

Name: Key Date: _____ Hour: _____

Midterm Review (Chapters 1 & 2)

Chapter 1: Quantities & Relationships

1. Explain the difference between the following:

a. independent and dependent quantities

- The dependent quantity depends on the independent quantity.
- The IQ is labeled on the x-axis. The DQ is on the y-axis.

b. domain and range

- The Domain is all of the possible input values. (x)
- The Range is all of the possible output values. (y)

2. Make up a scenario. Identify the independent and dependent quantities.

Susie is selling lemonade to raise money for a local charity. She is selling lemonade for \$2 per cup. She totals her money at the end of the week.

IQ - # of cups of lemonade sold

DQ - total \$ earned

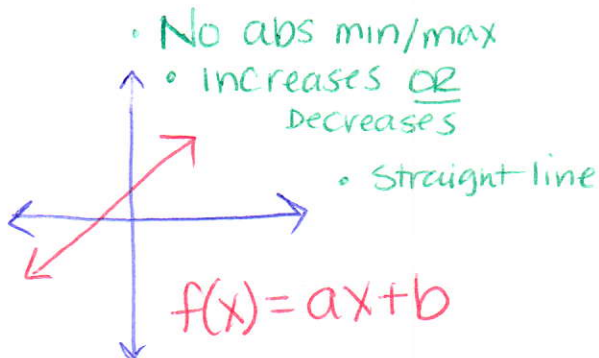
3. How do you know if a relation is a function?

- No repeats in the domain (x's)
- Passes the vertical line test.

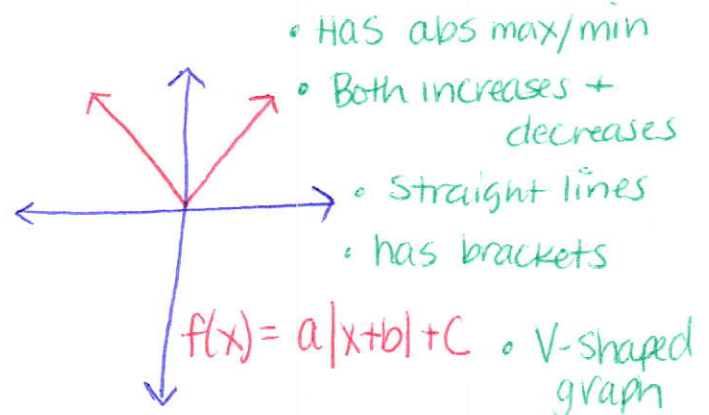
Remember
("x's can't be two-timers")

4. For each function family write an equation in function notation, sketch a graph, and describe the graphical behavior (increasing/decreasing, absolute min/max....etc.)

Linear

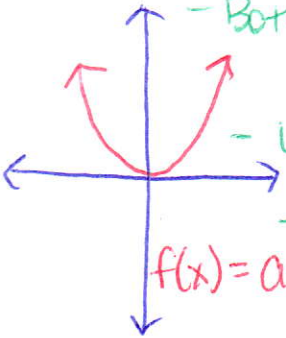


Linear Absolute Value



Quadratic

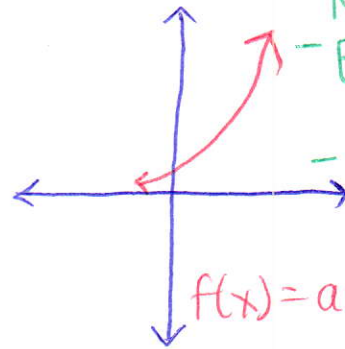
- Has abs min/max
- Both increases and decreases
- U-shaped graph
- curved lines



$$f(x) = ax^2 + bx + c$$

Exponential

- No abs min or max
- Either increases or decreases
- Curved line
- x has to be exponent



$$f(x) = a \cdot b^x$$

Chapter 2: Graphs, Equations, and Inequalities

Time (sec.)	0	1	2	3	3.5	4	5
Height (ft.)	2000	3325	4650	5975	6637.5	7300	?

