

1. Give an example of:

- a. An irrational number greater than one but less than two
- b. A non-integer
- c. An imaginary number
- d. A negative odd number
- e. A digit that is not a counting number
- f. A natural number that is negative
- g. A real number that is also irrational

- a. $\sqrt{2}$
- b. $3.7, 4.2, \dots$
- c. $i, 2i, -3i, \dots$
- d. $-7, -11, \dots$
- e. 0
- f. Does not exist
- g. $\sqrt{3}, \sqrt{5}, \dots$

2. Name all sets of numbers to which each of the following belongs:

- a. -12
- b. $\sqrt{21}$
- c. 4
- d. $\sqrt{-5}$

- a. Real, rational, integer
- b. Real, irrational
- c. Real, rational, integer,
Whole, natural
- d. imaginary

3. Identify the property the statement illustrates.

- a. $(4 + 9) + 3 = 4 + (9 + 3)$
- b. $15 \cdot 1 = 15$
- c. $5 + (-5) = 0$
- d. $6 \cdot 4 = 4 \cdot 6$
- e. $7(2 + 8) = 7(2) + 7(8)$

- a. associative property
of addition
- b. Identity property
of multiplication
- c. Inverse property
of addition
- d. commutative property
of multiplication
- e. Distributive
Property

4. Carry out the indicated operations:

- a. $15 + 3 - 21 = 18 - 21 = -3$
- b. $52 \div 4 \cdot 11 = 13 \cdot 11 = 143$
- c. $35 - 15 \div 5 + 21 = 35 - 3 + 21 = 32 + 21 = 53$
- d. $(3 - 2x)(4 + x) = 12 + 3x - 8x - 2x^2$

- a. -3
- b. 143
- c. 53
- d. $-2x^2 - 5x + 12$

5. Simplify the following algebraic expressions:

a. $2m^2 - 5n^2 + 6n^2 - 8m$

a. $2m^2 + n^2 - 8m$

b. $7(m-3) + 4(m+5) = 7m - 21 + 4m + 20$

b. $11m - 1$

c. $10(n^2 + n) - 6(n^2 - 2) = 10n^2 + 10n - 6n^2 + 12$

c. $4n^2 + 10n + 12$

d. $y^2 + 2y + 3y^2$

d. $4y^2 + 2y$

6. Evaluate the following for $x = -3$ and $x = 5$

a. $|3 - 2x|$ $|3 - 2(-3)| = |3 + 6| = 9$
 $|3 - 2(5)| = |3 - 10| = 7$

a. $9, 7$

b. $5x + 7$ $5(-3) + 7 = -15 + 7 = -8$
 $5(5) + 7 = 25 + 7 = 32$

b. $-8, 32$

c. $2x^2 - 3x - 9$ $2(-3)^2 - 3(-3) - 9 = 18 + 9 - 9 = 18$
 $2(5)^2 - 3(5) - 9 = 50 - 15 - 9 = 26$

c. $18, 26$

7. Solve each equation:

a. $6m - 3 = 21$
 $\quad +3 \quad +3$
 $\frac{6m}{6} = \frac{24}{6}$ $m = 4$

a. $m = 4$

b. $3 = 2p + 5$
 $\quad -5 \quad -5$
 $\frac{-2}{2} = \frac{2p}{2}$ $p = -1$

b. $p = -1$

c. $1 = \frac{1}{3}a - 5$
 $\quad +5 \quad +5$
 $\frac{6}{3} = \frac{1}{3}a$ $a = 18$
 $\times 3 \quad \times 3$

c. $a = 18$

d. $5b - 4 = 2b + 8$
 $\quad -2b \quad -2b$
 $\frac{3b - 4}{3} = \frac{8}{3}$ $b = 4$

d. $b = 4$

e. $2c + 14 = 6 - 4c$
 $\quad +4c \quad +4c$
 $\frac{6c + 14}{-14} = \frac{6}{-14}$ $\frac{6c}{6} = \frac{-8}{6}$

e. $c = -\frac{4}{3}$

f. $3(2x - 5) - x = -7(x + 3)$
 $6x - 15 - x = -7x + -21$
 $5x - 15 = -7x - 21$
 $\quad +7x \quad +7x$
 $12x - 15 = -21$
 $\quad +15 \quad +15$
 $\frac{12x}{12} = \frac{-6}{12}$

