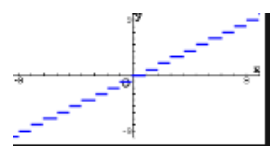
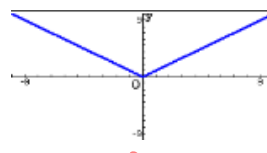
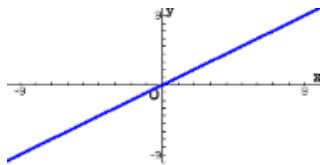
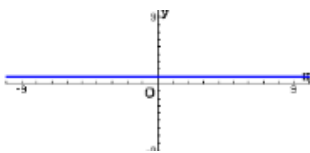


Lesson #7

Aim: How do we transform graphs of parent functions?

Do Now: Use a graphing calculator to sketch

1) $f(x) = 1$ 2) $f(x) = x$ 3) $f(x) = |x|$ 4) $f(x) = [x]$



Question: Based on today's lesson: What do they all have in common? They are all parent functions.

"A parent function is the simplest function of a family of functions. For the family of quadratic functions, $y = ax^2 + bx + c$, the simplest function of this form is $y = x^2$. The

"Parent" Graph: The simplest parabola is $y = x^2$, whose graph is shown at the right."

→ It does not have any transformations

I - Parent Functions \rightarrow Transformations

- 1) Shift: Vertically or Horizontally
- 2) Reflect: Across x or y Axis
- 3) Stretch or Compression

II Shifting.

1) Vertically

$$f(x) \pm c$$

example

$$\text{vert. } y = x^2 - 2$$

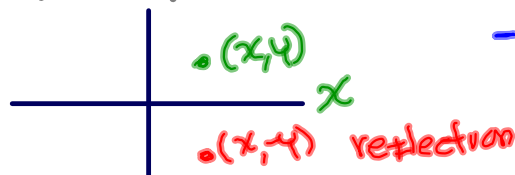
2) Horizontally

$$f(x \pm c)$$

$$\text{horiz. } y = (x-2)^2$$

III - Reflection Across x or y Axis.

1) x Axis Reflection: $r_{x\text{axis}} (x, y) \Rightarrow (x, -y)$



$$-f(x)$$

2) y Axis Reflection: $r_{y\text{axis}} (x, y) \Rightarrow (-x, y)$

$$f(-x)$$

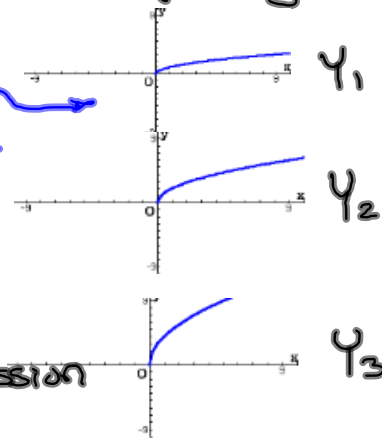
IV Stretching or Compressing

1) Please define as stretching or compressing

a) $f(x) = \sqrt{x}$ Parent function

b) $g(x) = \sqrt{4x}$

c) $h(x) = 4\sqrt{x}$



Stretch 4

Compression

X	Y1	Y2	Y3
1	1	2	4
2	1.4142	2.8284	5.6568
3	1.732	3.4641	6.9282
4	2	4	8

V - Combining transformation

$$1) g(x) = C \cdot f(a(x-b)) + d$$

2) Let's Explain each transformation

✓ a) If $a < 0$ reflection on the y-axis

✓ b) stretch or compress $\frac{1}{a}$

✓ c) shift left/right (b)

✓ d) stretch or compress by $|c|$

✓ e) If $c < 0$ reflection on the x-axis

f) shift up/down by (d)

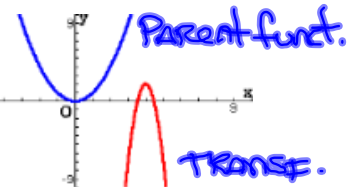
$$3) g(x) = -(3x-12)^2 + 2$$

what's the parent function?

$$y = x^2$$

$$g(x) = C \cdot f(a(x-b)) + d$$

$$-1 \cdot f(3(x-4)^2) + 2$$



$$a = 3$$

$$b = 4$$

$$c = -1$$

$$d = 2$$

note

→ compression by a factor $\frac{1}{3}$

→ shift right by 4

→ $|-1| = 1$

→ $c < 0$ so a reflection on the x-axis

→ $d = 2$ up 2 units