Compound Inequalities

① What are the solutions of $2 < \frac{3x-8}{2} < 5$? Graph the solutions.

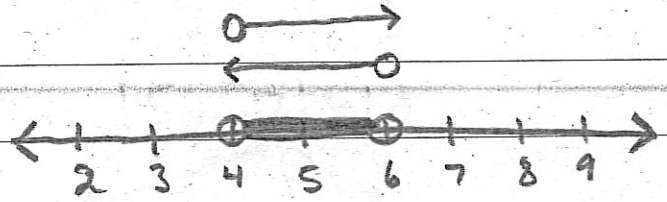
$2 \cdot \frac{3x-8}{2} > 2 \cdot 2$ | $2 \cdot \frac{3x-8}{2} < 5 \cdot 2$

$3x-8>4$ | $3x-8<10$

$+8 \quad +8$ | $+8 \quad +8$

$\frac{3x}{3} > \frac{12}{3}$ | $\frac{3x}{3} < \frac{18}{3}$

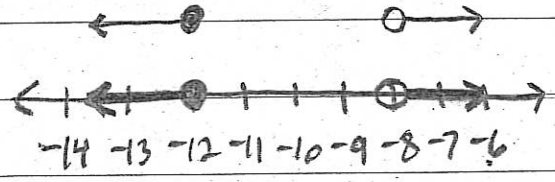
$x>4$ | $x<6$



Interval Notation

$(4,6)$

② Graph the solutions of $x \leq -12$ or $x > -8$.



Interval Notation

$(-\infty, -12]$ or $(-8, \infty)$

Absolute Value Equations and Inequalities

① What are the solutions of $|x|+3=8$? Graph.

