

LINEAR FUNCTIONS

Function - a relation in which each x-coord is paired with EXACTLY one y-coord.

$\{(2,7) (3,-1) (4,8) (-9,6)\}$ yes

$\{(4,5) (6,-3) (7,-4) (4,11) (-2,21)\}$ no

$\{(8,-7) (-3,-7) (14,-7)\}$ yes

* What is a function?

* Domain & Range

* Function Notation

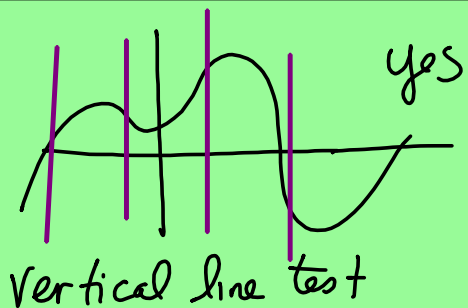
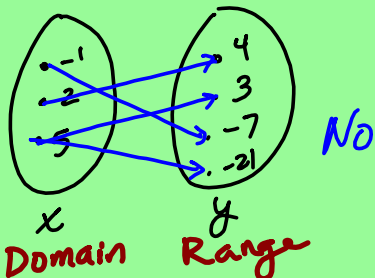
* Lines

* slope

* Eq. of line

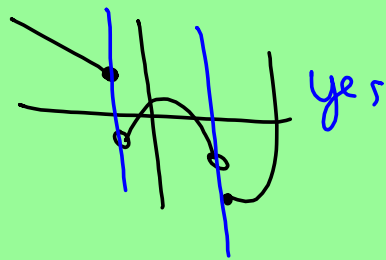
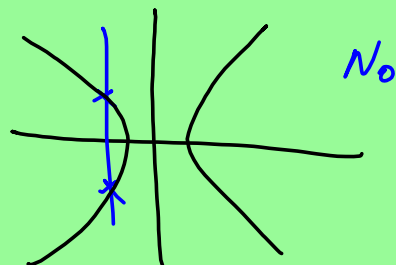
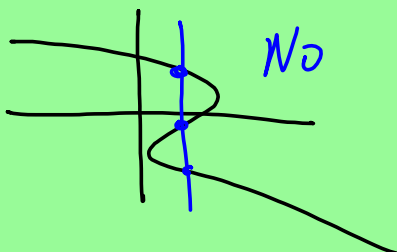
x-coord cannot repeat with different y's.

