How to Shift Function Graphs: Function Transformations

Here are very helpful formulas when shifting graph functions:

1. To shift graph functions to the left:
   We will be adding inside the function:
   \[ y = f(x+b) \]

2. Shift to the right:
   We will be subtracting inside the function:
   \[ y = f(x-b) \]

3. To shift graph up some units:
   We would be adding outside the function:
   \[ y = f(x)+b \]

4. To shift graph down some units:
   We will be subtracting outside the function:
   \[ y = f(x)-b \]
**Let’s do an example!**

We would be using the basic quadratic function of: \( y = x^2 \)

1. **To shift \( y=x^2 \) two units to the left:**
   We would be adding inside the function of \( y=x^2 \). So, \( y = (x+2)^2 \).

2. **To shift \( y=x^2 \) two units to the right:**
   We would be subtracting inside the function of \( y=x^2 \). So, \( y = (x-2)^2 \).

3. **To shift \( y=x^2 \) two units up:**
   We would be adding outside the function of \( y=x^2 \). So, \( y = x^2 +2 \).

4. **To shift \( y=x^2 \) two units down:**
   We would be subtracting outside the function of \( y=x^2 \). So, \( y = x^2 -2 \).
Here's a view of the graph transformations for \( y = x^2 \):

Here's the graph of \( y = x^2 \):

\[
\begin{align*}
  y &= (x+2)^2 \\
  y &= (x-2)^2 \\
  y &= x^2 + 2 \\
  y &= x^2 - 2
\end{align*}
\]
**Now let's try another example!!**

But, now we would use the negative of the $y=x^2$. We would use: $y= -x^2$.

1. **To shift $y=-x^2$ two units to the left:**
   We would be adding inside the function of $y= -x^2$. So, $y = -(x+2)^2$.

2. **To shift $y= -x^2$ two units to the right:**
   We would be subtracting inside the function of $y= -x^2$. So, $y= -(x-2)^2$.

3. **To shift $y= -x^2$ two units up:**
   We would be adding outside the function of $y= -x^2$. So, $y= -x^2 +2$.

4. **To shift $y= -x^2$ two units down:**
   We would be subtracting outside the function of $y= -x^2$. So, $y= -x^2 -2$. 
Now, try these on your own:

Tip: You can also try one a day!

1. \( y = x + 3 \)
2. \( y = x - 6 \)
3. \( y = x^2 + 6 \)
4. \( y = -x^2 - 8 \)
5. \( y = -x^2 + 12 \)
6. \( y = x^3 + 2 \)
7. \( y = -x^3 + 8 \)
8. \( y = -x^3 - 12 \)

Good luck and happy learning and reviewing!!

Also: don’t forget, if you have a graphing calculator use it to check your graph functions.

Answers on the next two pages! So you can check your answers! 😊