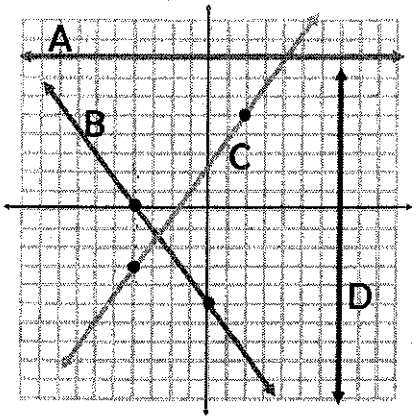
Algebra 1 Name Key

Characteristics of Linear Functions Date

Warm-up: Find the rate of change.



1. Line A m = 0
2. Line B m = -5/4
3. Line C m = 4/3
4. Line D m = und.

What if you don't have a graph?

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

5. (1, 4) (6, 2) $\frac{2-4}{6-1} = \frac{-2}{-5} = \boxed{\frac{2}{5}}$

6. (2, –3) (4, 3) $\frac{3+3}{4-2} = \frac{6}{2} = \boxed{3}$

Characteristics of Linear Functions

Rate of Change - the slope of a function

Domain - the set of x-values for a function

Range - the set of y-values for a function

increasing interval - the interval where the graph rises and the y-values increase

decreasing interval - the interval where the graph falls and the y-values decrease

x-intercept - the point(s) where a graph crosses the x-axis

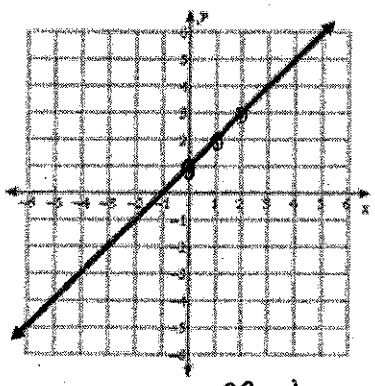
y-intercept - the point(s) where a graph crosses the y-axis

end-behavior - the behavior at the end of the graph (up or down) as x approaches negative infinity (left) or positive infinity (right).

Note: A continuous linear function will always have a domain and range that include all real numbers. $(-\infty, \infty)$

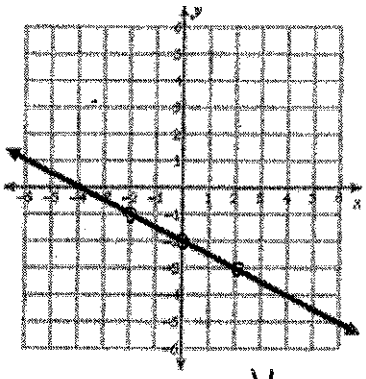
Rate of Change: the slope of a function. Find the rate of change for each function below.

1.



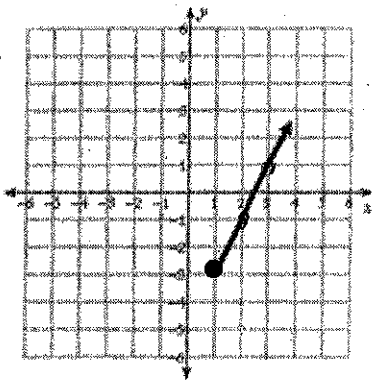
Rate of Change: m=1

2.



Rate of Change: -1/2

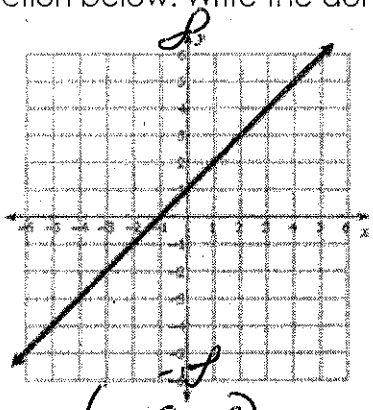
3.



Rate of Change: 2

Domain: the set of x-values. **Range**: the set of y-values. Find the domain and range for each function below. Write the domain and range in ~~inequality notation~~. Interval Notation

1.



$-\infty$ ∞ $-\infty$

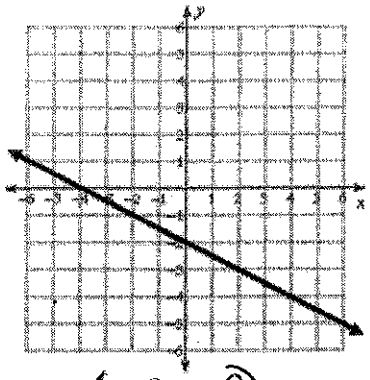
Interval

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

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

means $-\infty < x < \infty$

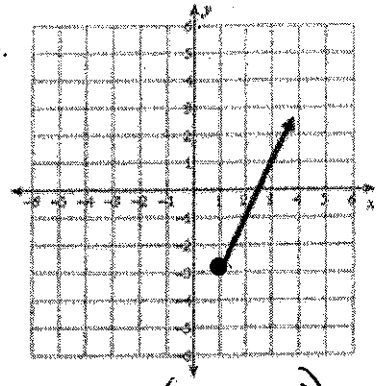
2.



