

State whether each equation or function is a linear function. Write *yes* or *no*. Explain.

16. $3y - 4x = 20$ *yes* 17. $y = x^2 - 6$ *no* 18. $h(x) = 6$ *yes*
 19. $j(x) = 2x^2 + 4x + 1$ *no* 20. $g(x) = 5 + \frac{6}{x}$ *no* 21. $f(x) = \sqrt{7-x}$ *no*
 22. $4x + \sqrt{y} = 12$ *no* 23. $\frac{1}{x} + \frac{1}{y} = 1$ *no* 24. $f(x) = \frac{4x}{5} + \frac{8}{3}$ *yes*

Find the *x*-intercept and the *y*-intercept of the graph of each equation. Then graph the equation using the intercepts.

35. $y = -8x - 4$ 36. $5y = 15x - 90$ 37. $-4y + 6x = -42$
 38. $-9x - 7y = -30$ 39. $\frac{1}{3}x - \frac{2}{9}y = 4$ 40. $\frac{3}{4}y - \frac{2}{3}x = 12$

REGULARITY Find the rate of change for each set of data.

1.

Time (min)	2	4	6	8	10
Distance (ft)	12	24	36	48	60

$$m = \frac{24-12}{4-2} = \frac{12}{2} = 6$$

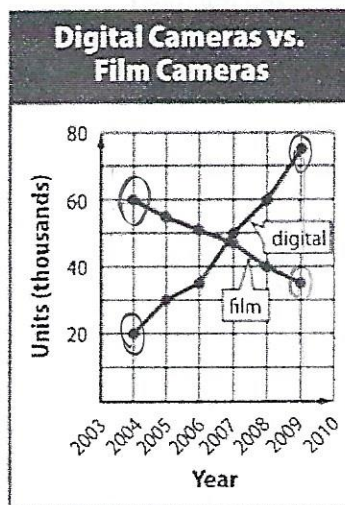
2.

Time (sec)	5	10	15	20	25
Volume (cm ³)	16	32	48	64	80

$$m = \frac{32-16}{10-5} = \frac{16}{5}$$

3. **CAMERAS** The graph shows the number of digital still cameras and film cameras sold by Yellow Camera Stores in recent years.

- Find the average rate of change of the number of digital cameras sold from 2004 to 2009.
- Find the average rate of change of the number of film cameras sold from 2004 to 2009.
- What do the signs of each rate of change represent?



a) (2004, 20)
(2009, 75)

$$m = \frac{75-20}{2009-2004} = \frac{55}{5} = 11$$

b) (2004, 60)
(2009, 35)

$$m = \frac{35-60}{2009-2004} = \frac{-25}{5} = -5$$

c) Digital sales are increasing by 11,000 a year while film is decreasing by 5,000 a year.

Find the rate of change for each set of data.

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Time (day)	3	6	9	12	15
Height (mm)	20	40	60	80	100

$$m = \frac{40-20}{6-3} = \frac{20}{3} = \boxed{6.67 \text{ mm/day}}$$

10.

Weight (lb)	11	22	33	44	55
Cost (\$)	8	16	24	32	40

$$m = \frac{16-8}{22-11} = \frac{8}{11} = .73$$

$$\boxed{\$.73/\text{lb}}$$

11. HEALTH The table below shows Lisa's temperature during an illness over a 3-day period.

Day	Monday		Tuesday		Wednesday	
Time	8:00 A.M.	8:00 P.M.	8:00 A.M.	8:00 P.M.	8:00 A.M.	8:00 P.M.
Temp (°F)	100.5	102.3	103.1	100.7	99.9	98.6

- a. What was the average rate of change in Lisa's temperature from 8:00 A.M. on Monday to 8:00 P.M. on Monday?
- b. What was the average rate of change in Lisa's temperature from 8:00 A.M. on Tuesday to 8:00 P.M. on Wednesday? Is your answer reasonable? What does the sign of the rate mean?
- c. During which 12-hour period was the average rate of change in Lisa's temperature the greatest?

a) $\frac{102.3-100.5}{12} = \frac{1.8}{12} = .15$

$$\boxed{.15^\circ\text{F/hr}}$$

b) $\frac{98.6-103.1}{36} = \frac{-4.5}{36} = -.125$

$$\boxed{-.125^\circ\text{F/hr}}$$

c) Tuesday from 8AM to 8PM

Yes, her temp is dropping.

