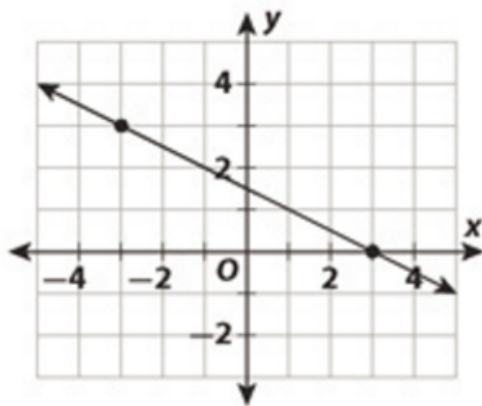


Bellringer

5. What is the slope of the line below?



(A) -2

(B) $-\frac{1}{2}$

(C) $\frac{1}{2}$

(D) 2

2. Prasert earns \$9 an hour. Which table represents this proportional relationship?

(A)

Hours	4	6	8
Earnings (\$)	36	54	72

(B)

Hours	4	6	8
Earnings (\$)	36	45	54

(C)

Hours	2	3	4
Earnings (\$)	9	18	27

(D)

Hours	2	3	4
Earnings (\$)	18	27	54

4.1 Representing Linear Nonproportional Relationships

8.F.3

Interpret the equation $y=mx+b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear

Proportional

			+13	+39	+52	+26	
y	\$	0	13	52	104	130	
x	hr	0	1	4	8	10	
			+1	+3	+4	+2	

Austin makes \$13/hr

$$y = kx$$

$$y = 13x$$

$$\frac{13}{1} = \frac{39}{3} = \frac{13}{1} \quad \frac{52}{4} = \frac{13}{1} \quad \frac{26}{2} = \frac{13}{1}$$

Nonproportional

			+13	+13	+26	+52	
y	\$	20	33	46	72	124	137
x	hrs	0	1	2	4	8	9
			+1	+1	+2	+4	

Austin makes \$13/hr and a \$20 driving bonus

$$y = mx + b$$

$$y = 13x + 20$$

$$\frac{13}{1} = \frac{13}{1} \quad \frac{26}{2} = \frac{13}{1} \quad \frac{52}{4} = \frac{13}{1}$$

Vocabulary

Linear Equation - an equation whose solutions are ordered pairs that form a line when graphed on a coordinate plane

* Written as $y = mx + b$

* When $b \neq 0$, it is nonproportional

* When $b = 0$, it is proportional

Representing Linear Relationships Using Tables

EXAMPLE 1

The equation $y = 3x + 2$ gives the total charge, y , for one person to rent a pair of shoes and bowl x games at Baxter Bowling Lanes based on the prices shown. Make a table of values for this situation.

STEP 1

Choose x -values

y	Total \$	2	5	11	17	32
x	games	0	1	3	5	10

**STEP 2**

$$y = 3(0) + 2$$

$$y = 0 + 2$$

$$y = 2$$

$$y = 3(1) + 2$$

$$y = 3 + 2$$

$$y = 5$$

$$y = 3(3) + 2$$

$$y = 9 + 2$$

$$y = 11$$

$$y = 3(5) + 2$$

$$y = 15 + 2$$

$$y = 17$$

ADDITIONAL EXAMPLE 1

The equation $y = 2x + 5$ gives the total height, y , of a plant in an experiment that was 5 cm tall at the beginning of the experiment and grew 2 cm each day. Make a table of values for this situation.

$$y = 2(0) + 5$$
$$y = 2(1) + 5$$
$$y = 2(2) + 5$$

x	# Days	0	1	2	4	5
y	height	5	7	9	13	15

YOUR TURN

$$y = 12x - 4$$

1. Francisco makes \$12 per hour doing part-time work on Saturdays. He spends \$4 on transportation to and from work. The equation $y = 12x - 4$ gives his earnings y , after transportation costs, for working x hours. Make a table of values for this situation.

x (number of hours)	0	1	2	3
y (earnings in dollars)	-4	8	20	32

$$12(0) - 4$$

$$12(1) - 4$$

$$12(2) - 4$$

$$12(3) - 4$$

Bellringer

You want to go to the fair. The price of entry is \$10.00. Each ride at the fair will cost you a ticket. Each individual ticket costs \$3.00 to purchase. This situation is represented by the equation $y=3x+10$. Make a table of values to represent this situation. How much money will it cost if I want to ride all 12 rides at the fair?

y	\$	10	13	16	31	46	49	52	58
x	Tix	0	1	2	7	12	13	14	16

$y = 3(0) + 10$
 $0 + 10$

$y = 3(1) + 10$
 $3 + 10$

$y = 3(2) + 10$
 $6 + 10$

$y = 3(7) + 10$
 $21 + 10$

$y = 3(12) + 10$

EXPLORE ACTIVITY

The entrance fee for Mountain World theme park is \$20. Visitors purchase additional \$2 tickets for rides, games, and food. The equation $y = 2x + 20$ gives the total cost, y , to visit the park, including purchasing x tickets.

