

Target 3-1

The beginning of two variables...

Algebra I

11-5-13

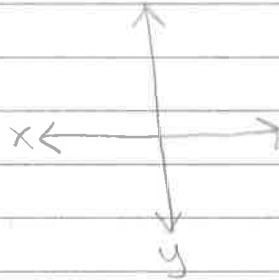
①

Independent variables

Dependent variables

x-axis

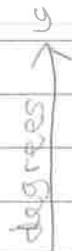
y-axis



Independent variable happens first

Dependent variable happens second

Time
 minutes
 hours
 days
 months
 years



Temperature
degrees

minutes

* time is always independent *

Month

Amount of rain

Age

Growth

years in school

Knowledge

hours worked

money made

doing your chores

going to the movies

Rate of change:

rise
run

or $\frac{\text{change in dependent}}{\text{change in independent}}$

or $\frac{\text{change in } y}{\text{change in } x}$

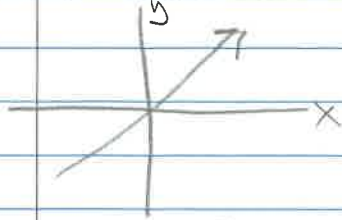
Slope * huge concept *

- similar to rate of change but always ←
- left as a fraction (no decimals) ←

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

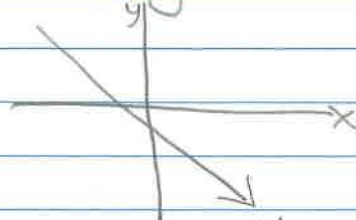
Slope

Positive



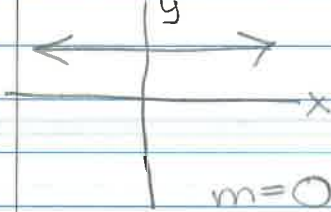
$$m = \frac{\Delta y}{\Delta x}$$
$$m = \frac{\text{rise}}{\text{run}}$$
$$m = \frac{\text{up}}{\text{right}}$$

Negative



$$m = \frac{-4}{1}$$
$$m = \frac{2}{-1}$$
$$m = -\frac{3}{4}$$

Zero

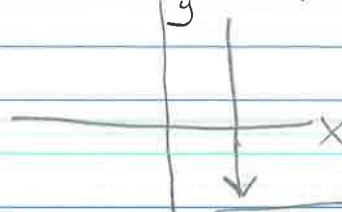


$$m = 0$$

$$m = \frac{10}{3}$$
$$m = \frac{0}{8}$$
$$m = \frac{0}{5}$$

} don't leave answers like this

Undefined



undefined no "m="

$$m = \frac{3}{0}$$
$$m = \frac{-5}{0}$$

} don't leave answers like this

Determine the rate of change. Is it linear?

x	y
-2	4
-1	2
0	0
1	-2

$$\text{rate of change} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2}{1}$$

$$\frac{2-4}{-1-(-2)} = \frac{-2}{1}$$

$$\frac{0-2}{0-(-1)} = \frac{-2}{1}$$

$$\frac{-2-0}{1-0} = \frac{-2}{1}$$

yes, it is linear

Find Slope:

① (x_1, y_1) and (x_2, y_2)
 $(4, 3)$ and $(2, 6)$

$$\frac{3-6}{4-2} = \frac{-3}{2} = \frac{-3}{2} \quad \text{or} \quad \frac{6-3}{2-4} = \frac{3}{-2} = \frac{-3}{2}$$

② (x_1, y_1) and (x_2, y_2)
 $(-3, 2)$ and $(5, 5)$

$$\frac{5-2}{5-(-3)} = \frac{3}{8} \quad \text{or} \quad \frac{2-5}{-3-5} = \frac{-3}{-8} = \frac{3}{8}$$