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

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

3.

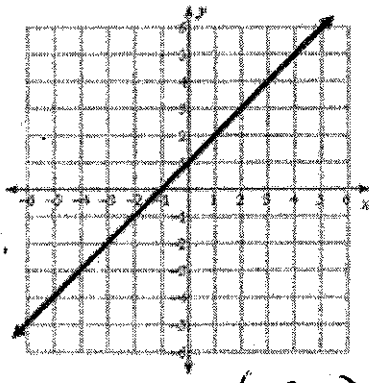


Domain: $(-\infty, \infty)$

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

Increasing Interval: the interval where the graph rises and the y– values increase. **Decreasing Interval**: the interval where the graph falls and the y – values decrease. (The intervals should be ~~written in inequality notation~~, and are written in terms of x). Find the intervals of increase and decrease for each function below.

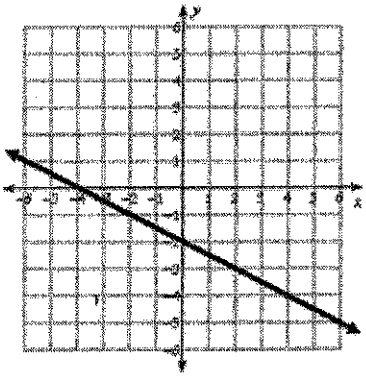
1.



Increasing Interval: $(-\infty, \infty)$

Decreasing Interval: None

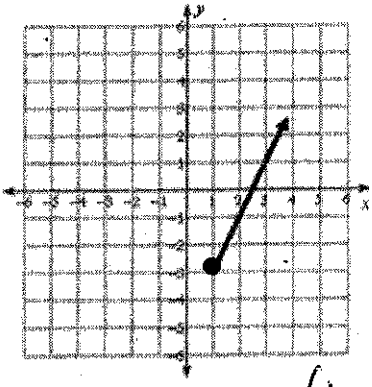
2.



Increasing Interval: none

Decreasing Interval: $(-\infty, \infty)$

3.

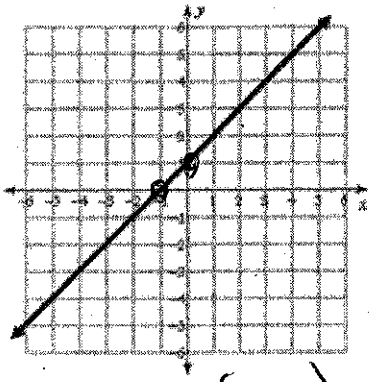


Increasing Interval: $(1, \infty)$

Decreasing Interval: none

X-Intercept: the point(s) where a graph crosses the x-axis. **Y-Intercept**: the point where a graph crosses the y-axis. Find the x-intercept (s) and y-intercepts of each function below.

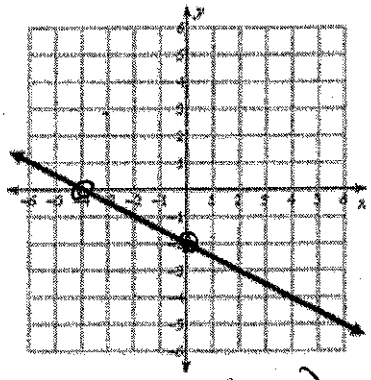
1.



x – intercept(s): $(-1, 0)$

y – intercept: $(0, 1)$

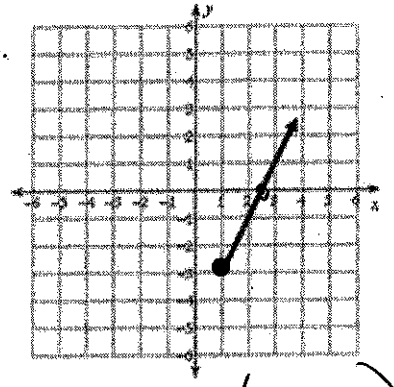
2.



x – intercept(s): $(-4, 0)$

y – intercept: $(0, -2)$

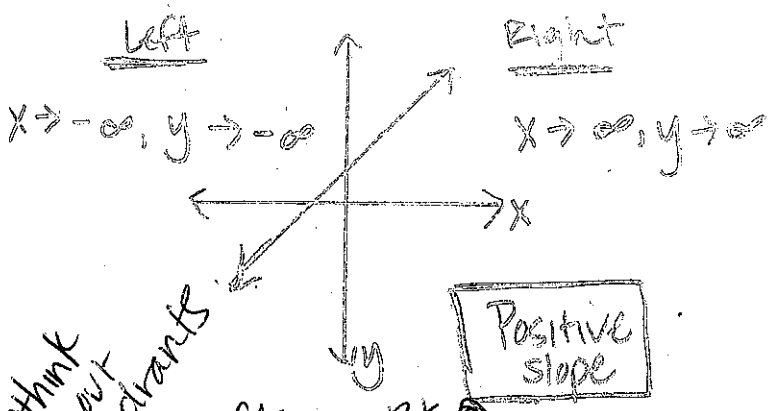
3.

