

3.1 CONSTANT RATE OF CHANGE

ch3

↳ TABLES ↳

\* change in  $\frac{Y}{X}$

$$\frac{\Delta Y}{\Delta X}$$




IF rate of change is constant (stays same) that means it is LINEAR. (straight line)

X	Time	0	1	2	3	4
Y	# of songs	0	2	4	6	8

+1 +1 +1 +1

+2 +2 +2 +2

Rate of Change =  $\frac{2}{1} \frac{2}{1} \frac{2}{1} = \underline{\underline{LINEAR}}$

Proportional = line goes through the origin  $(x, y)$   
 $(0, 0)$  

	X	Y
COOLING WATER		
	Time	Temp
+5	5	95
+5	10	90
+5	15	86
+5	20	82

$$\frac{Y}{X} \left\{ \begin{array}{l} -5 \\ -4 \\ -4 \end{array} \right. \begin{array}{l} 5 \\ 5 \\ 5 \end{array}$$

NOT CONSTANT

Is this linear? NO

	X	Y
+2	1	10
+4	3	20
+2	7	40
	9	50

⊛ tricky

$$\frac{Y}{X} \left\{ \begin{array}{l} 10 \\ 20 \\ 40 \\ 50 \end{array} \right. \begin{array}{l} 10 \\ 20 \\ 10 \\ 5 \end{array}$$

yes, constant

Is this linear? YES

### SPEED OF A CAR OVER TIME

X	SPEED	0	4.5	9	13.5	18	21.5
Y	TIME	0	3	6	9	12	15

4.5 4.5 4.5 4.5 3.5 ←

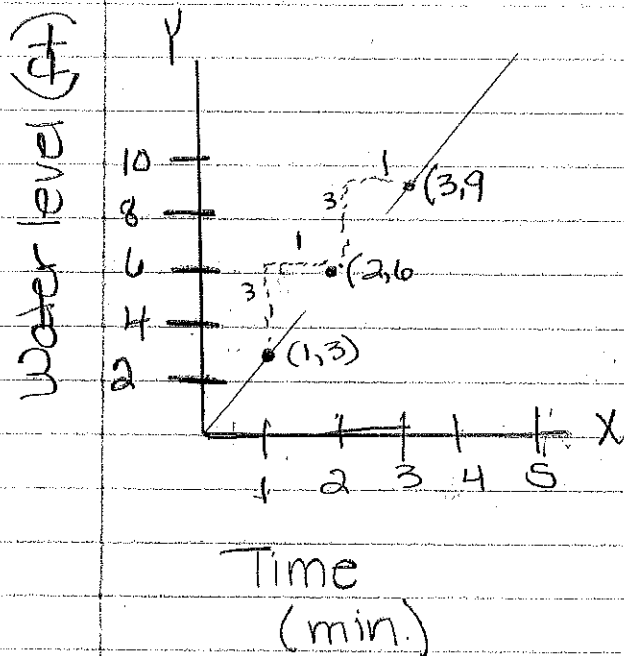
+3 +3 +3 +3 +3

Is this linear? NO

X 4.5 4.5 4.5 4.5 3.5

# CONSTANT RATE OF CHANGE

## GRAPHS



Linear? YES

Rate of change =

$$\frac{\Delta Y}{\Delta X}$$

RISE <sup>up/down</sup>  
RUN over

went up 3  
over 1

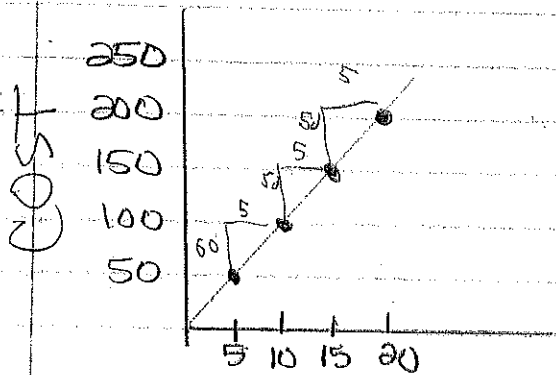
table

	X	Y	
+1	0	0	+3
+1	1	3	+3
+1	2	6	+3
	3	9	+3

$$\frac{\Delta Y}{\Delta X} = \frac{3}{1}$$

RISE  $\updownarrow$   
RUN  $\longleftrightarrow$

Cont'd.



(5, 50)  
(10, 100)  
(15, 150)  
(20, 200)

LINEAR? YES

# of people

\$ 50 for 5 people

$$\frac{50}{5} = 10$$

\$ 10 per person

# ~ SLOPE ~

- ① looking at a picture
- ② looking at a graph

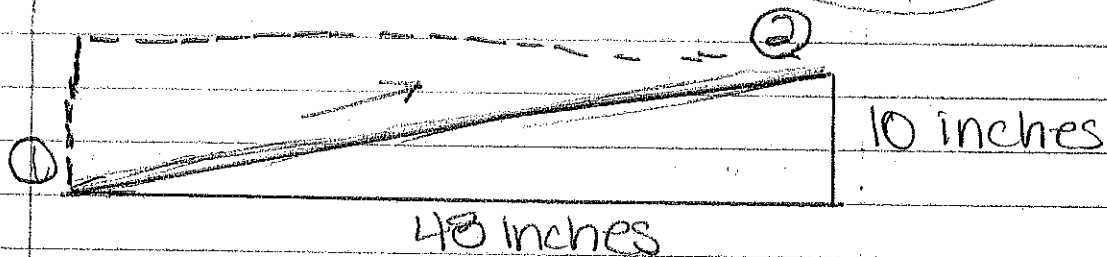
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- ③ calculate from a table
- ④ given  $(x, y)$  points