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

$$g. \left[\frac{1}{2}x + 4 = \frac{-2}{3}x + \frac{1}{2} \right] \cdot \frac{6}{1}$$

$$7x + 24 = 3$$

$$\begin{array}{r} 7x + 24 = 3 \\ -24 \quad -24 \\ \hline 7x = -21 \\ \frac{7x}{7} = \frac{-21}{7} \end{array}$$

$$3x + 24 = -4x + 3$$

$$\begin{array}{r} 3x + 24 = -4x + 3 \\ +4x \quad +4x \\ \hline 7x + 24 = 3 \end{array}$$

$$h. 3(x+5) = 3x+15$$

$$3x+15 = 3x+15$$

$$g. \underline{x = -3}$$

$$h. \underline{\text{Identity}}$$

$$i. -2(4-3x)+7=6(x+1)$$

$$-8+6x+7=6x+6$$

$$6x-1=6x+6$$

$$i. \underline{\text{No Solution}}$$

$$j. |x-5|=7$$

$$x-5=7 \quad x-5=-7$$

$$\begin{array}{r} x-5=7 \\ +5 \quad +5 \\ \hline x=12 \end{array} \quad \begin{array}{r} x-5=-7 \\ +5 \quad +5 \\ \hline x=-2 \end{array}$$

$$j. \underline{x = 12, -2}$$

$$k. |2x+12|=4x$$

$$2x+12=4x \quad 2x+12=-4x$$

$$\begin{array}{r} 2x+12=4x \\ -2x \quad -2x \\ \hline 12=2x \\ x=6 \end{array} \quad \begin{array}{r} 2x+12=-4x \\ -2x \quad -2x \\ \hline 12=-6x \\ x=-2 \end{array}$$

$$k. \underline{x = 6}$$

8. Solve each equation for y

$$a. y-6x=7$$

$$\begin{array}{r} y-6x=7 \\ +6x \quad +6x \\ \hline y=6x+7 \end{array}$$

$$a. \underline{y = 6x + 7}$$

$$b. 3x+2y=12$$

$$\begin{array}{r} 3x+2y=12 \\ -3x \quad -3x \\ \hline 2y = -3x + 12 \\ \frac{2y}{2} = \frac{-3x+12}{2} \end{array}$$

$$b. \underline{y = -\frac{3}{2}x + 6}$$

$$c. 2x+5y=-1$$

$$\begin{array}{r} 2x+5y=-1 \\ -2x \quad -2x \\ \hline 5y = -2x - 1 \\ \frac{5y}{5} = \frac{-2x-1}{5} \end{array} \quad y = -\frac{2}{5}x - \frac{1}{5}$$

$$c. \underline{y = -\frac{2}{5}x - \frac{1}{5}}$$

9. Solve each formula for the indicated variable

$$a. \frac{A}{2\pi} = \frac{2\pi r}{2\pi}; \text{ Solve for } r$$

$$a. \underline{r = \frac{A}{2\pi}}$$

$$b. \frac{S}{\pi r} = \frac{\pi r(h+k)}{\pi r}; \text{ Solve for } h$$

$$\frac{S}{\pi r} = h + \frac{k}{r}$$

$$b. \underline{h = \frac{S}{\pi r} - k}$$

$$c. V = \frac{4}{3}\pi abc; \text{ Solve for } c$$

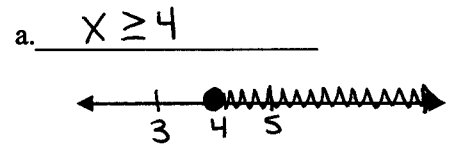
$$\cdot \frac{3}{4}$$

$$c. \underline{c = \frac{3V}{4\pi ab}}$$

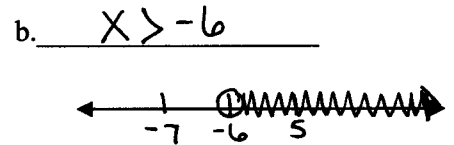
$$\frac{3}{4}V = \frac{\pi abc}{\pi ab}$$

10. Solve, write the solution set, and graph on the number line in the given domain:

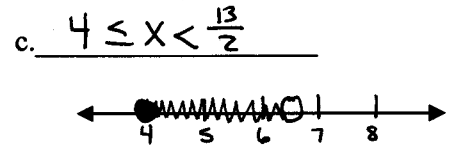
$$\begin{aligned} \text{a. } 5x - 7 &\geq 13 \\ +7 \quad +7 \\ \hline 5x &\geq 20 \\ \frac{5x}{5} &\geq \frac{20}{5} \quad x \geq 4 \end{aligned}$$



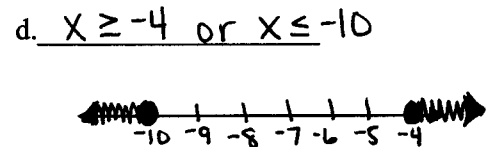
$$\begin{aligned} \text{b. } 4 - 3x &< 22 \\ -4 \quad -4 \\ \hline -3x &< 18 \\ \frac{-3x}{-3} &< \frac{18}{-3} \quad x > -6 \end{aligned}$$



