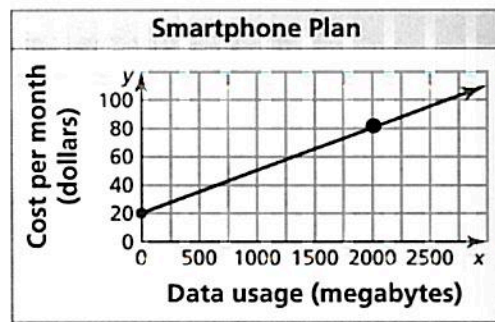


Unit 7 - Applications with Linear Functions

- 1) (a) What is the y-intercept of the line? Explain its meaning in the context of the problem.

The y-intercept is (0, 20). In the context of this situation, the y-intercept represents an initial fee (cost) before any data is used.



- (b) Find the slope of the line. Explain its meaning in the context of the problem.

(0, 20) (2000, 80)

$$\frac{\Delta y}{\Delta x} = \frac{80 - 20}{2000 - 0} = \frac{60}{2000} = \frac{\$0.03}{1 \text{ megabyte}}$$

With this Smartphone plan, a person pays 3 cents for each megabyte of data used.

- 2) A band is performing at an auditorium for a fee of \$1500. In addition to this fee, the band receives \$6 of each ticket sold.

- a) Write an equation that represents the band's revenue (y) when x tickets are sold.

$$y = 6x + 1500$$

- b) The band needs \$5000 for new equipment. How many tickets must be sold for the band to earn enough money to buy the new equipment?

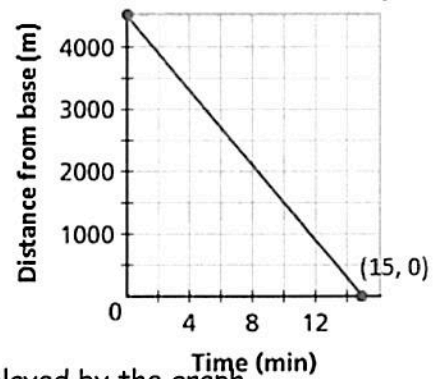
$$\begin{aligned} y &= \text{revenue} = \$5000 \\ x &= \# \text{ of tickets} = ? \end{aligned}$$

$$\begin{aligned} y &= 6x + 1500 \\ 5000 &= 6x + 1500 \\ 3500 &= 6x \\ 583.\bar{3} &= x \end{aligned}$$

584 tickets must be sold for the band to earn enough money.

- 3) The Sandia Peak Tramway in Albuquerque, New Mexico travels a distance of about 4500 meters to the top of Sandia peak. The graph shows the tram's distance from the summit to the base.

Sandia Peak Tramway



- a) Identify the x and y-intercepts. Explain their meaning in the context of the situation.

x-intercept: 15

It takes 15 minutes to reach the base from the peak.

y-intercept: 4500

The peak is 4500m from the base.

- b) Write an equation that models the relationship displayed by the graph.

slope	y-intercept	equation
$(0, 4500) (15, 0)$ $\frac{\Delta y}{\Delta x} = \frac{4500 - 0}{0 - 15}$ $= \frac{4500}{-15}$ $= -300$	4500	$y = -300x + 4500$

- c) Identify the rate of change in your equation. Explain its meaning.

$\frac{-300 \text{ meters}}{1 \text{ minute}}$

The tram descends from the peak to the base 300 meters per minute.

- d) State the domain and range of the graph.

Domain: $[0, 15]$

Range: $[0, 4500]$

- 4) A recreation department bought bottled water to sell at a fair. When the fair began at 10:00 am, they had 280 bottles. At 6:00 pm they had run out. Calculate the average rate of bottles sold per hour.

x = number of hours since fair began

y = number of bottles

$(0, 280) (8, 0)$

$$\frac{\Delta y}{\Delta x} = \frac{280 - 0}{0 - 8} = \frac{280}{-8} = \frac{-35 \text{ bottles}}{1 \text{ hour}}$$

On average, 35 bottles are sold each hour.

- 5) The tables below represent the amount of hours worked and the amount of money earned by two different employees in the same company over one year.

Employee # 1

x Hours Worked	y Money Earned
0	0
1000	20,000
2000	40,000

Employee # 2

x Hours Worked	y Money Earned
0	50,000
1000	50,000
2000	50,000

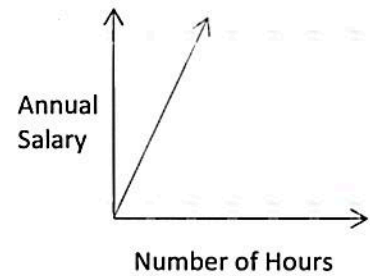
- a) Write an equation for each employee that shows the relationship between the annual salary (y) and the number of hours worked (x).

Employee #1		Employee #2	
<u>slope</u>	<u>y-intercept</u>	<u>slope</u>	<u>y-intercept</u>
$\frac{\Delta y}{\Delta x} = \frac{20000 - 0}{1000 - 0}$ $= \frac{20000}{1000}$ $= 20$	0	$\frac{\Delta y}{\Delta x} = \frac{50000 - 50000}{1000 - 0}$ $= \frac{0}{1000}$ $= 0$	50,000
$y = 20x$		$y = 50,000$	

- b) Sketch the relationships and compare the graphs.

Employee #1

As the number of hours worked increases, the annual salary increases.



Employee #2

As the number of hours worked increases, the annual salary remains the same.

