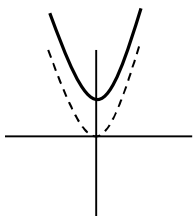


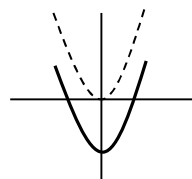
Transformations

Original graph: $y = f(x)$

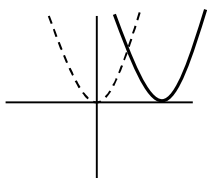
Vertical shift c units **up**: $y = f(x) + c$



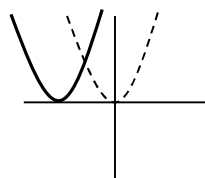
Vertical shift c units **down**: $y = f(x) - c$



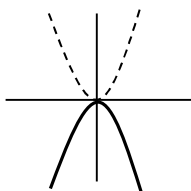
Horizontal shift c units to the **right**: $y = f(x-c)$



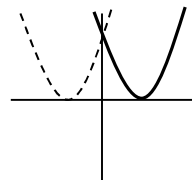
Horizontal shift c units to the **left**: $y = f(x+c)$



Reflection about the **x-axis**: $y = -f(x)$



Reflection about the **y-axis**: $y = f(-x)$



Practice:

Draw a graph of the original function and its transformation. How did the function change?

- | | | |
|----------------------------|-----------------------------------|---------------|
| 1. Original: $y = 3x$ | Transformation: $y = 3x - 2$ | Change: _____ |
| 2. Original: $y = x^2$ | Transformation: $y = (x - 3)^2$ | Change: _____ |
| 3. Original: $y = x - 3 $ | Transformation: $y = x - 3 + 2$ | Change: _____ |
| 4. Original: $y = 2x $ | Transformation: $y = - 2x $ | Change: _____ |

Write an equation for the given transformation.

- | | |
|----------------------------|--|
| 5. Original: $y = 2x$ | Transformation: Move it 7 units up |
| 6. Original: $y = x^2$ | Transformation: Move it 2 units left |
| 7. Original: $y = x - 3 $ | Transformation: Move it 1 unit down |
| 8. Original: $y = x + 1 $ | Transformation: Move it 2 units right and reflect it over the x-axis |
| 9. Original: $y = x^2$ | Transformation: Move it 5 units right and up 3 units |