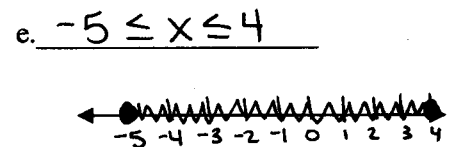
$$\begin{aligned} \text{c. } 3 &\leq 2x - 5 < 8 \\ +5 \quad +5 \quad +5 \\ \hline 8 &\leq 2x < 13 \\ \frac{8}{2} &\leq \frac{2x}{2} < \frac{13}{2} \quad 4 \leq x < \frac{13}{2} \end{aligned}$$



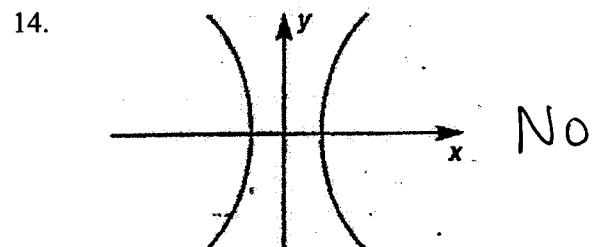
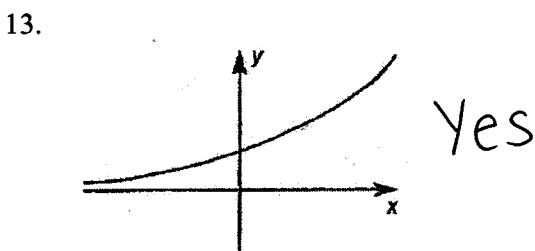
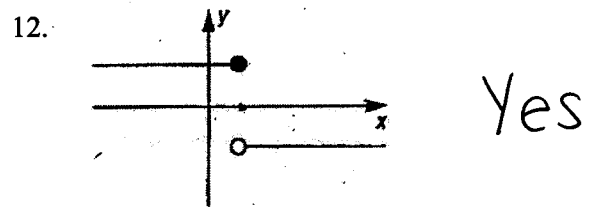
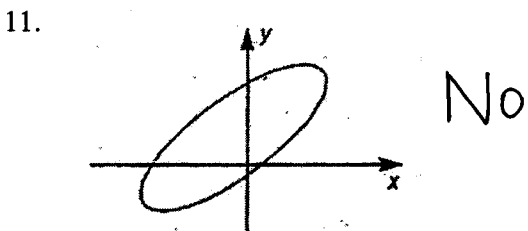
$$\begin{aligned} \text{d. } |x + 7| &\geq 3 \\ x + 7 &\geq 3 \quad \text{or} \quad x + 7 \leq -3 \\ x &\geq -4 \quad \text{or} \quad x \leq -10 \end{aligned}$$



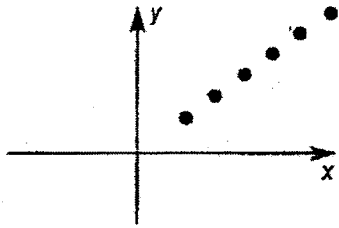
$$\begin{aligned} \text{e. } |2x + 1| &\leq 9 \\ -9 &\leq 2x + 1 \leq 9 \\ -1 \quad -1 \quad -1 \\ \hline -10 &\leq 2x \leq 8 \\ \frac{-10}{2} &\leq \frac{2x}{2} \leq \frac{8}{2} \quad -5 \leq x \leq 4 \end{aligned}$$



Tell whether or not the relation graphed is a function.

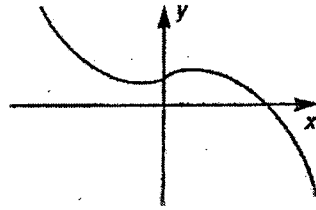


15.



Yes

16.