$$|x|+3=8$$
$$-3 \quad -3$$
$$|x| = 5$$

$X=5$ $\qquad$ $X=-5$

② $3|5y-7|-6>24$

$+6 \quad +6$

$\frac{3|5y-7|}{3} > \frac{30}{3}$

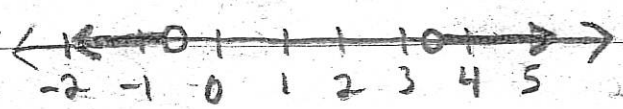
$|5y-7|>10$

$5y-7>10$ $\qquad$ $5y-7<-10$

$+7 \quad +7$ $\qquad$ $+7 \quad +7$

$\frac{5y}{5} < \frac{17}{5}$ $\qquad$ $\frac{5y}{5} < \frac{-3}{5}$

$y > \frac{17}{5}$ or $y < -\frac{3}{5}$



③ $10+|3m-8|<8$

$-10 \quad -10$

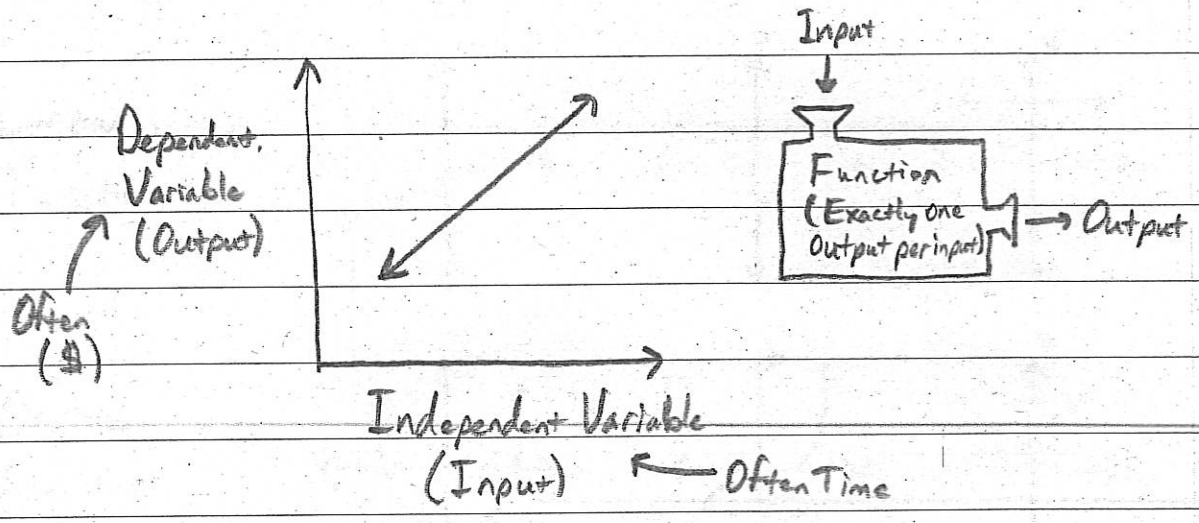
$|3m-8|<-2$

↑

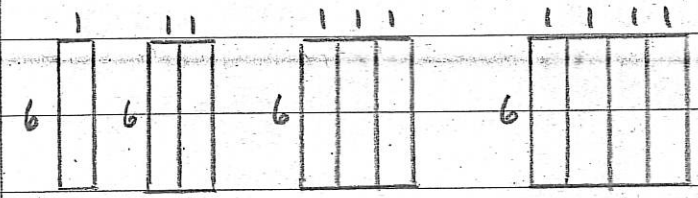
The absolute value of an expression cannot be negative.

No Solution

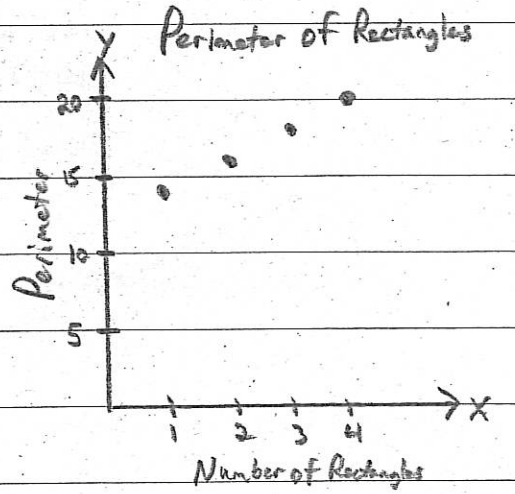
Patterns and Linear Functions



In the diagram below, what is the relationship between the number of rectangles and the perimeter? Represent this relationship using a table, equation, and a graph.



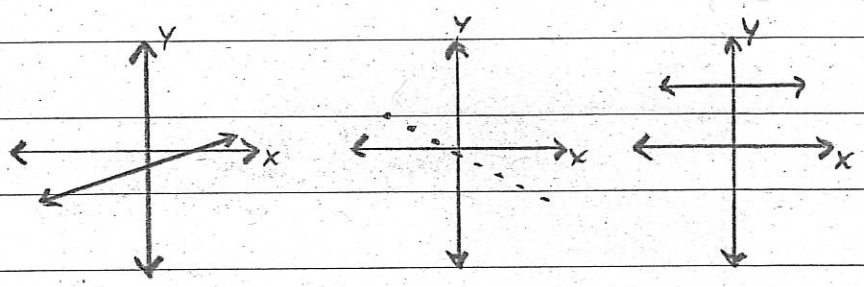
Number of Rectangles (x)	Perimeter (y)	Ordered Pair (x, y)
1	14	(1, 14)
2	16	(2, 16)
3	18	(3, 18)
4	20	(4, 20)



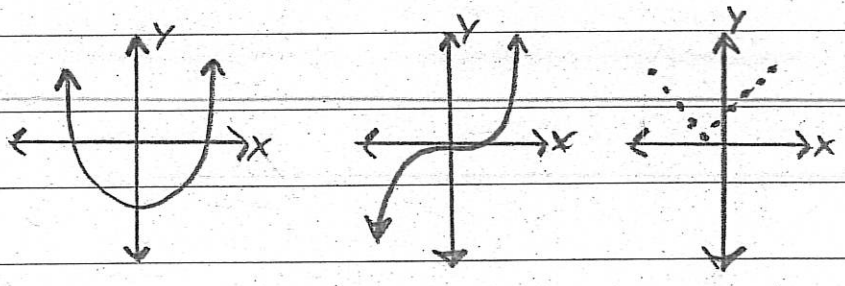
Equation: $y = 2x + 12$

Patterns and Nonlinear Functions

Linear Functions →



Nonlinear Functions →



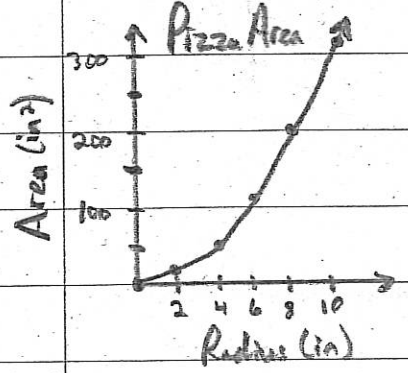
Graph these functions. Linear or nonlinear?