STEP 1

Complete the table.

x (number of tickets)	0	2	4	6	8
y (total cost in dollars)	20	24	28	32	36

STEP 2

Plot the ordered pairs from the table. Describe the shape of the graph.

$(0, 20)$ $(2, 24)$ $(4, 28)$ $(6, 32)$ $(8, 36)$

$$y = 2(0) + 20$$

$$0 + 20$$

$$y = 2(4) + 20$$

$$8 + 20$$

$$y = 2(8) + 20$$

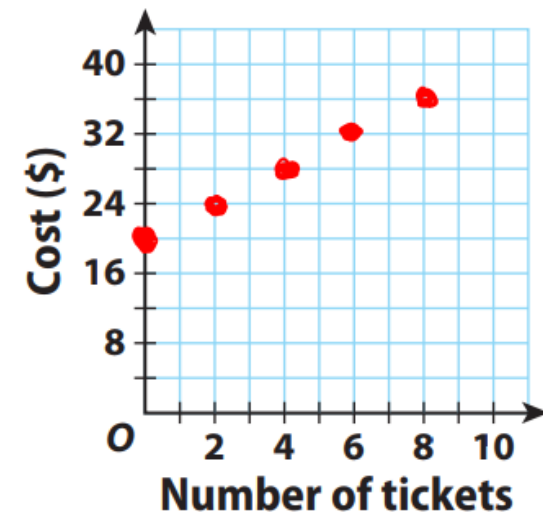
$$16 + 20$$

$$y = 2(2) + 20$$

$$4 + 20$$

$$y = 2(6) + 20$$

$$12 + 20$$

Theme Park Costs

STEP 3

Find the rate of change between each point and the next.

Is the rate constant?

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

STEP 4

Calculate $\frac{y}{x}$ for the values in the table. Explain why the relationship between number of tickets and total cost is not proportional.

Representing Linear Relationships Using Graphs

EXAMPLE 2

The diameter of a Douglas fir tree is currently 10 inches when measured at chest height. Over the next 50 years, the diameter is expected to increase by an average growth rate of $\frac{2}{5}$ inch per year. The equation $y = \frac{2}{5}x + 10$ gives y , the diameter of the tree in inches, after x years. Draw a graph of the equation. Describe the relationship.

STEP 1

Table; Choose values that make sense

y	inches	10	14	18	22	30
x	years	0	10	20	30	50

STEP 2

Plot Ordered Pairs

$(0, 10)$ $(10, 14)$ $(20, 18)$ $(30, 22)$ $(50, 30)$

STEP 3

Describe Relationship

Linear
Nonproportional

ADDITIONAL EXAMPLE 2

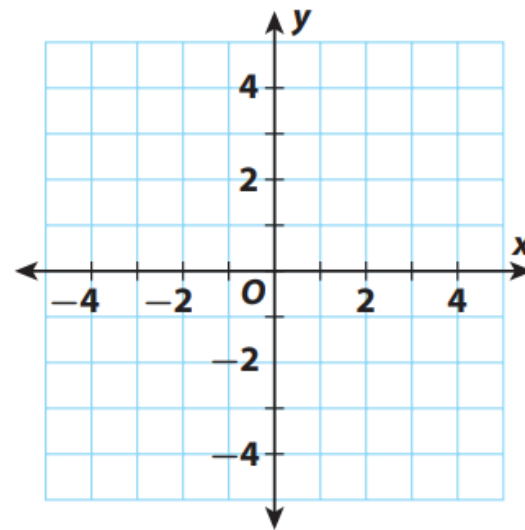
A lake has an average depth of 4 feet. A new dam has just been completed, and the average depth of the lake will increase by $\frac{3}{4}$ foot each day for the next 8 days. The equation $y = \frac{3}{4}x + 4$ gives y , the average depth of the lake, after x days. Draw a graph of the equation. Describe the relationship.

y	ft					
x	Days					

YOUR TURN

3. Make a table and graph the solutions of the equation $y = -2x + 1$.

x	-1	0	1	2
y				



GP

P98

1-6