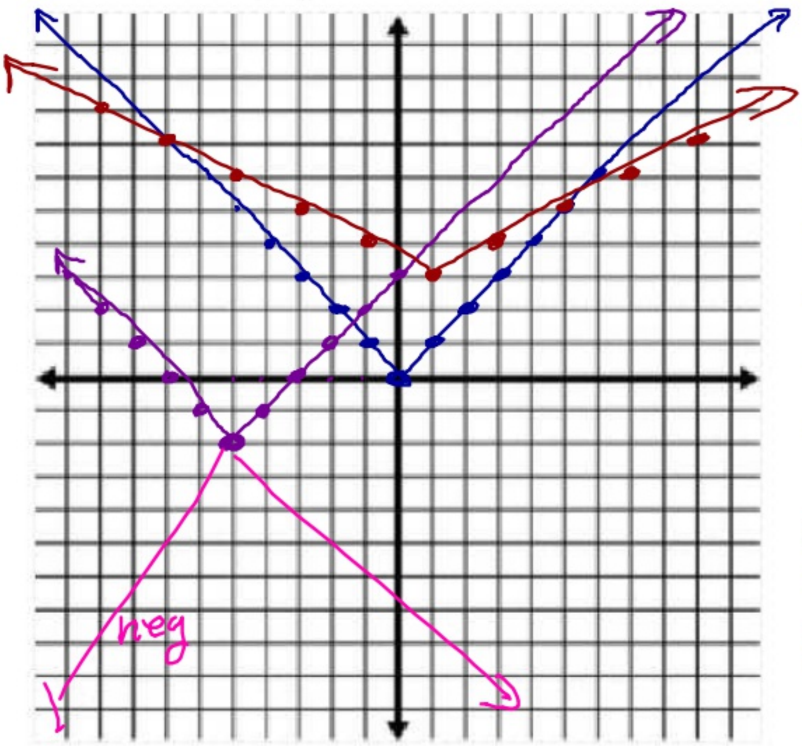
Name ______________________________ Period __________

Secondary 2 Honors – Functions Unit – Transformations – DAY 1 NOTES

1. Graph the absolute value function

$$f(x) = |x| \qquad f(x) = 1|x-0|+0$$



x	y
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3

$g(x) = -|x+5|-2$

$h(x) = \frac{1}{2}|x-1|+3$

Features of an absolute value function:

Domain $(-\infty, \infty)$ Range $[0, \infty)$

Increasing $(0, \infty)$ Decreasing $(-\infty, 0)$

Critical point $(0, 0)$

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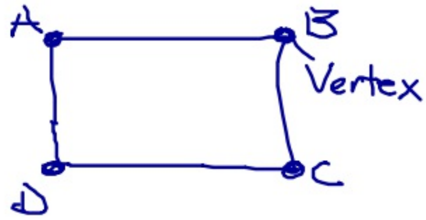


Now you try, but graph the equations from # 2 & 3 on the same graph you used from # 1, but use different colors for all 3 graphs.

2. $g(x) = |x+5| - 2$

x	y
-8	
-7	0
-6	-1
-5	-2
-4	-1
-3	0
-2	1
-1	2
0	3
1	3
2	

Domain_______________

Range_______________

Increasing_______________

Decreasing_______________

Critical point_______________

3. $h(x) = \frac{1}{2}|x-1| + 3$

x	y
-2	4 1/2
-1	4
0	3 1/2
1	3
2	3 1/2
3	4
4	4 1/2

Domain_______________

Range_______________

Increasing_______________

Decreasing_______________

Critical point_______________

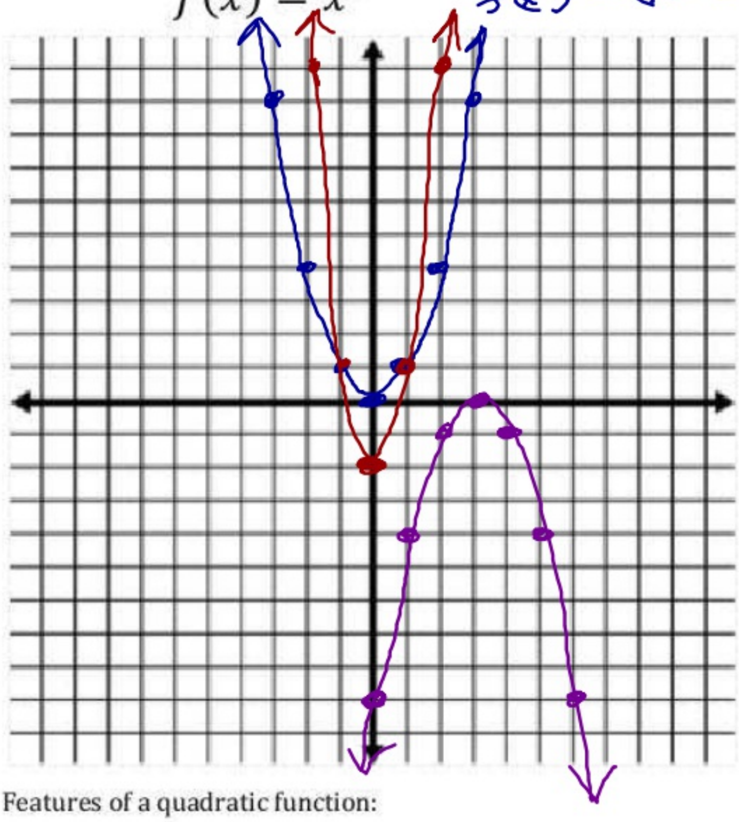
Now contrast the graphs.