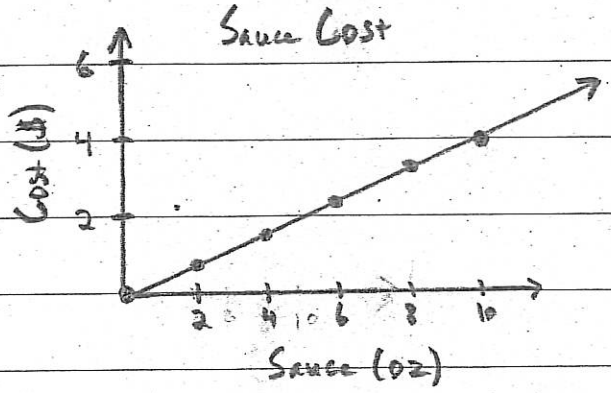
Pizza Area

r (in)	Area (in^2)
2	12.57
4	50.27
6	113.10
8	201.06
10	314.16

Sauce Cost

Weight (oz)	Cost
2	$1.80
4	$1.60
6	$2.40
8	$3.20
10	$4.00





Nonlinear

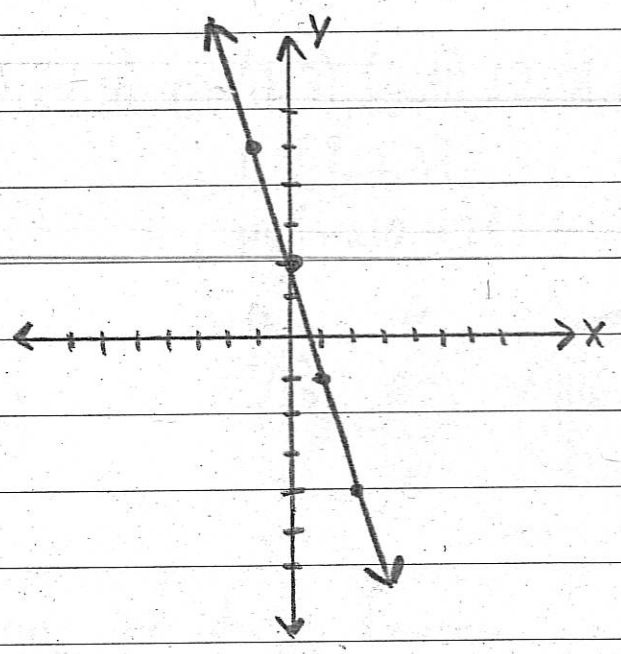
Linear

Graphing a Function Rule

What is the graph of each function rule?

① $y = -3x + 2$

x	y	(x, y)
0	2	(0, 2)
1	-1	(1, -1)
-1	5	(-1, 5)
2	-4	(2, -4)
-2	8	(-2, 8)

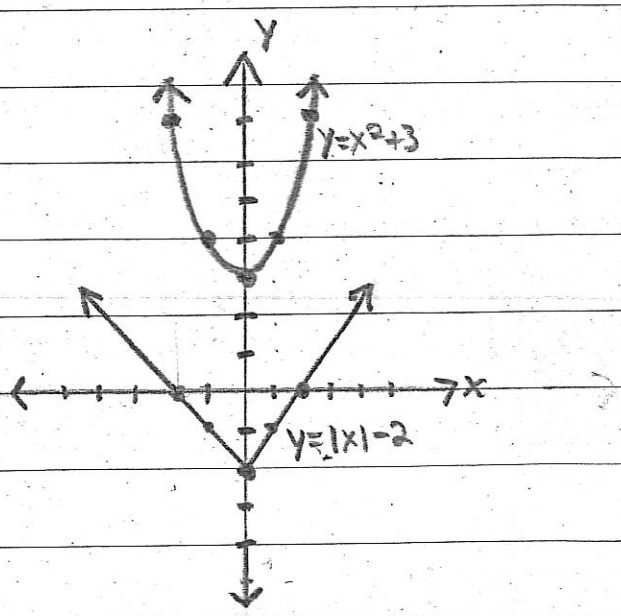


② $y = |x| - 2$

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

③ $y = x^2 + 3$

x	y
0	3
1	4
-1	4
2	7
-2	7
3	17
-3	12



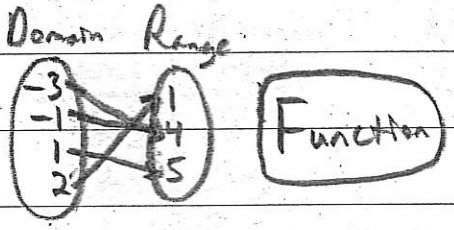
Functions, Domain, and Range

Identify the domain and range. Is the relation a function.

