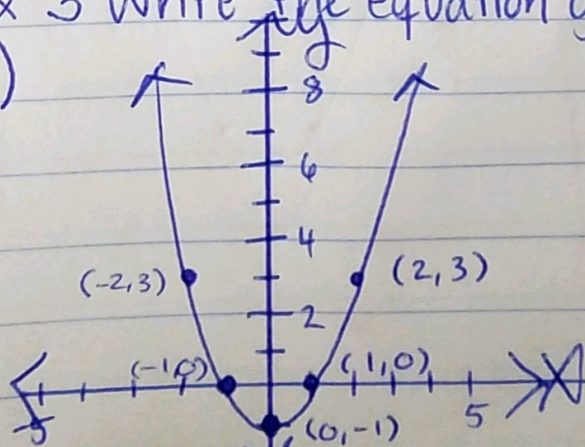
- c) vertex at $(2, 4)$ & reflection over x-axis

$$m(x) = -(x-2)^2 + 4$$

Transformations: Graphs

Ex #3 Write the equation given the graph:

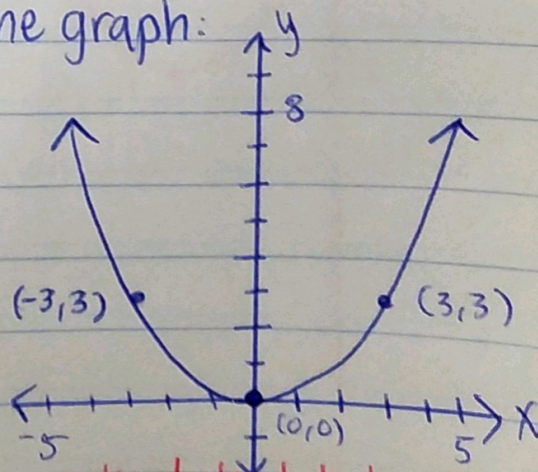
a)



down 1

$$a(x) = (x)^2 - 1$$

b)

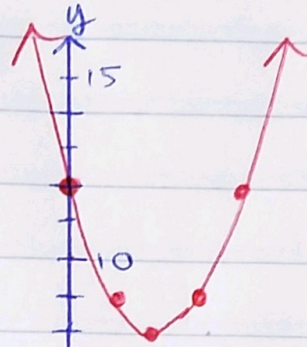


vertical stretch by 3
horizontal stretch by $\frac{1}{3}$

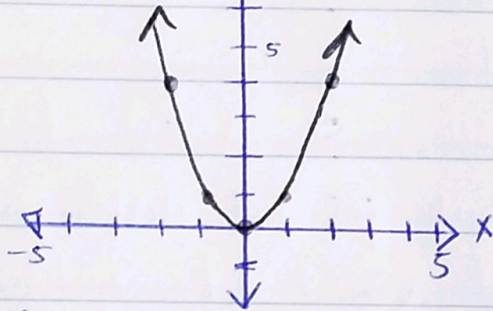
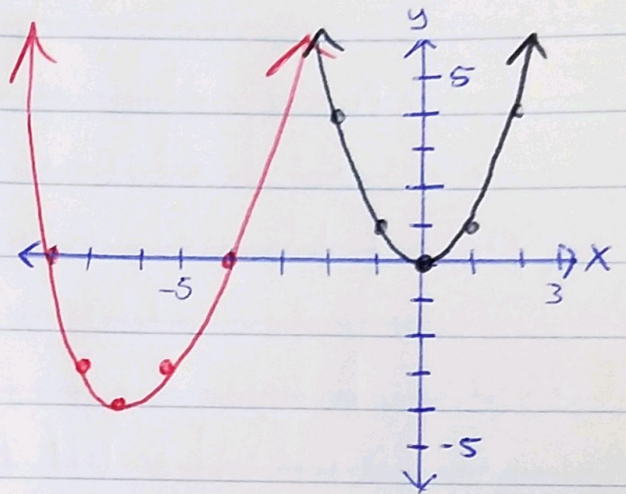
$$b(x) = 3\left(\frac{1}{3}x\right)^2$$

Ex #4 Graph the following:

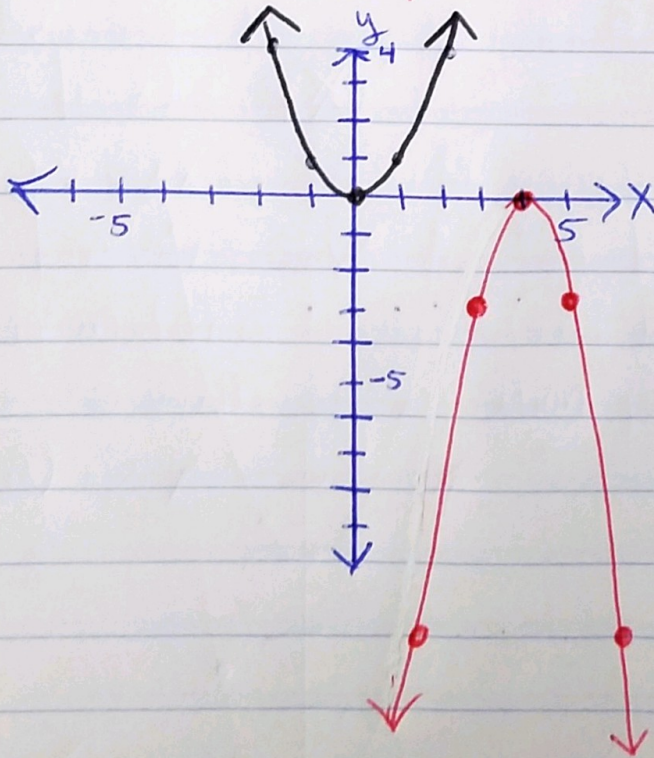
a) $j(x) = (x-2)^2 + 8$



b) $k(x) = (x+6)^2 - 4$



c) $n(x) = -3(x-4)^2$



d) $p(x) = \frac{1}{2}(x+3)^2 - 5$

