L1 - Translations

December-14-15
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"Changes" to
- equations
- graphs

4 Lessons
Quest 6: Jan. 19

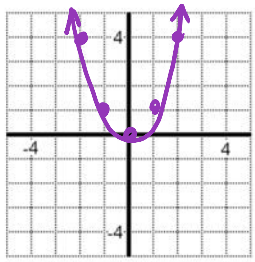
Unit 6: Transformations
Lesson 1 - Translations of Functions

Here are the **Basic Functions** (and their coordinates!) you need to get familiar with.

1. Quadratic functions (a.k.a. parabolas)

$y = x^2$

x	y

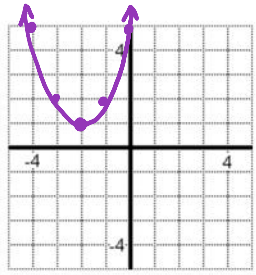


Ex.

$y = (x+2)^2 + 1$

p=-2 q=1

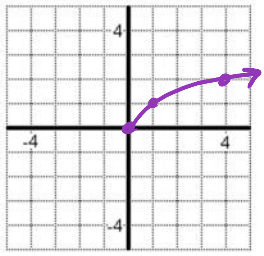
Change?
- left 2
- Up 1



2. Radical functions (a.k.a. square root function)

$y = \sqrt{x}$

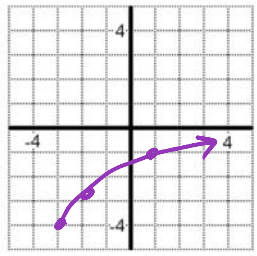
x	y



Ex.

$y = \sqrt{x+3} - 4$

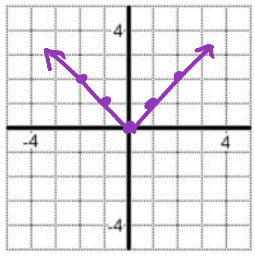
Change?
- 3 left
- 4 down



3. Absolute-value functions

$y = |x|$

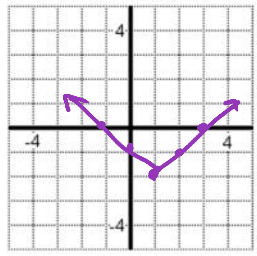
x	y



Ex.

$y = |x-1| - 2$

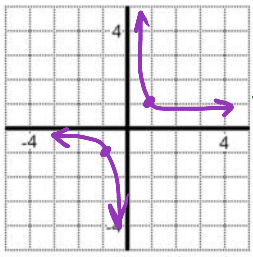
Change?
- 1 right
- 2 down



4. Reciprocal functions

$y = \frac{1}{x}$

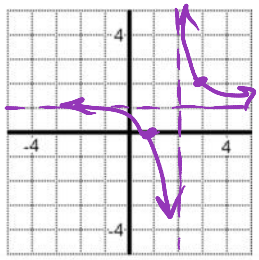
x	y
1	1
-1	-1



Ex.

$y = \frac{1}{x-2} + 1$

Change?
- 2 right
- 1 up



Note: You are expected to remember the shape of the above (left) functions!

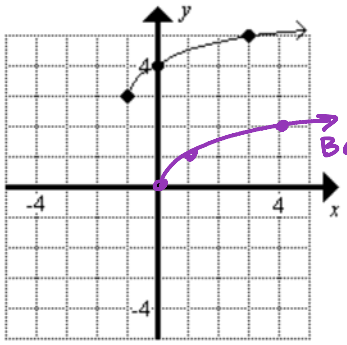
Regardless of the type of function $y = f(x)$, the transformed function $y = f(x-c)+d$ tells us:

"c" = horizontal translation (HT) * by opposite of c

"d" = vertical translation (VT) * by d

Ex. 1: Find the equations for the base functions and their transformed graphs.

a)



Base function:

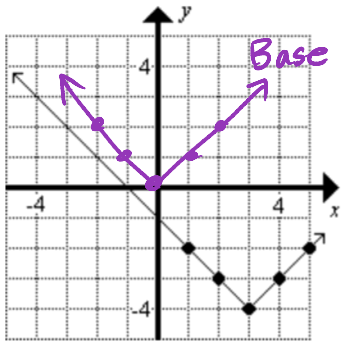
Radical: $y = \sqrt{x}$

Transformed function:

HT: 1 left
VT: 3 up

$y = \sqrt{x+1} + 3$

b)



Base function:

Absolute Value: $y = |x|$

Transformed function:

HT: 3 right
VT: 4 down

$y = |x-3| - 4$

Ex. 2: For the function $y-4 = f(x+2)$ state the value of c and d that represent the horizontal and vertical translations applied to $y = f(x)$

Base: $y = f(x)$

New: $y-4 = f(x+2)$

$y = f(x+2) + 4$

$c = -2$ $\quad d = 4$

HT: 2 left
VT: 4 up

Ex. 3: Determine the new function when $y = f(x-6)+1$ is translated 4 units to the left and 2 units downward.

$y = f(x-6+4)+1-2$

$y = f(x-2)-1$

Ex. 4: Describe what happens to the graph of a function if you replace x with $x+7$ and y with $y+1$

Base: $y = f(x)$

$y+1 = f(x+7)$

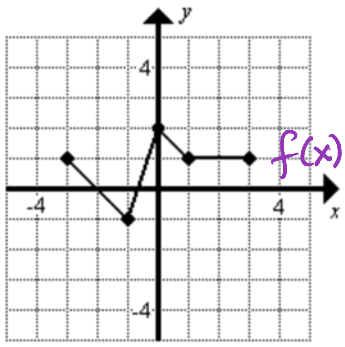
$y = f(x+7)-1$

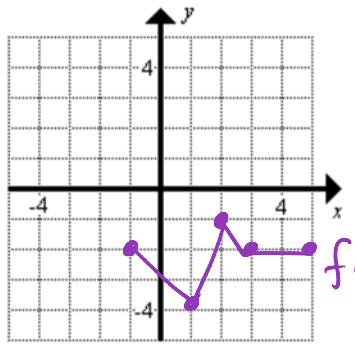
HT: 7 left
VT: 1 down

Ex. 5: Transform the following graph. Describe the transformations in words.

Given: $y = f(x)$

Graph: $y = f(x-2)-3$





HT: 2 right
VT: 3 down

To translate, choose key points on the graph and then translate each one to graph its corresponding **image point on the transformed graph.

Mapping Notation: $(x, y) \rightarrow (x+2, y-3)$

2 right 3 down

Practice: Worksheet H1 - Translations