① $(2,1), (-3,4), (1,5), (-1,4)$

D: $\{-3,-1,1,2\}$

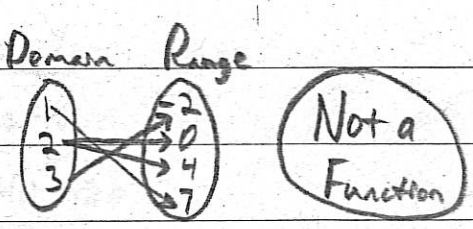
R: $\{1,4,5\}$



② $(1,7), (2,4), (2,0), (3,-2)$

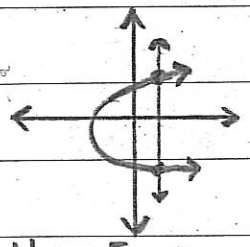
D: $\{1,2,3\}$

R: $\{-2,0,4,7\}$



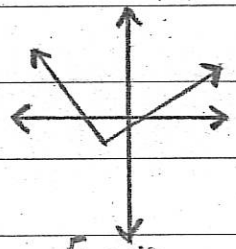
Use the <u>vertical line test</u> to identify functions

③



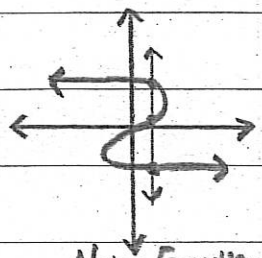
Not a Function

④



Function

⑤



Not a Function

⑥ The domain $f(x) = -2x+5$ is $\{-1,0,1\}$.

What is the range?

x	$-2x+5$	f(x)
-1	$-2(-1)+5$	7
0	$-2(0)+5$	5
1	$-2(1)+5$	3

The range is $\{3,5,7\}$.

Function Notation

$f(x) = -2x+5$

↖ Replaces y

Rate of Change and Slope

$$\text{Rate of Change} = \text{Slope} = m = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Find the rate of change.

①

Time (min.)	Distance (ft)
1	120
2	240
3	360
4	480

$$\text{Rate of Change} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{240 - 120}{2 - 1}$$

$$= \frac{120}{1} = \boxed{120 \frac{\text{ft}}{\text{min}}}$$

Find the slope.

② $(-1, 0)$ and $(3, -2)$

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

$$= \frac{0 - (-2)}{-1 - 3}$$

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

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

③ $(1, 3)$ and $(4, -1)$

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

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

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

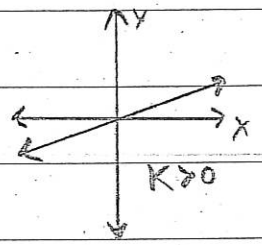
$$= \boxed{-\frac{4}{3}}$$

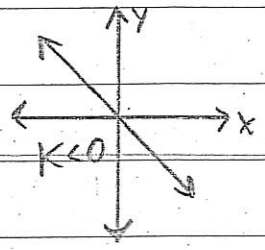
Direct Variation

$y = kx$

↑ Constant of Variation (slope)

Graphs of Direct Variations





Tell whether y varies directly with x. If it does, write an equation.

