Unit 4 Day 1

Absolute Value Functions

Warm-up: #1,2,3 on top of notes p.1

1) Write down all the transformations of the graph of $y = x^2$.

a. $y = (x+h)^2$ moves the graph of $y = x^2$ **Left h**

b. $y = (x-h)^2$ moves the graph of $y = x^2$ **Right h**

c. $y = (x)^2 + k$ moves the graph of $y = x^2$ **Up k**

d. $y = (x)^2 - k$ moves the graph of $y = x^2$ **Down k**

Graph each function. Be as accurate as you can. Remember to graph at least 5 points. Then indicate the transformations from the parent graph.

2) $y = (x+2)^2 - 3$

3) $y = -x^2 + 3$

4.) Given $f(x) = 5x - 10$

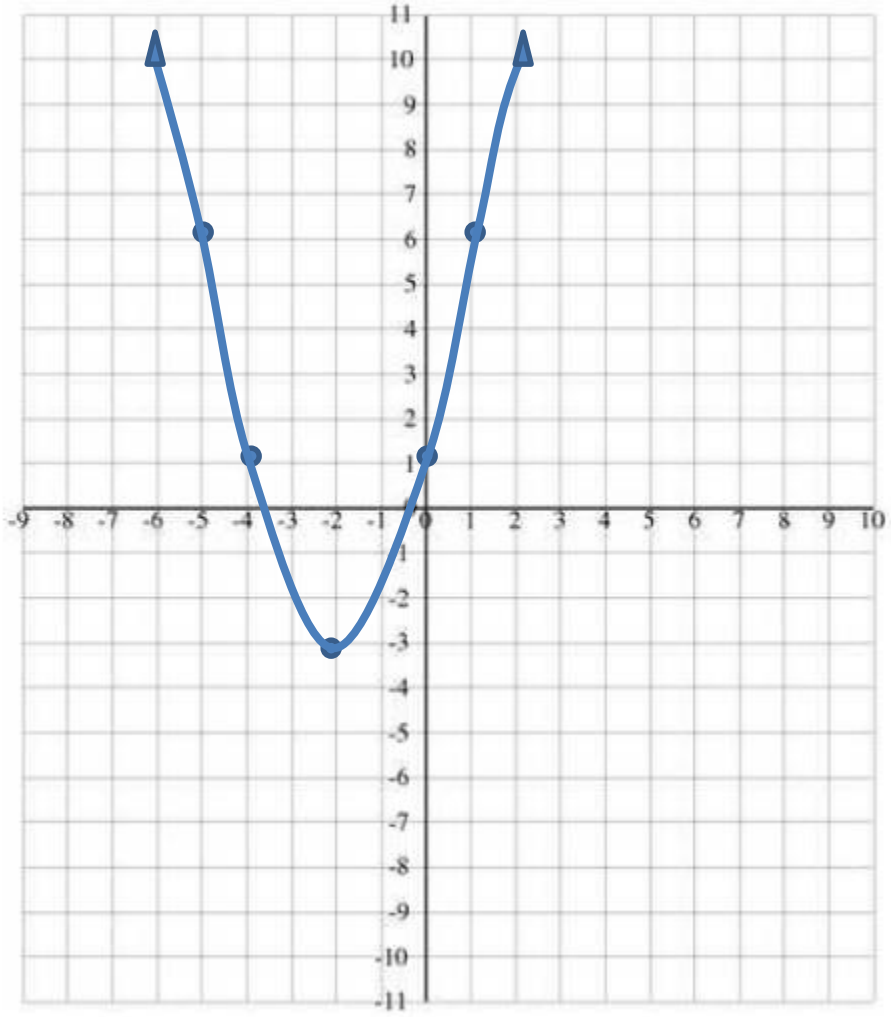
Evaluate $f(8) =$

5.) Given $f(x) = x^2 + 5$

Evaluate f(x - 3)=

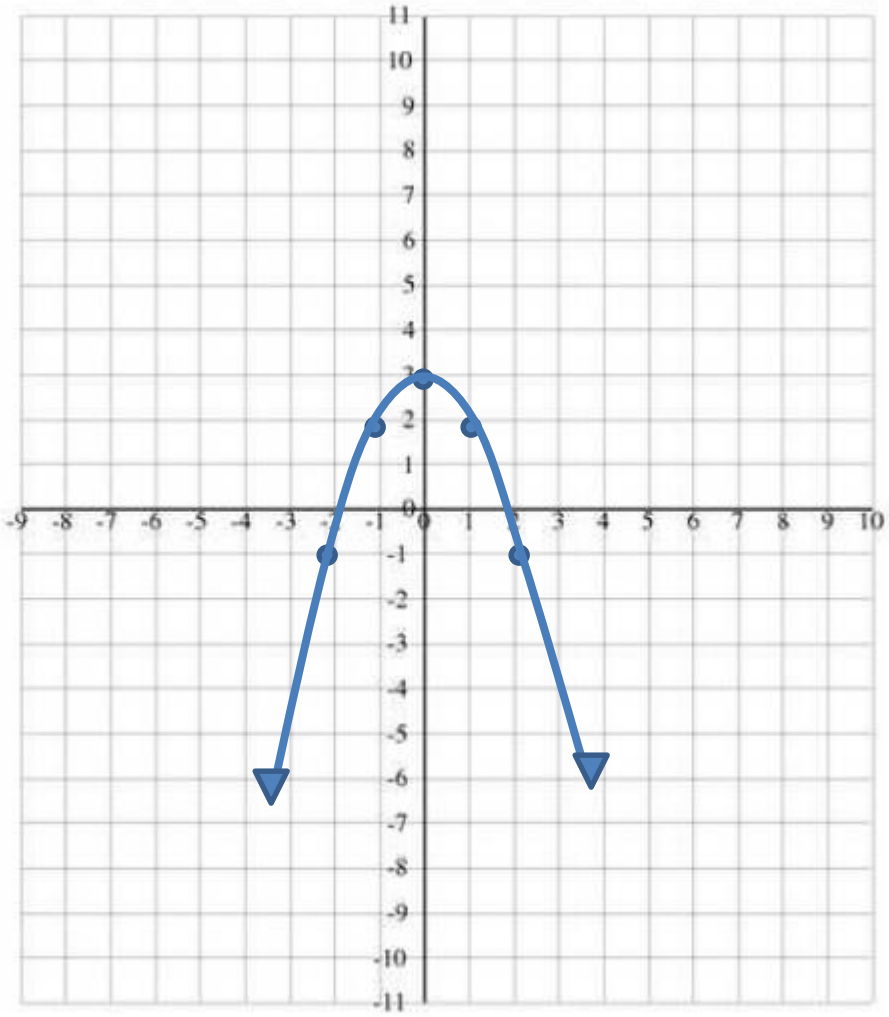
Graph each function. Be as accurate as you can. Remember to graph at least 5 points.

