## DO NOW

In a science fiction novel, the main character found a mysterious rock that decreased in size each day. The table below shows the part of the rock that remained at noon on successive days. Which fractional part of the rock will remain at noon on day 7?

| Day | Fractional Part of the Rock Remaining |
|---|---|
| 1 | 1 |
| 2 | $\frac{1}{2}$ |
| 3 | $\frac{1}{4}$ |
| 4 | $\frac{1}{8}$ |

x $\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$

1) $\frac{1}{128}$ 3) $\frac{1}{14}$

2) $\frac{1}{64}$ 4) $\frac{1}{12}$

What type of function is represented in the table?

Exponential function

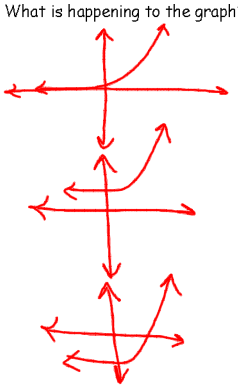
Feb 6-12:50 PM

## Calculator Exploration

On your calculator graph:

1. $y = 2^x$ (Parent Function)
2. $y = 2^x + 4$
3. $y = 2^x - 4$

What is happening to the graph?



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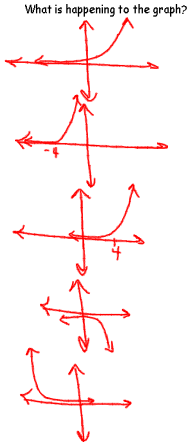
## Calculator Exploration

On your calculator graph:

1. $y = 2^x$ (parent function)
2. $y = 2^{x+4}$
3. $y = 2^{x-4}$
4. $y = -2^x$
5. $y = 2^{-x}$

What is happening to the graph?

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## Exponential Function Rules

**Rule 1:**

$y = a^x + k$ vertical shift UP

$y = a^x - k$ vertical shift DOWN

**Rule 2:**

$y = a^{(x+k)}$ horizontal shift to the LEFT

$y = a^{(x-k)}$ horizontal shift to the RIGHT

**Rule 3:**

$y = -a^x$ reflection in the x-axis (flip)

$y = a^{-x}$ reflection over the y-axis

Feb 19-9:02 PM

## Transformations of the graphs of functions

| | |
|---|---|
| $f(x) + c$ | shift $f(x)$ up c units |
| $f(x) - c$ | shift $f(x)$ down c units |
| $f(x + c)$ | shift $f(x)$ left c units |
| $f(x - c)$ | shift $f(x)$ right c units |
| $f(-x)$ | reflect $f(x)$ about the y-axis |
| $-f(x)$ | reflect $f(x)$ about the x-axis |
| $cf(x)$ | When $0 < c < 1$ – vertical shrinking of $f(x)$<br>When $c > 1$ – vertical stretching of $f(x)$<br>**Multiply the y values by c** |
| $f(cx)$ | When $0 < c < 1$ – horizontal stretching of $f(x)$<br>When $c > 1$ – horizontal shrinking of $f(x)$<br>**Divide the x values by c** |

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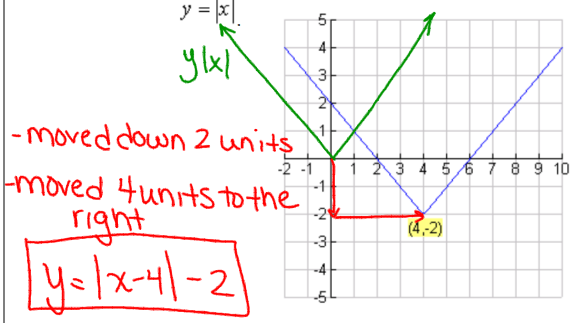
Write the equation for the graph shown at the right. Assume that the parent function was $y = |x|$.




$y = |x-4| - 2$

Feb 5-1:33 PM

Given the graph of the function $f(x)$ shown below, sketch the graphs of:

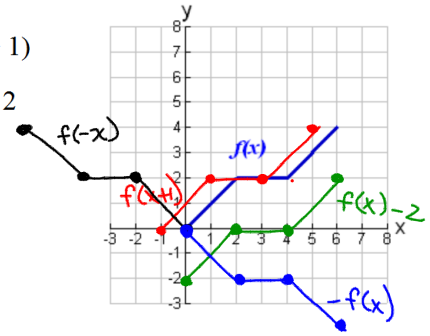
a. $f(x+1)$

b. $f(x) - 2$

c. $f(-x)$

d. $-f(x)$

e. $2f(x)$

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