

Sec 1.4 Linear Functions

Alternative Forms for the Equation of a Line

1. The *slope-intercept form* is $y = b + m x$ where m is the slope and b is the y -intercept.
 $y = mx + b$
2. The *point-slope form* is $y - y_0 = m(x - x_0)$ where m is the slope and (x_0, y_0) is a point on the line.
 $y = y_1 + m(x - x_1)$
3. The *standard form* is $Ax + By + C = 0$ where A , B , and C are constants.

Finding a Formula for a Linear Function from a Table of Data

Ex. The following table gives data from a linear function. Find a formula for the function.

Temperature, $y = f(x)$ ($^{\circ}\text{C}$)	0	5	20
Temperature, x ($^{\circ}\text{F}$)	32	41	68

$$m = \frac{5-0}{41-32} = \frac{5}{9}$$

$$y = \frac{5}{9}x - 17\frac{7}{9}$$

$$y = \frac{5}{9}x + b$$

$$0 = \frac{5}{9} \cdot 32 + b$$

$$0 = \frac{160}{9} + b$$

$$-\frac{160}{9} = b$$

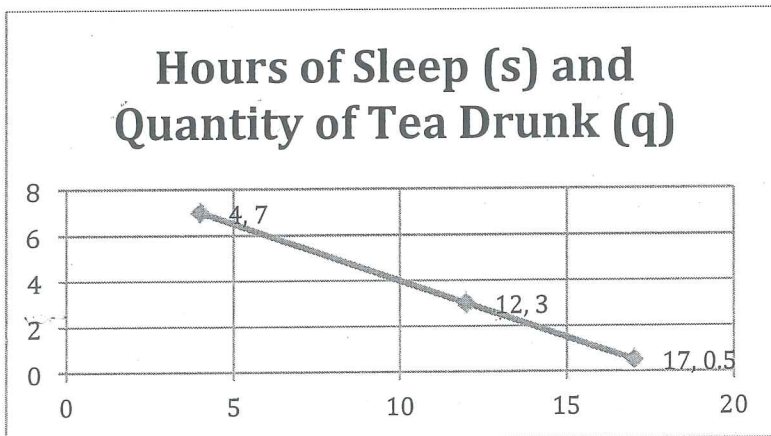
$$y = 0 + \frac{5}{9}(x-32)$$

$$= 0 + \frac{5}{9}x - 17\frac{7}{9}$$

$$y = \frac{5}{9}x - 17\frac{7}{9}$$

Finding a Formula for a Linear Function from a Graph

Ex. The graph gives data from a linear function. Find a formula for the function.



$$m = \frac{3-7}{12-4}$$

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

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

$$y = 7 - \frac{1}{2}(x-4)$$

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

$$y = -\frac{1}{2}x + 9$$

$$y = 3 - \frac{1}{2}(x-12)$$

$$y = 3 - \frac{1}{2}x + 6$$

$$y = \frac{1}{2}x + 9$$

$$y = mx + b$$

$$7 = -\frac{1}{2}(4) + b$$

$$7 = -2 + b$$

$$9 = b$$

Finding a Formula for a Linear Function from a Verbal Description

Ex. We have \$24 to spend on soda and chips for a party. A six-pack^y of soda costs \$3 and a bag of chips costs \$2. The number of six-packs we can afford, y , is a function of the number of bags of chips we decide to buy, x . Find an equation relating x and y . Then graph your equation. Once you have graphed the equation, interpret the intercepts and the slope in context of the party.

The y -intercept $(0, 8)$ means that 8 six-packs were purchased and no chips were purchased.

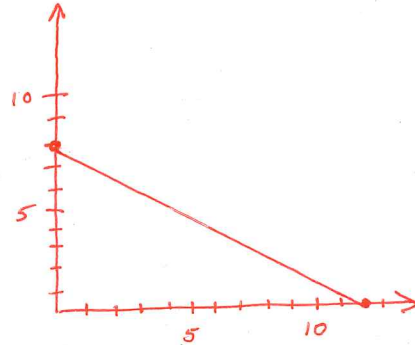
The x -intercept $(12, 0)$ means 12 chips and no six-packs were purchased.

$$\text{or } 2x + 3y = 24$$

$$-2x -2x$$

$$\frac{3y}{3} = \frac{-2x + 24}{3}$$

$$y = -\frac{2}{3}x + 8$$



The slope, $-\frac{2}{3}$, means that if we purchase two more six-packs, we can purchase 3 less chips, and vice versa.

Ex. Open your textbooks to page 32. Look at and read example 4. Write down 2 ideas for when you may use point-slope form instead of slope-intercept form. Which form do you think is more beneficial to use? Why?

Point-slope form works well when we do not know the y -intercept and we need to find it.

It is useful when we have the slope and one point or simply two points.

Slope-intercept form is beneficial when graphing and it gives us a better idea of the behavior of the line.

HW: pg 33-36 #1-23 (outside of class), #24-53 in class