22. **CCSS REASONING** The table shows your height on a water slide at various time intervals.

- a. Graph the height versus the time on the water slide.
- b. Find the average rate of change in a rider's height between 1 and 3 seconds.
- c. Find the average rate of change in a rider's height between 0 and 5 seconds.
- d. What is another word for *rate of change* in this situation?

Time (s)	Height (ft)
0	120
1	90
2	60
3	30
4	0
5	0

b) (1,90) (3,30)

$$\frac{30-90}{3-1} = \frac{-60}{2} = -30$$

$$\boxed{-30 \text{ ft/s}}$$

c) (0,120)(5,0)

$$\frac{0-120}{5-0} = \frac{-120}{5} = -24$$

$$\boxed{-24 \text{ ft/s}}$$

d) Speed or Velocity

Find the value of r so that the line that passes through each pair of points has the given slope.

31. $(6, r), (3, 3), m = 2$

32. $(8, 1), (5, r), m = \frac{1}{3}$

33. $(10, r), (4, -3), m = \frac{4}{3}$

34. $(8, -2), (r, -6), m = -4$

$$\textcircled{31} \quad 2 = \frac{r-3}{6-3}$$

$$3 \cdot 2 = \frac{r-3}{3} \cdot 3$$

$$\begin{array}{r} 6 = r - 3 \\ +3 \quad +3 \end{array}$$

$$\boxed{r=9}$$

$$\textcircled{32} \quad \frac{1}{3} = \frac{1-r}{8-5}$$

$$3 \cdot \frac{1}{3} = \frac{1-r}{3} \cdot 3$$

$$\begin{array}{r} 1 = 1 - r \\ -1 \quad -1 \end{array}$$

$$\begin{array}{r} 0 = -r \\ -1 \quad + \end{array}$$

$$\boxed{r=0}$$

$$\textcircled{33} \quad \frac{4}{3} = \frac{r+3}{10-4}$$

$$3 \cdot \frac{4}{3} = \frac{r+3}{6} \cdot 6$$

$$\begin{array}{r} 8 = r + 3 \\ -3 \quad -3 \end{array}$$

$$\boxed{r=5}$$

$$\textcircled{34} \quad -4 = \frac{-2-(r)}{8-r}$$

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

$$\begin{array}{r} -32 + 4r = 4 \\ +32 \quad +32 \end{array}$$

$$\frac{4r}{4} = \frac{36}{4}$$

$$\boxed{r=9}$$

#35

$$0 = -8x - 4$$

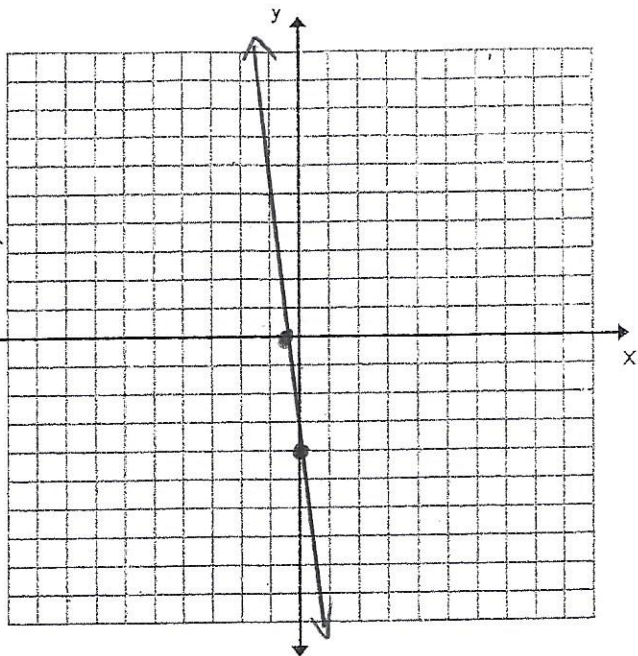
$$4 = -8x$$

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

