

# Practice Transformations of Quadratics

- State the transformations
- Sketch showing all steps.

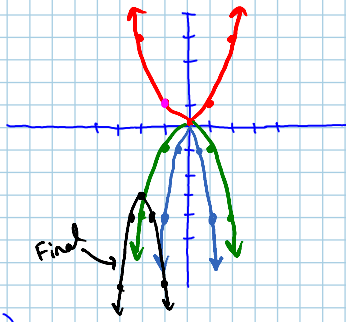
①.  $y = -(4+2x)^2 - 3$       ②.  $y = 0.5(5-x)^2 + 1$

③.  $y = 3x^2 + 4$       ④.  $y = (2x-10)^2 - 6$

ANSWERS - I'll do this by using letters a, k, d, c  
 (another way that works only with quadratics is to factor out the "k" outside of squared bracket, so that it becomes the "a"  
 this cannot be done with all functions, so I will not do this method in these solutions)

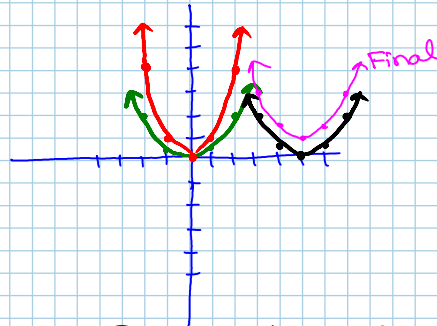
①.  $y = -(2(x+2))^2 - 3$

- parent  $y = x^2$
- $a = -1$  reflect in x-axis
- $k = 2$  horizontally compress (skinny)  $x \div 2$
- $d = -2$  left
- $c = -3$  down



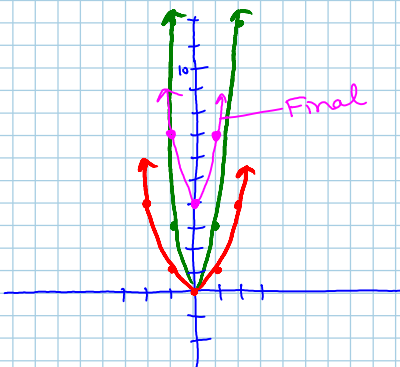
②.  $y = 0.5(-x-5)^2 + 1$

- parent  $y = x^2$
  - $a = 0.5$  vertically compress
  - $k = -1$  reflect in y-axis
  - $d = 5$  right
  - $c = 1$  up
- $y \cdot a$  (wide) will not affect parabolas since they are symmetrical



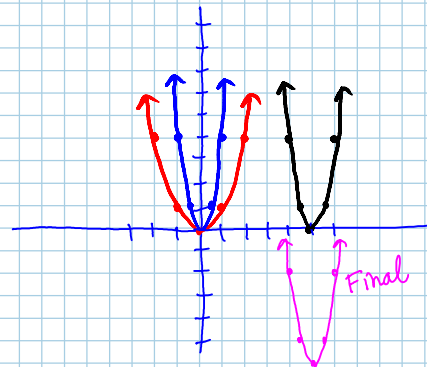
③.  $y = 3x^2 + 4$

- parent  $y = x^2$
- $a = 3$  vertically stretched  $y \cdot a$  (skinny)
- $k = 1$  nothing
- $d = 0$  nothing
- $c = 4$  up



④.  $y = (2(x-5))^2 - 6$

- parent  $y = x^2$
- $a = 1$  nothing
- $k = 2$  horizontally compressed  $x \div k$  (skinny)
- $d = 5$  right
- $c = -6$  down



Note: In all these questions I've used

The form  $y = a(k(x-d))^2 + c$

→ First step is to factor out the "k"  
but keep it inside the outer  
bracket that is squared.

→ If this is not done "d" is not visible

ex. ④  $y = (2x-10)^2 - 6$  {d is not 10 but 5}

method 1 factor out  $k=2$ , keep it inside squared bracket:

$$y = (2(x-5))^2 - 6$$

$$\begin{aligned} a &= 1 \\ k &= 2 \\ d &= 5 \\ c &= -6 \end{aligned}$$

method 2 factor out  $k=2$ , pull it outside squared bracket

$$y = 2^2(x-5)^2 - 6$$

$$y = 4(x-5)^2 - 6$$

$$\begin{aligned} a &= 4 \\ k &= 1 \\ d &= 5 \\ c &= -6 \end{aligned}$$

these methods will give the same graph →  
However method 2 will not work for trigonometric functions

ex.  $y = a \sin[k(x-d)] + c$