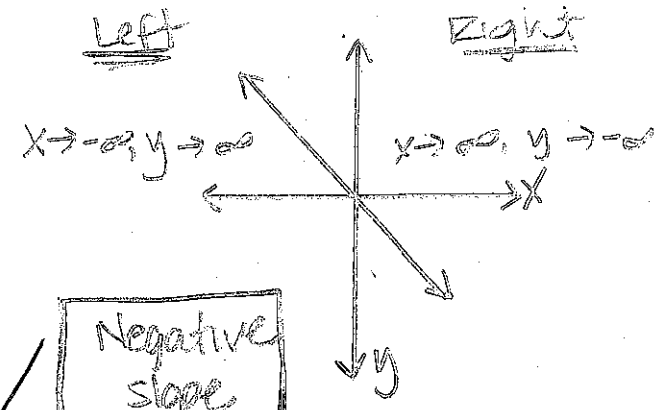


x – intercept(s): $(2.5, 0)$

y – intercept: none

End Behavior: the behavior at the end of the graph (up or down) as x approaches negative infinity (left) or positive infinity (right). Find the left and right end behavior of each function below.





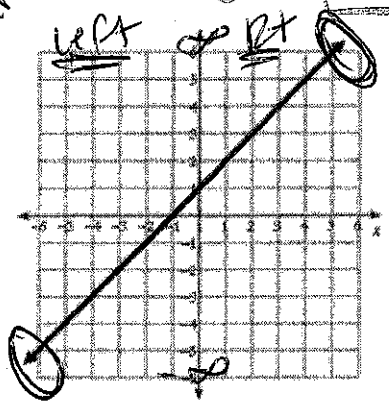
*think about quadrants

Positive slope

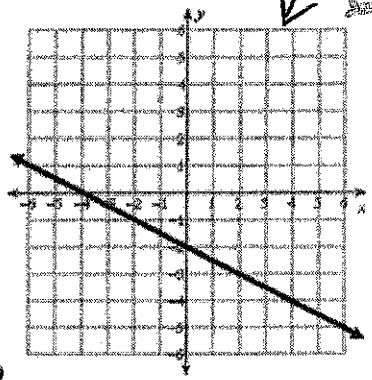
Negative slope

Left ∞ Rt

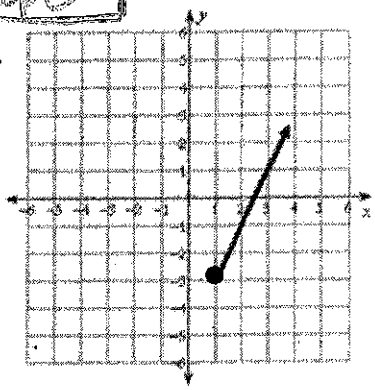
$-\infty$ ∞ $-\infty$



2.



3.



Left End Behavior: $x \to -\infty, y \to \infty$

Right End Behavior: ~~$y \to \infty$~~ $x \to \infty, y \to \infty$

Left End Behavior: _____

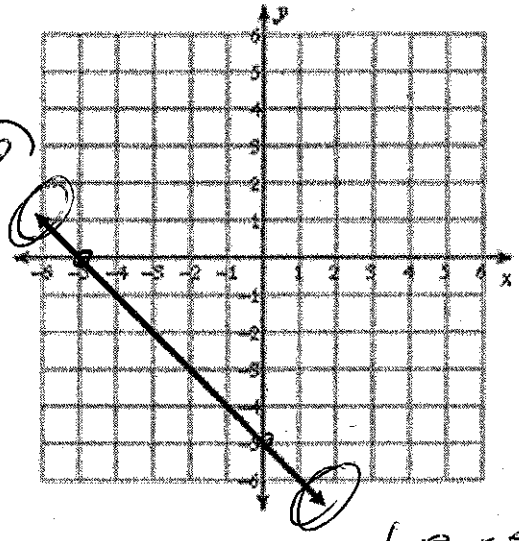
Right End Behavior: _____

Left End Behavior: $x \to 1, y \to -3$

Right End Behavior: $x \to \infty, y \to \infty$

positive slope

* Put it all together!



$(-\infty, \infty)$

$(\infty, -\infty)$

always the same for continuous linear function

Characteristic	Answer
Rate of Change	-1
Domain	$(-\infty, \infty)$
Range	$(-\infty, \infty)$
Increasing Interval	none
Decreasing Interval	$(-\infty, \infty)$
x-intercept	$(-3, 0)$
y-intercept	$(0, -5)$
Left End Behavior	$x \to -\infty, y \to \infty$
Right End Behavior	$x \to \infty, y \to -\infty$

think of quadrants