What's Going On?

Checking In	Homework Logs
Minds on	Even More Tables of Values
Action!	***a*** vs. ***k***
Consolidation	Tell Me About Myself

Learning Goal - I will understand the effects of our final parameter, *k,* on our parent functions.

Checking In

Pre R.A.F.T.

Use a red pen and correct yesterday's FFM question.

Determine the inverse of the given function.

$$h(x) = 3\sqrt{x+1} - 4$$

Let $y = h(x)$

$$y = 3\sqrt{x+1} - 4$$

Switch the variables

$$x = 3\sqrt{y+1} - 4$$

Solve for y

$$x = 3\sqrt{y+1} - 4$$

$$\frac{x+4}{3} = \frac{3\sqrt{y+1}}{3}$$

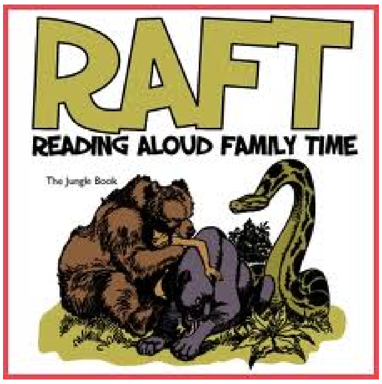
$$\left(\sqrt{y+1}\right)^2 = \left(\frac{x+4}{3}\right)^2$$

$$y+1 = \left(\frac{x+4}{3}\right)^2$$

$$y = \left(\frac{x+4}{3}\right)^2 - 1$$

Checking In

R.A.F.T.



Checking In

A "New" Term!

NEW TERM

An **invariant point** is a point on a graph that is unchanged by a transformation.

Minds on

Even More Tables of Values

$f(x) = x^2$

x	y
-4	16
-2	4
0	0
2	4
4	16

$g(x) = 2x^2$

x	y
-4	32
-2	8
0	0
2	8
4	32

$h(x) = (2x)^2$

x	y
-4	64
-2	16
0	0
2	16
4	64

Action!

a vs. *k*

$f(x) = x^2$

x	y
-4	16
-2	4
0	0
2	4
4	16

$h(x) = (2x)^2$

x	y
-4	64
-2	16
0	0
2	16
4	64

So to apply ***k***, we multiply the y-values by k^2?

Or is it 2***k?***

Action!

a vs. *k*

So to apply ***k***, we multiply the y-values by k^2?

Or is it 2***k***?

$f(x) = x^2$

x	y
-4	16
-2	4
0	0
2	4
4	16

$h(x) = (2x)^2$

x	y
-4	64
-2	16
0	0
2	16
4	64

$j(x) = (4x)^2$

x	y
-4	256
-2	64
0	0
2	64
4	256

Looks like k^2! But wait a second!!!! Only the quadratic function family has an exponent of 2... what would happen to the other parent functions?

Action!

all aboot *k*

$f(x) = |x|$

x	y
-4	4
-2	2
0	0
2	2
4	4

$h(x) = |2x|$

x	y
-4	8
-2	4
0	0
2	4
4	8

$j(x) = |4x|$

x	y
-4	16
-2	8
0	0
2	8
4	16

Well now we just seem to multiply the original y-values by ***k***... I would have thought that ***k*** affected each parent function the same way, kind of like ***a***, ***d***, and ***c*** each do a specific thing. Let's try one more thing!

Action!

all aboot *k*

This time, instead of keeping the same x-values, let's **figure out the x-values** if the y-values don't change! We already know that ***d*** affects the x-values, maybe ***k*** does too.

$f(x) = x^2$

x	y
-4	16
-2	4
0	0
2	4
4	16

$h(x) = (2x)^2$

x	y
-2	16
-1	4
0	0
1	4
2	16

$j(x) = (4x)^2$

x	y
-1	16
-0.5	4
0	0
0.5	4
1	16

***Careful! You'll be solving square roots here... what's the square root of 4?**

Action!