2) $y = (x+2)^2 - 3$



Graph each function. Be as accurate as you can. Remember to graph at least 5 points.

3) $y = -x^2 + 3$



4.) Given $f(x) = 5x - 10$

Evaluate $f(8) = 30$

f(8)= 5(8) – 10
f(8)= 40 – 10
f(8)= 30

5.) Given $f(x) = x^2 + 5$

Evaluate f(x - 3) = $x^2 - 6x + 14$

$f(x - 3) = (x - 3)^2 + 5$
$f(x - 3) = x^2 - 6x + 9 + 5$
$f(x - 3) = x^2 - 6x + 14$

Classwork / Homework

HW Packet p. 1, 2

If you can't print, have a parent email me! You REALLY need the notes and packet for each day – especially in this unit – there are a LOT of graphs!

Unit 4 Day 1

Absolute Value Functions

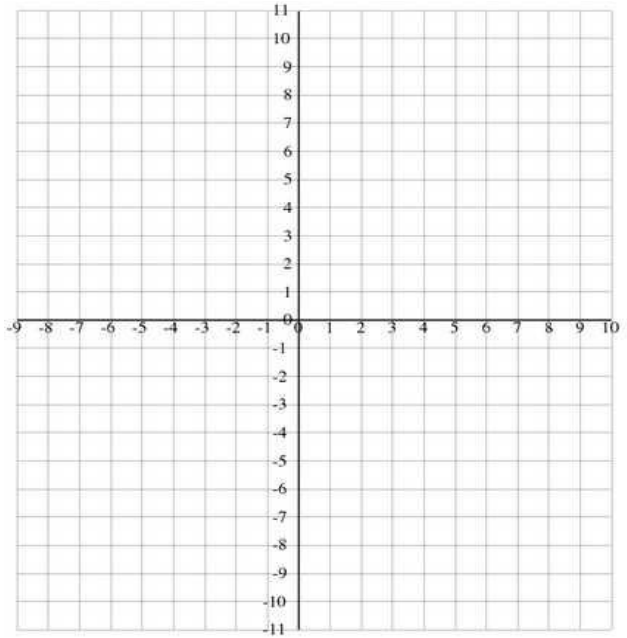
Graphing Absolute Value

Notes p. 1

A function of the form $f(x) = | mx + b | + c$, where $m \neq 0$ is an **absolute value function**.

