

3-3 Notes

Rate of Change and Slope

Linear Functions have a constant rate of change – also called the slope of the line.

Determine whether each function is linear. Explain.

a.

x	y
1	-6
4	-8
7	-10
10	-12
13	-14

+3
+3
+3
+3
+3

-2
-2
-2
-2
-2

yes! constant rate of change

b.

x	y
-3	10
-1	12
1	16
3	18
5	22

+2
+2
+2
+2
+2

+2
+4
+2
+4

not a linear function
the rate of change varies.

Finding Slope:

Slope of a Line

$m = \frac{\text{rise}}{\text{run}}$ or $m = \frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) and (x_2, y_2) are the coordinates of any two points on a non-vertical line

Example 1: Find the slope of the line that passes through $(-3, 5)$ and $(4, -2)$.

$\frac{5 - (-2)}{-3 - 4} = \frac{7}{-7}$

$m = -1$

* note: order doesn't matter as long as same top & bottom.

Example 2: Find the value of r so that the line through $(10, r)$ and $(3, 4)$ has a slope of $-\frac{2}{7}$.

$\frac{r - 4}{10 - 3} = -\frac{2}{7}$

$\frac{r - 4}{7} = -\frac{2}{7}$

$7(r - 4) = -2(7)$

$7r - 28 = -14$

$7r = 14$

$r = 2$

Exercises

Find the slope of the line that passes through each pair of points.

1. $(4, 9), (1, 6)$

$\frac{\Delta y}{\Delta x} = \frac{9 - 6}{4 - 1} = \frac{3}{3}$

$m = 1$

2. $(-4, -1), (-4, -5)$

$\frac{\Delta y}{\Delta x} = \frac{-1 - (-5)}{-4 - (-4)} = \frac{4}{0}$

undefined!
vertical line

3. $(14, -8), (7, -6)$

$\frac{\Delta y}{\Delta x} = \frac{-8 - (-6)}{14 - 7} = \frac{-2}{7}$

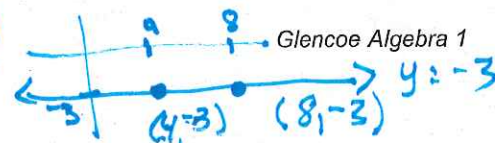
$m = -\frac{2}{7}$

4. $(4, -3), (8, -3)$

$\frac{\Delta y}{\Delta x} = \frac{-3 - (-3)}{4 - 8} = \frac{0}{-4}$

$m = 0$

horizontal line!



Find the value of r so the line that passes through each pair of points has the given slope.

5. $(6, 8), (r, -2), m = 1$

$$\Delta y = \frac{8 - (-2)}{6 - r} \Rightarrow \frac{10}{6 - r} = 1$$

$$1(6 - r) = 1(10)$$

$$6 - r = 10$$

$$-r = 4$$

$$r = -4$$

6. $(2, 8), (r, -4), m = -3$

$$\Delta y = \frac{8 - (-4)}{2 - r} = -3$$

$$\frac{12}{2 - r} = -3$$

$$-3(2 - r) = 12$$

$$-6 + 3r = 12$$

$$+6 \quad +6$$

$$3r = 18$$

$$\frac{3r}{3} = \frac{18}{3}$$

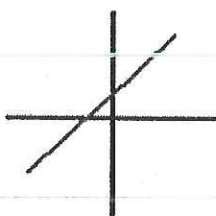
$$r = 6$$

"Uphill"

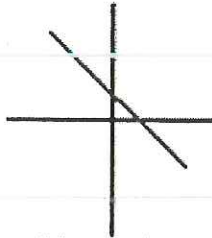
"Downhill"

Horizontal

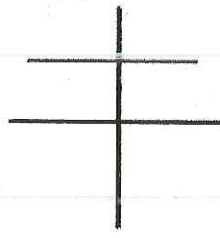
Vertical



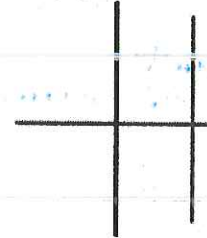
Positive Slope



Negative Slope



Slope = 0

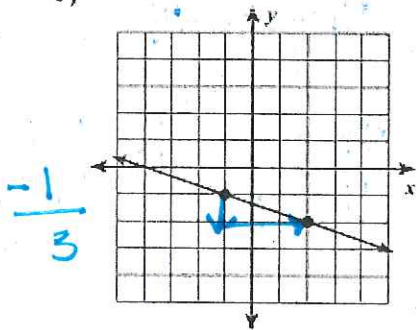


Slope is Undefined

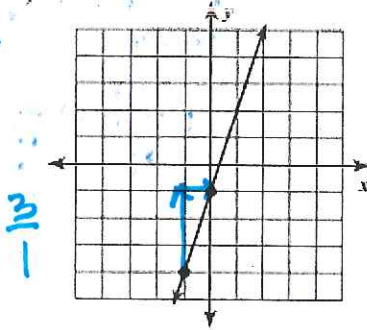
Find the slope of each line.

work from left to right & Go "up" or "down" 1/65

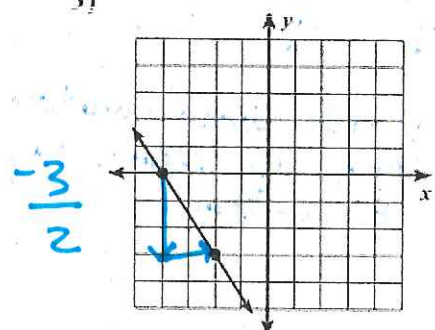
1)



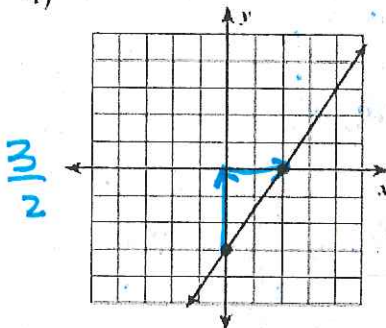
2)



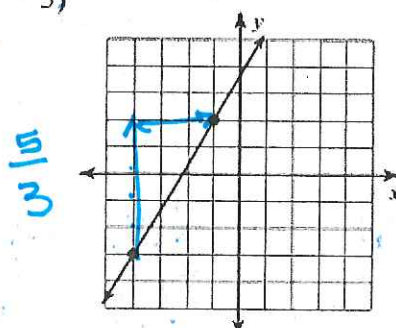
3)



4)



5)



6)