Yes

17. Find the slope of the line passing through the following points.

a. $(2, -4)$ $(4, -1)$ $\frac{-1 - (-4)}{4 - 2} = \frac{3}{2}$

a. $\frac{3}{2}$

b. $(-3, 6)$ $(-7, 3)$ $\frac{3 - 6}{-7 - (-3)} = \frac{-3}{-4}$

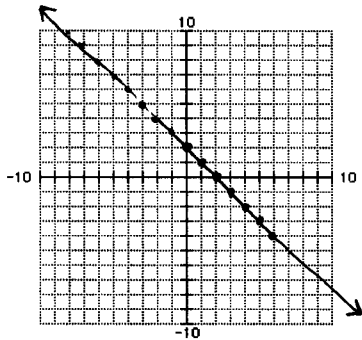
b. $\frac{3}{4}$

c. $(4, 4)$ $(4, 9)$ $\frac{9 - 4}{4 - 4} = \frac{5}{0}$

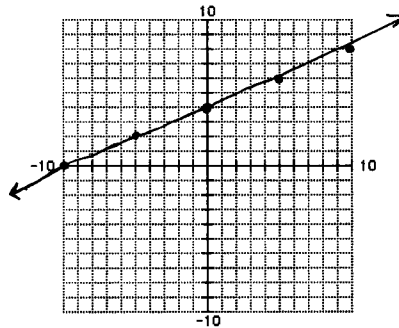
c. undefined

18. Graph each equation or inequality.

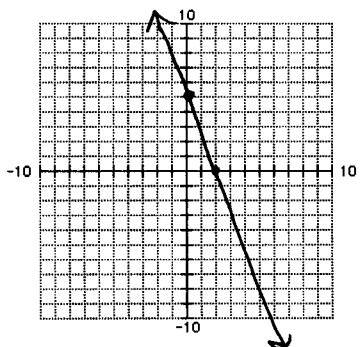
a. $y = -x + 2$



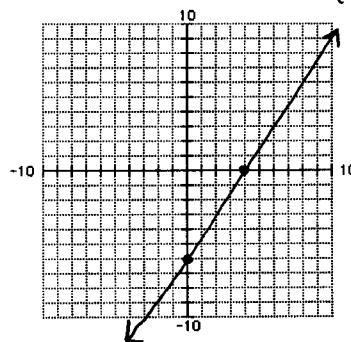
b. $y = \frac{2}{5}x + 4$



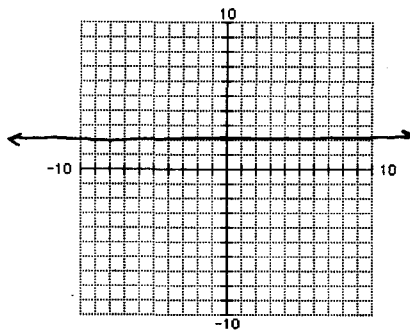
c. $5x + 2y = 10$ $(0, 5)$
 $(2, 0)$



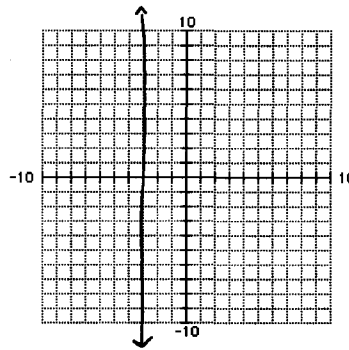
d. $3x - 2y = 12$ $(0, -6)$
 $(4, 0)$



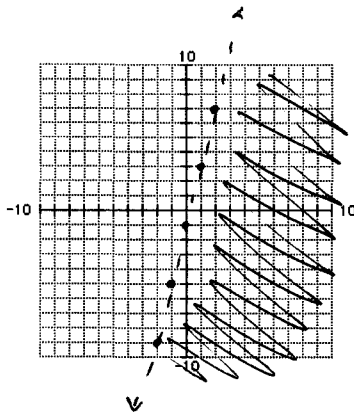
e. $y = 2$



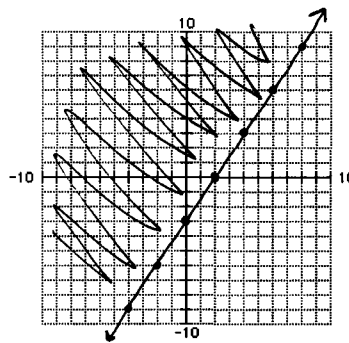
f. $x = -3$



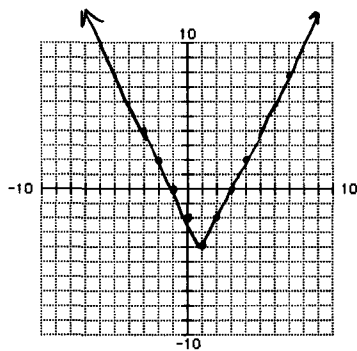
g. $y < 4x - 1$



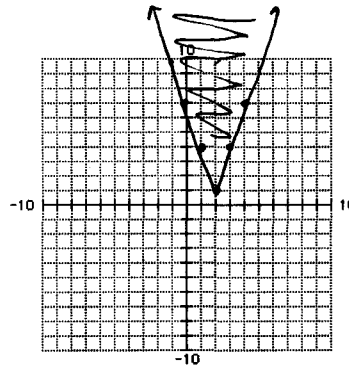
h. $y \geq \frac{3}{2}x - 3$



i. $y = 2|x - 1| - 4$



j. $y \geq 3|x - 2| + 1$



19. Write an equation of the line in slope-intercept form that passes through the given point and has the given slope.

a. $(-5, -6)$, slope = 4

$$y + 6 = 4(x + 5)$$

$$y + 6 = 4x + 20$$

$$\begin{array}{r} -6 \\ -6 \end{array}$$

$$y = 4x + 14$$

a. $y = 4x + 14$

b. $(8, 13)$, slope = -9

$$y - 13 = -9(x - 8)$$

$$y - 13 = -9x + 72$$

$$\begin{array}{r} +13 \\ +13 \end{array}$$

$$y = -9x + 85$$

b. $y = -9x + 85$

c. $(-4, 2)$, slope = $\frac{3}{2}$

$$y - 2 = \frac{3}{2}(x + 4)$$

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

$$\begin{array}{r} +2 \\ +2 \end{array}$$

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

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

20. Write an equation of the line that passes through the given point and satisfies the given condition.

