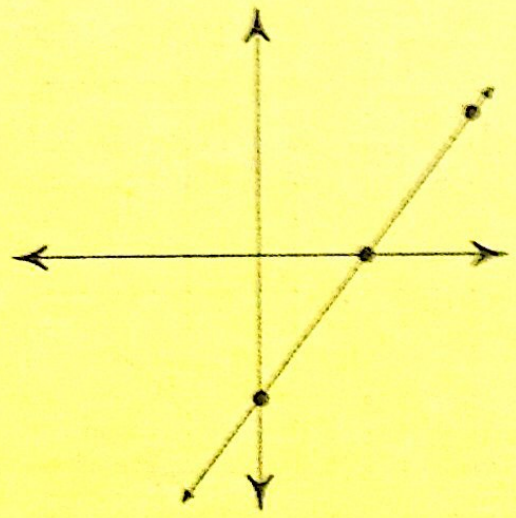


Equation of a Line

Linear Function Equations



$y = m x + b$
Slope y - intercept (0, b)

To write the equation of a line, you NEED:

- 1) Rate of Change (slope)
- 2) Y-intercept

Equation of a Line

Writing a rule from a Scenario

A candle that is 8 inches tall is lit. It starts to burn and melt. Each hour the candle melts $\frac{1}{2}$ an inch. Complete the table below for the candle's height.

Time burning (in hours)	0	1	2	3	4
Height (in inches)	8	7.5	7	6.5	6
		$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$

What is the rate of change? Explain what it means.

$-\frac{1}{2}$ The height decreases by $\frac{1}{2}$ inch every hour.

What is the y-intercept? Explain what it means.

8 The height of the candle starts at 8 inches.

Write a rule for the scenario:

$$y = -\frac{1}{2}x + 8$$

Write a NOW-NEXT rule for scenario:

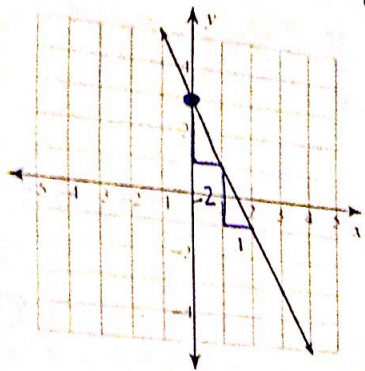
Next = NOW - $\frac{1}{2}$
Starting at 8

To write the equation of a line, you NEED:

1) Rate of Change (slope)

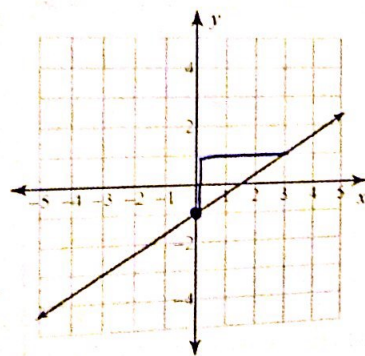
2) Y-intercept

Writing a rule from a graph:



Slope: $-\frac{2}{1}$ Y-intercept: 3

Rule: $y = -2x + 3$



Slope: $\frac{2}{3}$ Y-intercept: -1

Rule: $y = \frac{2}{3}x - 1$

Equation of a Line

Writing a rule from Two Points:

x y x y
 $(-1, -4)$ and $(2, 5)$

Rate of Change: $\frac{\Delta y}{\Delta x} = \frac{9}{3} = \left(\frac{3}{1}\right)$

$$y = mx + b$$

$$\rightarrow y = 3x + b$$

$$-4 = 3(-1) + b$$

$$-4 = -3 + b$$

$$\frac{+3}{+3} \quad \frac{+3}{+3}$$

$$-1 = b \leftarrow \text{y-intercept}$$

Rule: $y = 3x - 1$

$(4, 5)$ and $(5, 3)$

Rate of Change: $\frac{\Delta y}{\Delta x} = \left(\frac{-2}{1}\right)$

$$y = mx + b$$

$$\rightarrow y = -2x + b$$

$$5 = -2(4) + b$$

$$5 = -8 + b$$

$$\frac{+8}{+8} \quad \frac{+8}{+8}$$

$$13 = b \leftarrow \text{y-intercept}$$

Rule: $y = -2x + 13$

Writing a rule from a Table:

x	0	2	4	6	8
y	15	12	9	6	3

Annotations: $+2$ above x values, -3 below y values.

Rate of Change: $\frac{\Delta y}{\Delta x} = \left(\frac{-3}{2}\right)$

Y-intercept: 15

Rule: $y = -\frac{3}{2}x + 15$

x	0	30
y	10	35

Annotations: $+10$ next to x values, $+5$ next to y values.

Rate of Change: $\frac{\Delta y}{\Delta x} = \frac{5}{10} = \left(\frac{1}{2}\right)$

Y-intercept: 30

Rule: $y = \frac{1}{2}x + 30$