f(x) vs. g(x)

f(x) vs. h(x)

4. Graph a simple quadratic function of the form below.

$f(x) = x^2$ $\quad f(x) = (x-0)^2+0$



x	y
−3	9
−2	4
−1	1
0	0
1	1
2	4
3	9

$c(x) = -(x-3)^2+0$

$d(x) = 3x^2-2$

$= 3(x-0)^2-2$

Features of a quadratic function:

Domain $(-\infty, \infty)$ Range $[0, \infty)$

Increasing $(0, \infty)$ Decreasing $(-\infty, 0)$

Critical point/Vertex $(0,0)$

Now you try, but graph the equations from # 5 & 6 on the same graph you used from # 4, but use different colors for all 3 graphs.

5. $c(x) = -(x-3)^2 + 0$

x	y
0	-9
1	-4
2	-1
3	0
4	1
5	4

Domain $(-\infty, \infty)$

Range $(-\infty, 0]$

Increasing $(-\infty, 3)$

Decreasing $(3, \infty)$

Critical point $(3, 0)$

6. $d(x) = 3x^2 - 2$

$= 3(x-0)^2 - 2$

x	y

Domain $(-\infty, \infty)$

Range $(2, \infty)$

Increasing $(0, \infty)$

Decreasing $(-\infty, 0)$

Critical point $(0, -2)$

Now contrast the graphs.

f(x) vs. c(x)

f(x) vs. d(x)

What do you think causes the changes to each function?

Our most basic or **parent function** was labeled f(x).

So each time we did something to f(x) to transform (move stretch or reflect) it.

f(x+1) for instance if $f(x)=|x|$ would now become $f(x+1)=|x+1|$. How would this transform our graph?

translation one left $f(x)=|x - -1|+0$

f(x)+1 if $f(x)=|x|$ would now become $f(x)+1=|x|+1$. How would this transform our graph?

trans. up 1

3f(x) if $f(x)=|x|$ would now become $f(x)=3|x|$. How would this transform our graph?

linear: absolutevalue: rate of change.
quad: : factor of change.

To summarize: for our parent function of f(x), the transformed function would be

$$a\mathbf{f}(\mathbf{x}+v)+w$$

a:

- When |a|>1 the function is ________________
- When |a|<1 the function is ________________
- If a<0 the function is______________________

v:

- If v>0 the function shifts to the ________________
- If v<0 the function shifts to the ________________

w:

- If w>0 the function shifts ________________
- If w<0 the function shifts ________________

Secondary 2 Honors - Functions Unit

Day 1 Notes IN CLASS - Transformations

Without knowing the parent function, describe what each transformation would do to any parent function.

1) f(x+2)

a: none
h: left 2
k: none

2) f(x-5)

a: none
h: right 5
k: none

3) -f(x)+6

a: reflection
h: none
k: up 6

4) f(x+3)-2

5) 2f(x)+2

a: mult. by 2
h: none
k: up 2

6) 0.75f(x-1)

Without graphing, describe the transformations to each function from the original parent function, $f(x)=x^2$ or $c(x)=|x|$, in words. Then write the function notation of the transformation.

7) $g(x) = -(x+4)^2 + 2$ quad
a: reflection, h: left 4 k: up 2

8) $h(x) = 2(x+1)^2 + 1$

9) $k(x) = -3|x+4|$: absolute
a: reflection, mult. of 3
h: left 4
k: none

10) $m(x) = -2|x| - 3$

11) $n(x) = 2|x+1| - 4$

12) $p(x) = \frac{1}{2}\left(x - \frac{3}{2}\right)^2 - \frac{17}{8}$