1. Identify the rate of change for this table.

$$\begin{matrix} (0, 2000) & (1, 3325) \\ x_1 & y_1 & x_2 & y_2 \end{matrix}$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{3325 - 2000}{1 - 0} = \frac{1325}{1} = \boxed{1325}$$

2. How many feet after 5 seconds? How did you know?

$$7300 + 1325 = \boxed{8625}$$

Since the rate of change is 1325, I added it to 7300.

3. Write an equation in function notation to represent this table. Define your variables.

$$f(x) = 1325x + 2000$$

let $x = \# \text{ seconds}$ $f(x) = \text{height (ft)}$

4. What does each component on the function stand for?

$\boxed{2000}$ - The starting height

$\boxed{1325}$ - The increase in height every sec.

$\boxed{1325x}$ - The increase of height

$\boxed{f(x)}$ - total height

5. What is the slope? What is the y-intercept?

$$\text{Slope} = 1325$$

because it's the rate of change

$$\text{y-intercept} = 2000$$

because it's the starting height

Time (sec.)	0	1	2	3	4	5	6
Height (ft.)	10,500	10,300	10,100	9,900	9,700	9,500	9,300

The height of a tandem skydiving jump is 10,500 feet. Under normal atmospheric conditions, the skydivers usually free fall at a rate of 200 feet per second.

6. Fill in the table above to represent this situation. ✓
 7. What are the independent and dependent quantities?

IQ - Time (sec) DQ - height (ft)

8. Write an equation to model this scenario. Use function notation. Define your variables.

$$f(x) = 10,500 - 200x$$

let $x = \#$ of seconds

$f(x) =$ height in feet

9. Analyze the contextual meaning of each part of your equation.

10,500 - starting height of skydivers

-200 - the decrease in height every second

-200x - the total decrease in height

$f(x)$ = total height of skydivers after x seconds

10. Without actually graphing it, describe how the graph will look for this situation. How do you know?

Decreasing linear line

- constant rate of change - The height is decreasing

11. How high will the skydivers be in 25 seconds? Show your work. *plug in 25 for x

$$f(x) = 10,500 - 200x$$

$$f(25) = 10,500 - 200(25)$$

$$f(x) = 5,500$$

12. How long will it take for the skydivers to reach a height of 3000 feet? Show your work.

*Plug in 3000 for $f(x)$
 *solve for x

$$f(x) = 10,500 - 200x$$

$$3000 = 10,500 - 200x$$

$$\frac{-7500}{-200} = \frac{-200x}{-200}$$

$$x = 37.5$$

at 37.5 seconds the skydivers will be at 3000 ft.

13. What is the x -intercept? What does it mean in terms of this situation?

* The x -intercept is when $y=0$ (or $f(x)=0$)

So set $f(x)=0$

$$0 = 10,500 - 200x$$

$$\frac{-10,500}{-200} = \frac{-200x}{-200}$$

$$-10,500 = -200x$$

The x -intercept is when $f(x)=0$. So this means when the height is 0, or when they land... They will land at 52.5

14. Solve the following equations.

** Get variable by itself!*

a. $7m - 17 = 60$

$+17 \quad +17$ *add 17

$\frac{7m}{7} = \frac{77}{7}$ *divide by 7

$m = 11$

b. $b\left(\frac{p-15}{9}\right) = (-6)9$

* multiply by 9 to eliminate fraction

$p - 15 = -54$
 $+15 \quad +15$ *add 15

$p = -39$

c. $3(x-8) = 3$ * distribute the 3

$3x - 24 = 3$ * add 24
 $+24 \quad +24$

$\frac{3x}{3} = \frac{27}{3}$ *divide by 3

$x = 9$

d. $5t - 9 = -3t + 7$

$+9 \quad +9$ *add 9

* Get all the variables on one side and numbers on the other!