①

x	y	
4	6	$6 \div 4 = 1.5$
8	12	$12 \div 8 = 1.5$
10	15	$15 \div 10 = 1.5$

Yes, y varies directly with x

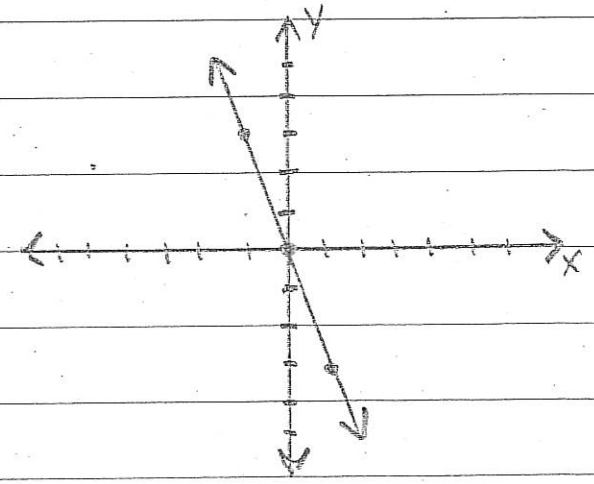
$y = 1.5x$

②

x	y	
−2	3.2	$3.2 \div (-2) = -1.6$
1	2.4	$2.4 \div 1 = 2.4$
4	1.6	$1.6 \div 4 = .4$

No, y does not vary directly with x

③ Graph $y = -3x$



Slope-Intercept Form

$y = mx + b$

m ↑ Slope b ↑ y-Intercept

y-Intercept is the y-coordinate of a point where the graph crosses the y-axis.

① What is an equation of the line with slope $-\frac{2}{3}$ and y-Int. 10?

$$y = -\frac{2}{3}x + 10$$

② What equation in slope-intercept form represents the line that passes through $(3,-2)$ and $(1,-3)$?

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

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

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

$y = mx + b$

$y = \frac{1}{2}x + b$

$-2 = \frac{1}{2}(3) + b$

$-2 = 1\frac{1}{2} + b$

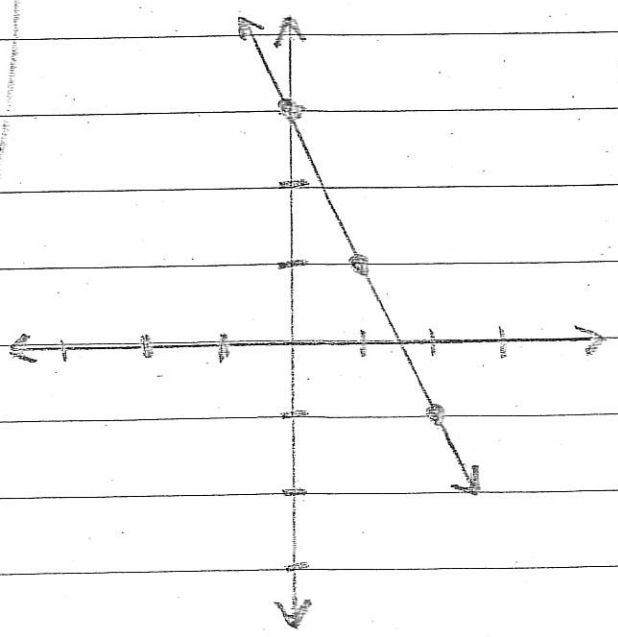
$-1\frac{1}{2} \quad -1\frac{1}{2}$

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

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

$$y = \frac{1}{2}x - \frac{7}{2}$$

③ Graph $y = -2x + 3$



Point-Slope Form

$y - y_1 = m(x - x_1)$

- y_1: y-Coordinate
- m: Slope
- x_1: x-Coordinate

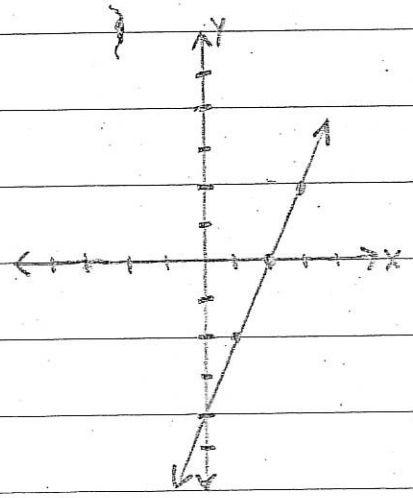
① A line passes through $(8, -4)$ and has a slope of $\frac{2}{3}$. What is an equation in point-slope form of the line?

$y - y_1 = m(x - x_1)$

$\boxed{y + 4 = \frac{2}{3}(x - 8)}$

② What is the graph of the equation

$y + 2 = 2(x - 1)$



③ Given: $(-2, -3)$ and $(1, 4)$

Write an equation.

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

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

$$= \boxed{\frac{7}{3}}$$

$\boxed{y + 3 = \frac{7}{3}(x + 2)}$

or

$\boxed{y - 4 = \frac{7}{3}(x - 1)}$