$$\left(-\frac{1}{2}, 0\right)$$

$$y = -4$$

$$(0, -4)$$



#36

$$0 = 15x - 90$$

$$90 = 15x$$

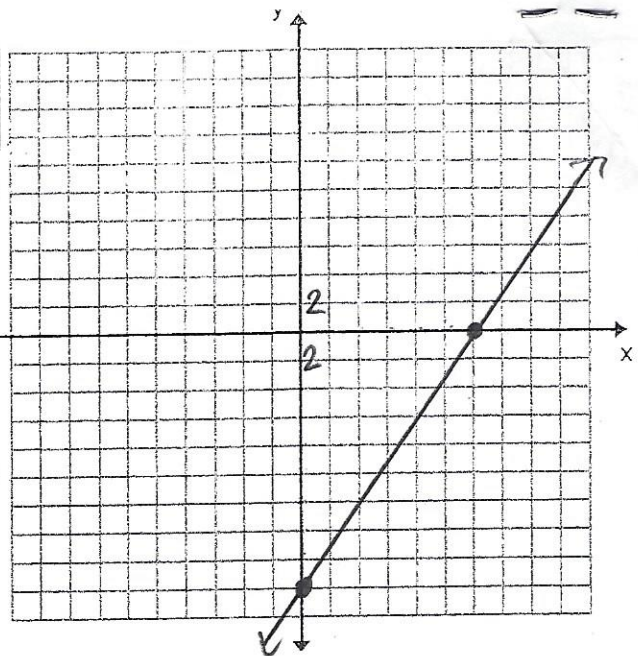
$$x = 6$$

$$(6, 0)$$

$$5y = -90$$

$$y = -18$$

$$(0, -18)$$



#37

$$6x = -42$$

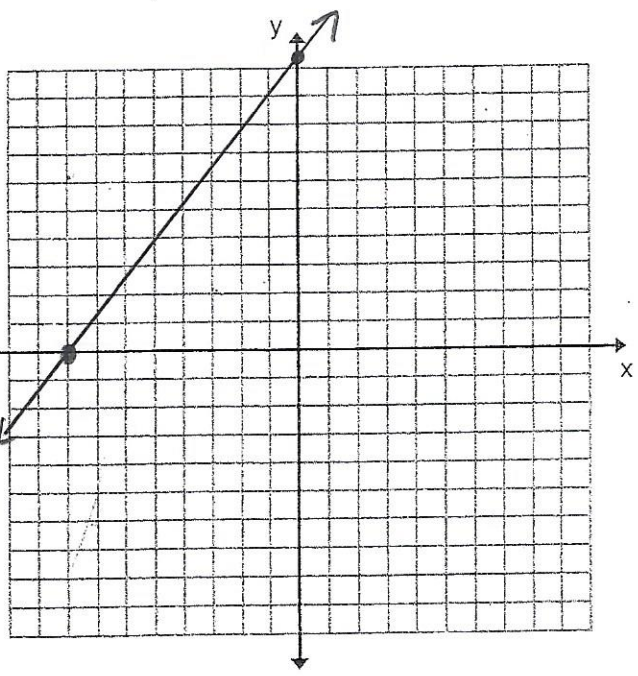
$$x = -8$$

$$(-8, 0)$$

$$-4y = 42$$

$$y = \frac{21}{2}$$

$$\left(0, \frac{21}{2}\right)$$



#38

$$-9x = -30$$

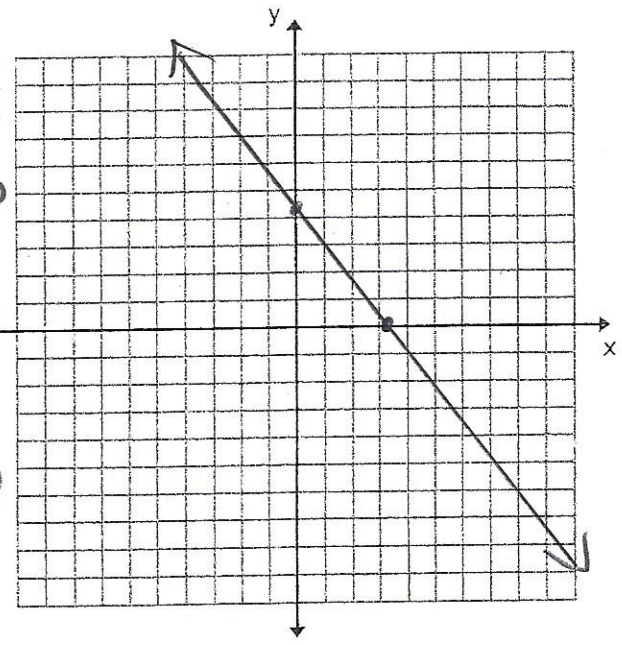
$$x = 3.3$$

$$(3.3, 0)$$

$$-7y = -30$$

$$y = 4.3$$

$$(0, 4.3)$$



#39

$$\frac{1}{3}x = 4$$

$$x = 12$$

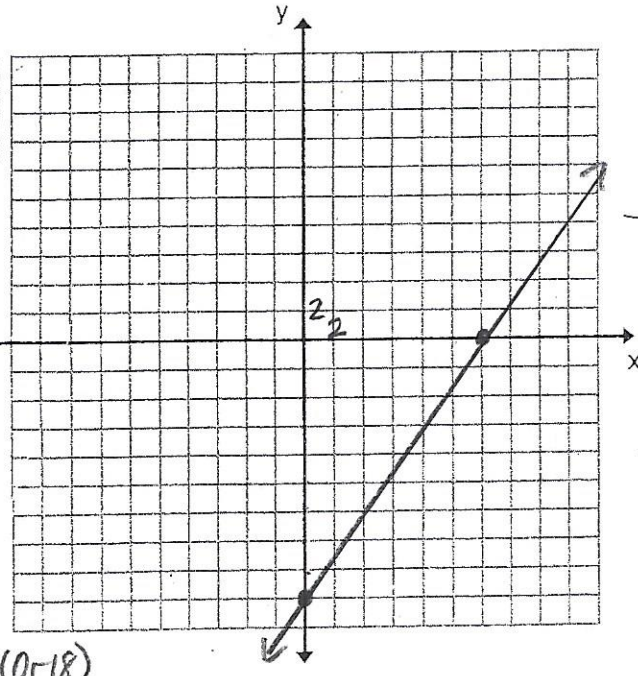
$$(12, 0)$$

$$-\frac{2}{9}y = 4$$

$$y = 4 \cdot \frac{9}{-2}$$

$$y = -18$$

$$(0, -18)$$



#40

$$-\frac{2}{3}x = 12$$

$$x = 12 \cdot \frac{-3}{2}$$

$$x = -18$$

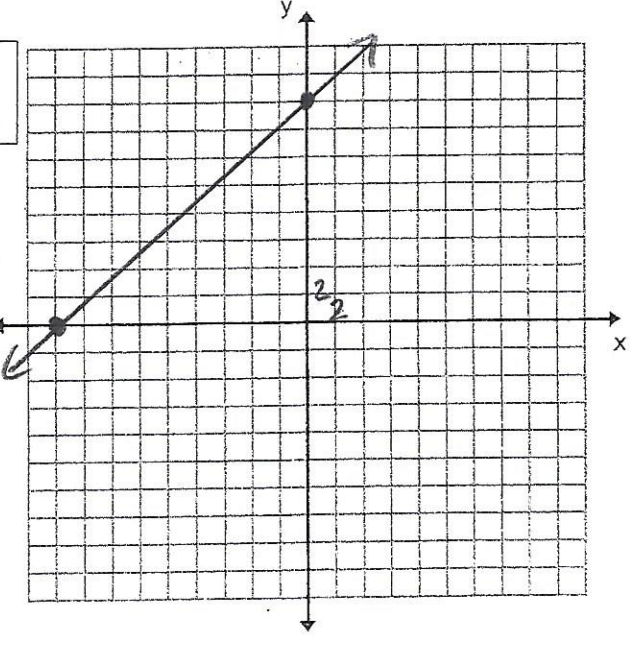
$$(-18, 0)$$

$$\frac{3}{4}y = 12$$

$$y = 12 \cdot \frac{4}{3}$$

$$y = 16$$

$$(0, 16)$$



9