$5t = -3t + 16$
 $+3t \quad +3t$ *add 3t

$\frac{8t}{8} = \frac{16}{8}$ *divide by 8

$t = 2$

* Note: you could have started by dividing by 3 instead of distributing.

15. Solve the following inequalities and graph the solution on a number line.

Same goal as equations. Get variable by itself!

a. $-7x + 19 < -16$
 $-19 \quad -19$ * Subtract 19

$\frac{-7x}{-7} < \frac{-35}{-7}$ * divide by -7

$x > 5$

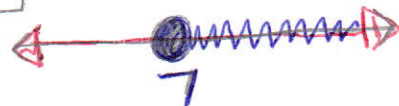
** when dividing by a neg. you must switch the sign!



b. $6x - 10 \geq 32$
 $+10 \quad +10$ * add 10

$\frac{6x}{6} \geq \frac{42}{6}$ * divide by 6

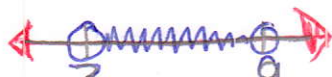
$x \geq 7$



c. $3 < 2x - 3 < 15$
 $+3 \quad +3 \quad +3$ * add 3 to each part

$\frac{6}{2} < \frac{2x}{2} < \frac{18}{2}$ * divide each part by 2

$3 < x < 9$



d. $x - 4 \leq 1$ OR $x - 4 \geq 3$

* add 4 +4 +4 | +4 +4 * Solve each separate. Then graph.

$x \leq 5$ OR $x \geq 7$



16. Roscoe needs at least \$230 for a new game console. He received \$80 for his birthday. He has been shoveling neighbors' properties for \$18 per sidewalk. Write an inequality to represent this situation and SOLVE to find out how many sidewalks he needs to shovel to reach his goal.

He needs to shovel at least 9 Sidewalks to meet his goal.

$$18s + 80 \geq 230$$

$$\begin{array}{r} -80 \\ -80 \end{array} \quad * \text{ Subtract } 80$$

$$18s \geq 150 \quad * \text{ divide by } 18$$

$$s \geq 8.33 \quad \leftarrow \text{ Round up}$$

17. Solve the following absolute value equations/inequalities and graph the solution on a number line:

* Case 1 + Case 2 (Positive + Neg)

a. $|5x - 3| = 12$

Positive	neg.	
$5x - 3 = 12$ $\begin{array}{r} +3 \\ +3 \end{array}$ $5x = 15$ $x = 3$	$-(5x - 3) = 12$ $-5x + 3 = 12$ $\begin{array}{r} -3 \\ -3 \end{array}$ $-5x = 9$ $x = -9/5$	* distribute the neg.
OR		

b. $|x + 17| = 4$

Pos.	neg
$x + 17 = 4$ $\begin{array}{r} -17 \\ -17 \end{array}$ $x = -13$	$-(x + 17) = 4$ $-x - 17 = 4$ $\begin{array}{r} +17 \\ +17 \end{array}$ $-x = 21$ $\begin{array}{r} \div -1 \\ \div -1 \end{array}$ $x = -21$
OR	

c. $|3x + 4| \geq 8$

Pos.	Neg.	
$3x + 4 \geq 8$ $\begin{array}{r} -4 \\ -4 \end{array}$ $3x \geq 4$ $\begin{array}{r} \div 3 \\ \div 3 \end{array}$ $x \geq 4/3$	$-(3x + 4) \geq 8$ $-3x - 4 \geq 8$ $\begin{array}{r} +4 \\ +4 \end{array}$ $-3x \geq 12$ $\begin{array}{r} \div -3 \\ \div -3 \end{array}$ $x \leq -4$	* dividing an inequality by a neg. you must flip sign.
* greater OR	OR	

d. $|6x + 8| < -4$

No Solution

* Since absolute value measures distance, the left side will always be positive. Therefore, it will never be less than a neg. number!