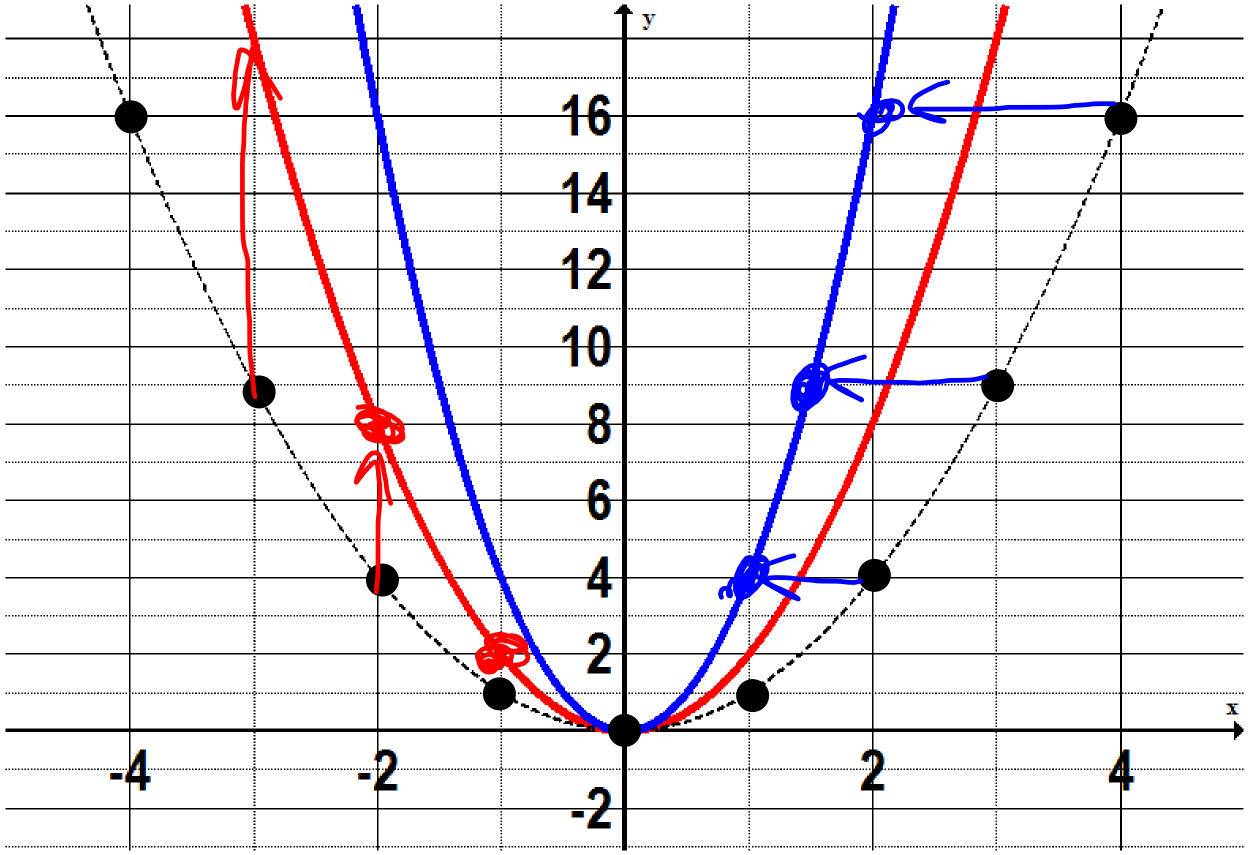
all aboot ***k***

So.... what does ***k*** do?!

Action!

The Effects of *k*

$f(x) = x^2$ $g(x) = 2x^2$ $h(x) = (2x)^2$



a changes the y-values

(**multiply** the y-values of the parent function by a!)

k changes the x-values

(**divide** the x-values of the parent function by k!)

Notice:

When ***a*** is 2, the y-values double.

When ***k*** is 2, the x-values halve.

$g(x) = af(\mathbf{k}x - d) + c$

This function describes a transformation of the graph of *f*.

f(x) can be: $f(x) = x^2$, $f(x) = |x|$,

$f(x) = \frac{1}{x}$, $f(x) = \sqrt{x}$

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a: **vertical stretch or compression**

- stretch when |***a***| > 1
- compression when |***a***| < 1

reflection in the x-axis when a is negative

(MULTIPLY THE Y-VALUES OF PARENT FUNCTION BY *a*)

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k: **horizontal stretch or compression**

- compression when |***k***| > 1
- stretch when |***k***| < 1

reflection in the y-axis when k is negative

(DIVIDE THE X-VALUES OF PARENT FUNCTION BY *k*)

$g(x) = af(\mathbf{k}x - d) + c$

This function describes a transformation of the graph of *f*.

f(x) can be: $f(x) = x^2$, $f(x) = |x|$,

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d: horizontal translation

- to the right when ***d*** is positive
- to the left when ***d*** is negative

(ADD *d* TO THE X-VALUES OF THE PARENT FUNCTION)

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c: vertical translation

- up when ***c*** is positive
- down when ***c*** is negative

(ADD *c* TO THE Y-VALUES OF THE PARENT FUNCTION)

Consolidation

Homework!

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