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$$\text{Slope} = \frac{\text{RISE}}{\text{RUN}}$$

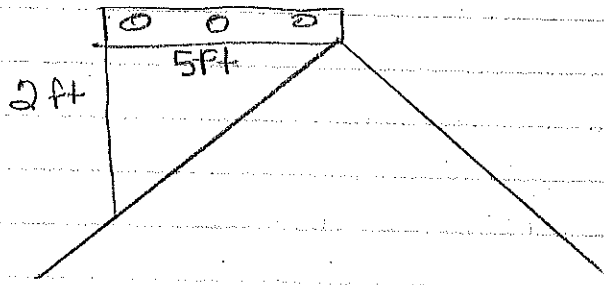
It's a fraction



★★ Go left to right

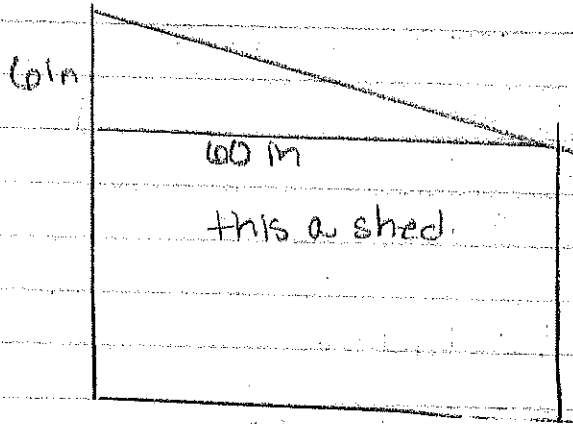
Go 1 to 2, rise 10, run 48,  $\frac{10}{48}$  or  $\frac{5}{24}$

Slope is  $\frac{5}{24}$



$$\frac{\text{rise}}{\text{run}} = \frac{2}{5}$$

Slope is  $\frac{2}{5}$

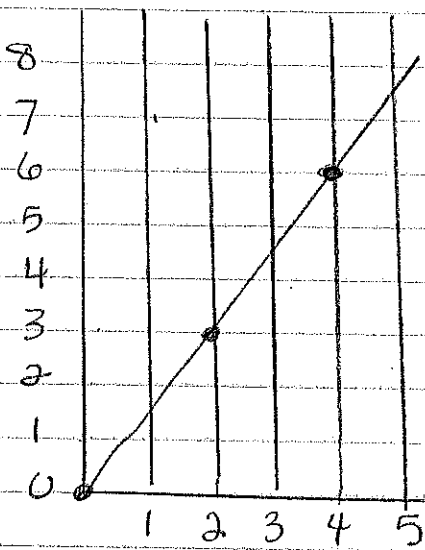


Roof is going down

NEGATIVE

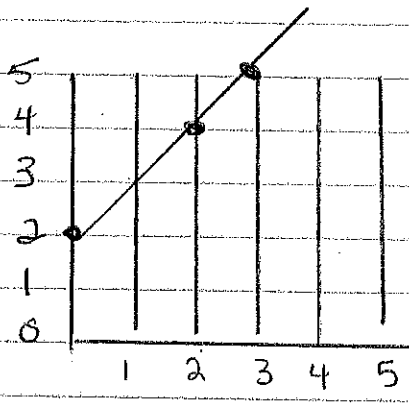
$$\frac{\text{Rise}}{\text{Run}} = \frac{-60}{60} = -\frac{1}{10}$$

slope =  $-\frac{1}{10}$

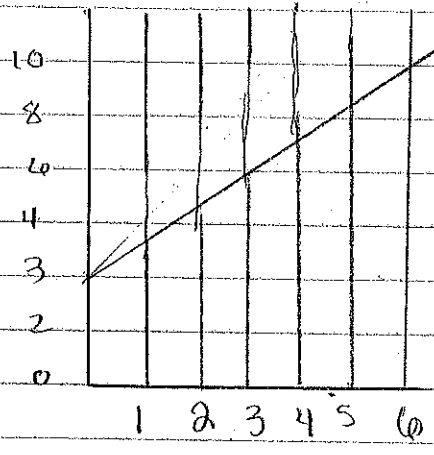


f slope

up 3 =  $\frac{3}{2}$   
over 2



up 1 =  $\frac{1}{1}$   
over 1



pick 2 on points



# SLOPE

TABLE

Electricity	
Time (h)	Cost (\$)
X	Y
5	15
8	24
12	36
24	72
30	90

3  
4

$$\frac{\Delta Y}{\Delta X}$$

$\frac{9}{3}$	$\frac{12}{4}$	$\frac{36}{12}$	$\frac{18}{6}$
↓	↓	↓	↓
3	3	3	3

$(x_1, y_1)$     $(x_2, y_2)$   
 $(2, 3)$     $(4, 7)$

SLOPE  
FORMULA

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

komplex

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

$(2, 4)$   $(8, 5)$     $(4, 0)$   $(8, 3)$     $(5, -3)$   $(8, -5)$

$$\frac{5-4}{8-2} = \frac{1}{6}$$

$$\frac{3-0}{8-4} = \frac{3}{4}$$

$$\frac{-5-(-3)}{8-5}$$

$$\frac{-5+3}{8-5} = \frac{-2}{3}$$