Let's play in our calculator with graphing absolute value functions. Graph the following in your calculator, use the list function to plot points and sketch the graph.

$$|x| = \begin{cases} -x, & \text{if } x<0 \\ x, & \text{if } x=0 \\ x, & \text{if } x>0 \end{cases}$$



Let's do #1 together!

1. $y = | x |$

Graphing Discovery

Notes p. 2 #2-10

Discovery #7-10

7. What is a zero of a function? Where are the zeros on each of the above graphs? A zero is the x-intercept, where the graph hits the x-axis. The zeros for each graph are at the vertex.

8. Where is the vertex of each graph?

1. $y = |x|$ (0, 0)

2. $y = 2|x + 4|$ (-4, 0)

3. $y = 2|x + 1.5|$ (-1.5, 0)

4. $y = |x - 2|$ (2, 0)

5. $y = 2|x - 3|$ (3, 0)

6. $y = -3|x + 2|$ (-2, 0)

9. Using the pattern, what is the vertex of $y = a|x - h|$?

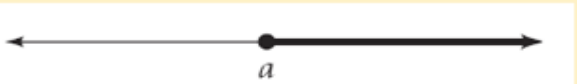
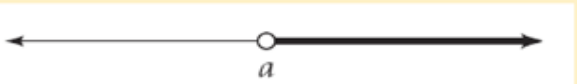
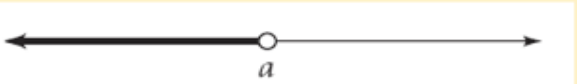
(h, 0)

10. How does "a" affect the graph?

"a" affects the slope of each side

Expressing Domain and Range with Interval Notation

Infinite Intervals

Interval Notation	*Set Notation*	*Graph*	*Type*
$[a, \infty)$	$\{x \mid x \geq a\}$		Closed
(a, ∞)	$\{x \mid x > a\}$		Open
$(-\infty, a]$	$\{x \mid x \leq a\}$		Closed
$(-\infty, a)$	$\{x \mid x < a\}$		Open

Express the values of x in interval notation.

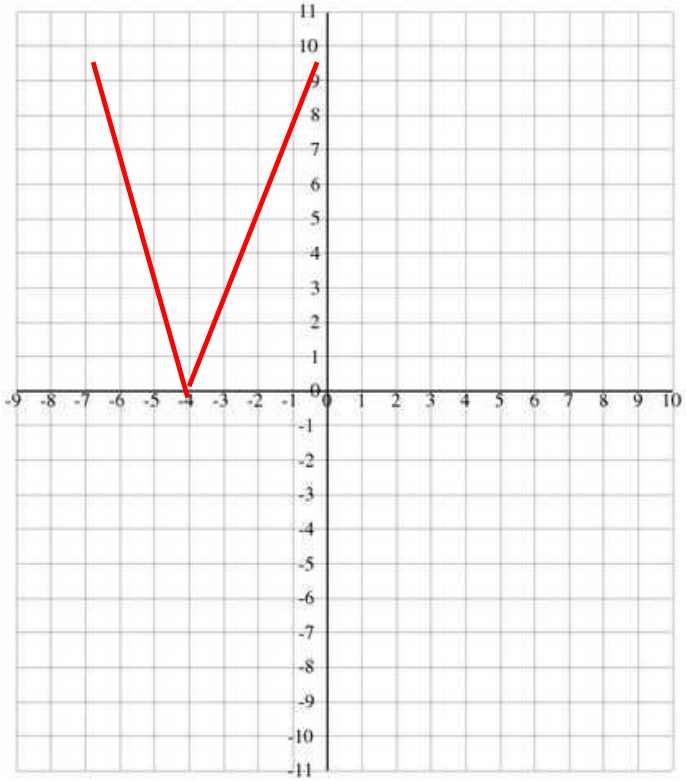
1) $x \geq 5$ $[5, \infty)$

2) x is all real numbers $(-\infty, \infty)$

3) $-1 < x \leq 8$ $(-1, 8]$

4) $x \leq -3$ *or* $x > 6$ $(-\infty, -3] \cup (6, \infty)$

Example: Graph y = 3| x + 4 |without your calculator



Step 1: Identify the vertex.
Step 2: Make a table of values (be sure that the x value from step 1 and values around tha x-value are included:

x	-8	-6	-4	-2	0	2
y	12	6	0	6	12	18

Step 3: Graph the function using the table

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

Example: The graph at the right models a car traveling at a constant speed.

a. Describe the relation shown in the graph.