③ (x_1, y_1) and (x_2, y_2)
 $(-3, -4)$ and $(-2, -8)$

$$\frac{-8-(-4)}{-2-(-3)} = \frac{-4}{1}$$

Determine the rate of change. Is it linear?

x	y
-1	14
7	5
-5	-6
3	+4

$$\frac{4}{8} = \frac{1}{2}$$

$$\frac{-6}{12} = \frac{1}{2}$$

$$\frac{4}{8} = \frac{1}{2}$$

yes

Put numbers in order first →

	x	y	
+4	<	-5	-1 > +2
#	<	-1	1 > +2
+4	<	3	3 > +2
		7	5 > +2

$$\frac{4}{2} = \frac{1}{2}$$

yes, it's linear

Find the slope of the line that passes

- ① through $(-3, -1)$ and $(5, -1)$

$$\text{slope} = m \quad m = \frac{-1 - (-1)}{5 - (-3)} = \frac{0}{8} = 0$$

$$\boxed{m = 0}$$

- ② $(-2, -4)$ and $(-2, 3)$

$$m = \frac{3 - (-4)}{-2 - (-2)} = \frac{7}{0}$$

$\boxed{\text{undefined}}$

- ③ $(-3, -5)$ and $(-2, -7)$

$$m = \frac{-7 - (-5)}{-2 - (-3)} = \frac{-2}{1}$$

$$\boxed{m = -2}$$

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

- ① $(12, 8)$ and $(-2, r)$ with $m = -4$

$$\frac{8 - r}{12 - (-2)} = -4 \quad 14 \cdot \frac{8 - r}{14} = -4 \cdot 14 \quad \frac{8 - r}{-8} = \frac{-56}{-8}$$

$$\frac{-1r}{-1} = \frac{-64}{-1} \quad \boxed{r = 64}$$

- ② $(5, -3)$ and $(-3, r)$ with $m = -\frac{1}{2}$

$$\frac{-3 - r}{5 - (-3)} = -\frac{1}{2} \rightarrow \frac{-3 - r}{8} = -\frac{1}{2} \rightarrow 8 \left(\frac{-3 - r}{8} \right) = \left(-\frac{1}{2} \right) 8$$

$$-3 - r = -4$$

$$+3 \quad +3$$

$$\frac{-1r}{-1} = \frac{-1}{-1}$$

$$\boxed{r = 1}$$

$$\text{or} \quad \frac{-3 - r}{8} = -\frac{1}{2}$$

$$2(-3 - r) = -8$$

$$-6 - 2r = -8$$

$$+6 \quad +6$$

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

$$\boxed{r = 1}$$

Algebra I

11-5-13

$$\textcircled{3} \quad (20, x) \text{ and } (9, 16) \text{ with } m = \frac{8}{11}$$

$$\frac{x-16}{20-9} = \frac{8}{11} \rightarrow \frac{x-16}{11} = \frac{8}{11}$$

$$11 \left(\frac{x-16}{11} \right) = \left(\frac{8}{11} \right) 11 \rightarrow \begin{array}{r} x-16 = 8 \\ +16 \quad +16 \\ \hline \end{array}$$

$$\boxed{x = 24}$$

\textcircled{3}

$$\textcircled{4} \quad (1, x) \text{ and } (-2, -7) \quad m = 4$$

$$\frac{x-(-7)}{1-(-2)} = 4 \rightarrow \frac{x+7}{3} = 4 \rightarrow 3 \left(\frac{x+7}{3} \right) = (4)3$$

$$\begin{array}{r} x+7 = 12 \\ -7 \quad -7 \\ \hline \end{array}$$

$$\boxed{x = 5}$$

$$\textcircled{5} \quad \frac{10-6}{r-5} = 2$$

$$\frac{10-6}{r-5} \neq \frac{2}{1}$$

$$2(r-5) = 4$$

$$2r - 10 = 4$$

$$+10 \quad +10$$

$$2r = 14$$

$$\frac{2r}{2} = \frac{14}{2}$$

$$r = 7$$

