



## Translations

In vertical direction  $\rightarrow$  add or subtract the number of units.

ex:  $y = x^2 - 2$

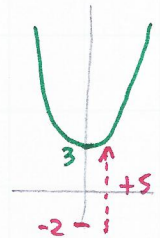


Translation  
5 units up

$$y = x^2 - 2 + 5$$

simplify:

$$y = x^2 + 3$$



In horizontal direction  $\rightarrow$  substitute for  $x$   
( $x + \dots$ ) if graph moves to the left  
( $x - \dots$ ) if graph moves to the right.

ex:  $y = 2x^3 - 4x$

Translation  
3 units to the left

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

(Action:  
substitute  $(x+3)$   
for every  $x$ )