Miles from the roadside stand increase as hours from the roadside stand increase

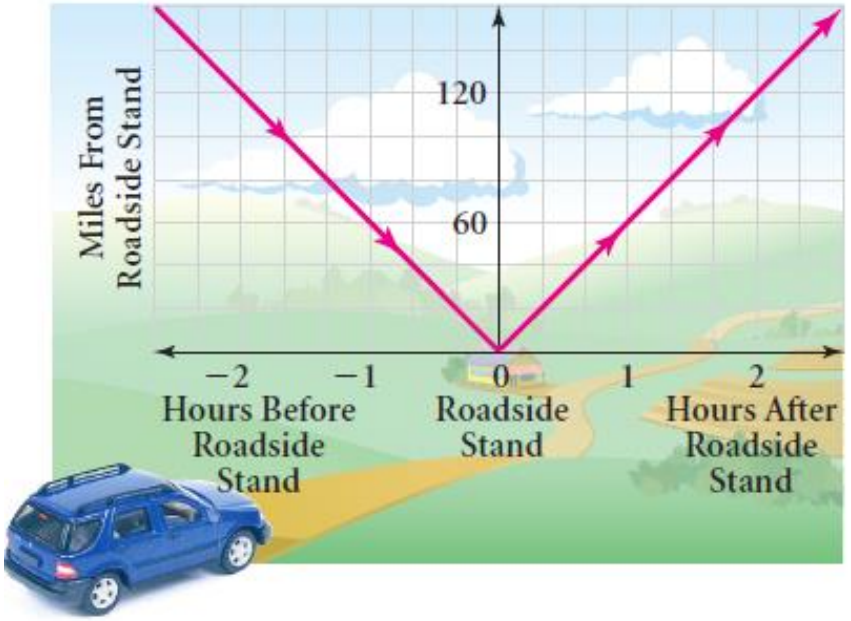
b. Which equation best represents the relation?

a. $y = |60x|$

b. $y = |x + 60|$

c. $y = |60 - x|$

d. $y = |x| + 60$



Complete Graphing Discovery

Notes p. 4

Done early? Try top of Notes p. 5

Sketch each graph and find the domain and range in interval notation

1. $y = \lvert x \rvert$	**2. $y = \lvert x \rvert + 4$**	**3. $y = \lvert x \rvert - 3$**

5. $y = \lvert x \rvert$	**6. $y = \lvert x + 4 \rvert$**	**7. $y = \lvert x - 3 \rvert + 4$**

Done early? Try top of Notes p. 5

Identify the transformations. Also determine the domain and range for each function.

1. $y = 3|x + 2| - 3$

Translated left 2, down 3, vertical stretch by 3

D: $(-\infty, \infty)$ R: $[-3, \infty)$

2. $y = |x - 1| + 2$

Translated right 1, up 2

D: $(-\infty, \infty)$ R: $[2, \infty)$

3. $y = 2|x + 3| - 1$

Translated left 3, down 1, vertical stretch by 2

D: $(-\infty, \infty)$ R: $[-1, \infty)$

4. $y = -1/3|x - 2| + 1$

Translated left 2, down 3, vertical compression by 1/3

D: $(-\infty, \infty)$ R: $(-\infty, 1]$

Transformations

$$y = -a|x - h| + k$$

- **Reflect over x-axis**
- **If a > 1 vertical stretch**
- **If a < 1 vertical compression**
- **Moves left (+) or right (-)**
- **Moves up (+) or down (-)**

Remember that (h, k) is your vertex

Using Vertex Form

What can we do if an equation is not in vertex form?

$y = |3x + 6| - 4$

What would the slope of the right side be?

3

We'll use that as our GCF. Factor it out, then we can have vertex form! ☺

$y = 3|x + 2| - 4$

What is our vertex?

(-2 , - 4)

How is it transformed from the parent?

Translated left 2, down 4
and stretched vertically by 3

What is the domain?

all real numbers

What is the range?

$[-4, \infty)$

Practice: Absolute Value Graphs & Transformations

Notes p. 6

Use **COLORED** PENCILS or MARKERS ☺

Classwork / Homework

HW Packet p. 1, 2

Try p.1 #13-21 odd first!

You can graph with your calculator

Use the table to plot points