Mapping



Domain
Set of x-coord

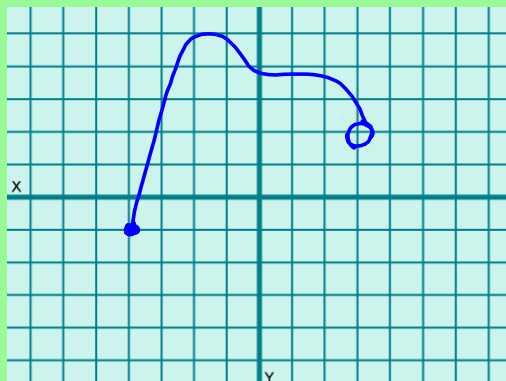
Range
Set of y-coord



$$\{(-3, 4) (5, -8) (7, 2) (9, -5)\}$$

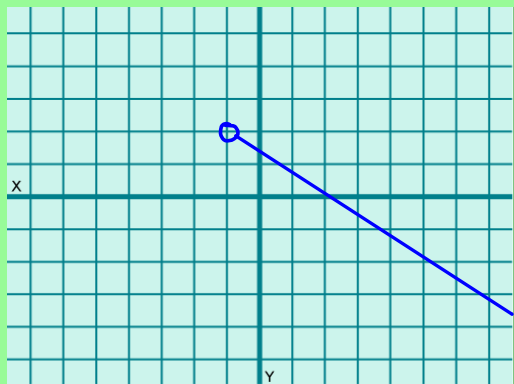
$$\text{Domain: } \{-3, 5, 7, 9\}$$

$$\text{Range: } \{-8, -5, 2, 4\}$$



$$\text{Domain: } -4 \leq x < 3$$

$$\text{Range: } -1 \leq y \leq 5$$



$$\text{Domain: } x > -1$$

$$\text{Range: } y < 2$$

FUNCTION NOTATION

$$f(x) = x^2 + 2x - 3$$

f of x

Find $f(2) = 2^2 + 2(2) - 3$

$$= 4 + 4 - 3$$

$$= 5$$

$(2, 5)$

$$g(x) = \frac{3x-1}{x^2}$$

$$g\left(\frac{1}{2}\right) = \frac{3\left(\frac{1}{2}\right) - 1}{\left(\frac{1}{2}\right)^2}$$

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

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

$$f(x) = \frac{x+1}{3} \quad D: \{-5, -1, \frac{1}{2}, 8\} \quad \text{Find range.}$$

$$f(-5) = \frac{-5+1}{3} = \frac{-4}{3}$$

$$f(-1) = \frac{-1+1}{3} = 0$$

$$f\left(\frac{1}{2}\right) = \frac{\frac{1}{2}+1}{3} = \frac{\frac{3}{2}}{3} = \frac{3}{2} \cdot \frac{1}{3} = \frac{1}{2}$$

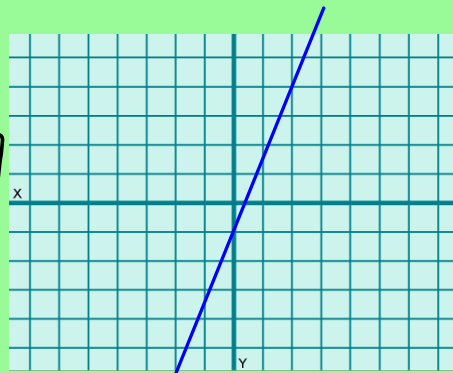
$$f(8) = \frac{8+1}{3} = 3$$

$$R: \left\{-\frac{4}{3}, 0, \frac{1}{2}, 3\right\}$$

LINES

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

change in y \rightarrow



$(2, -3)$ $(4, -9)$ = Find slope.

$$m = \frac{-9 - (-3)}{4 - 2} = \frac{-6}{2} = \boxed{-3}$$

Slope-intercept

$$y = mx + b$$

\uparrow Slope \uparrow y-int

$$y = \frac{5}{2}x - 1$$

Babysitting

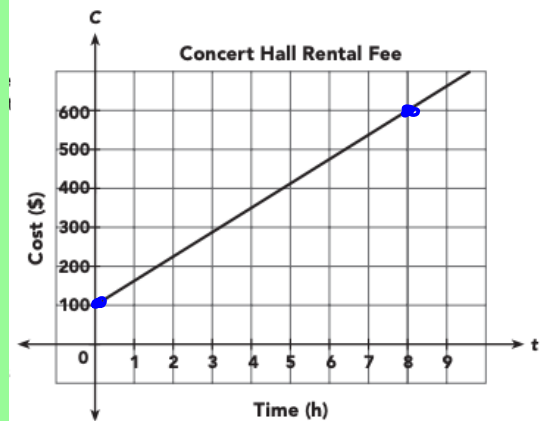
Kelly
 flat fee \$10
 \$6 per hour

Kim

Hrs	\$
1	22
2	26
3	30
4	34

Who charges more per hour?

What is Kim's flat fee?



$$m = \frac{500}{8} = 62.5 \frac{\$}{\text{hr}}$$

\$62.50 per hr.

$$y = 62.5x + 100$$

Container P

$$m = \frac{-300}{20} = -15 \frac{\text{mL}}{\text{min}}$$

$$y = -15x + 1000$$

$$W = 1000 - 15t$$

Container Q

$$m = \frac{-200}{20} = -10 \frac{\text{mL}}{\text{min}}$$

$$y = -10x + 800$$

$$W = 800 - 10t$$