a. $(-3, -5)$; parallel to $y = -4x + 1$

$$y + 5 = -4(x + 3)$$

$$y + 5 = -4x - 12$$

$$\begin{array}{r} -5 \\ -5 \end{array}$$

$$y = -4x - 17$$

a. $y = -4x - 17$

b. $(4, 1)$; perpendicular to $y = \frac{1}{3}x + 3$

$$y - 1 = -3(x - 4)$$

$$y - 1 = -3x + 12$$

$$\begin{array}{r} +1 \\ +1 \end{array}$$

$$y = -3x + 13$$

b. $y = -3x + 13$

c. $(2, 4)$; perpendicular to $y = 7$

$$x = 2$$

c. $x = 2$

21. Write an equation of the line that passes through the given points.

a. $(-1, 3)$ and $(2, 9)$

$$\frac{9 - 3}{2 - (-1)} = \frac{6}{3} = 2$$

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

$$y - 3 = 2x + 2$$

$$\begin{array}{r} +3 \\ +3 \end{array}$$

a. $y = 2x + 5$

b. $(4, -1)$ and $(6, -7)$

$$\frac{-7 - (-1)}{6 - 4} = \frac{-6}{2} = -3$$

$$y + 1 = -3(x - 4)$$

$$y + 1 = -3x + 12$$

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

b. $y = -3x + 11$

c. $(-5, -2)$ and $(-3, 8)$

$$\frac{8 - (-2)}{-3 - (-5)} = \frac{10}{2} = 5$$

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

$$y + 2 = 5x + 25$$

$$\begin{array}{r} -2 \\ -2 \end{array}$$

c. $y = 5x + 23$

22. For the equation $y + 2 = \frac{-3}{2}(x - 6)$:

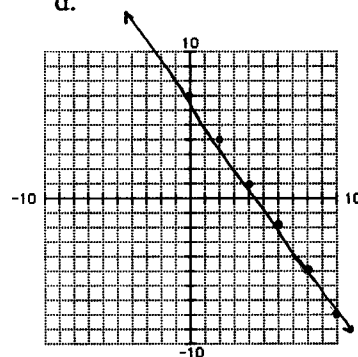
- Name the form of the equation
- Identify the point found in the equation
- Identify the slope
- Plot the graph from this information

a. Point-Slope Form

b. $(6, -2)$

c. $-\frac{3}{2}$

d.



e. $y = -\frac{3}{2}x + 7$

f. $3x + 2y = 14$

e. Transform the equation to slope-intercept form

$$y + 2 = \frac{-3}{2}x + 9 \quad y = -\frac{3}{2}x + 7$$

f. Transform the equation to standard form

$$y = -\frac{3}{2}x + 7 \quad \frac{2}{1}\left[\frac{3}{2}x + y = 7\right]$$

$$3x + 2y = 14$$

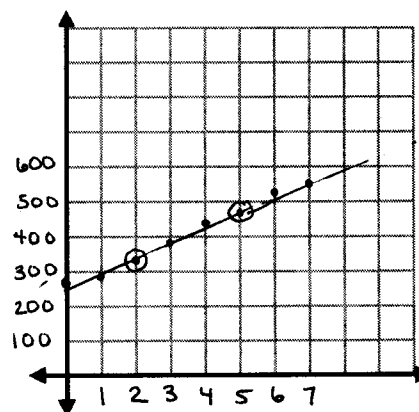
23. Approximate a line of best fit by following each step.

a. Draw a scatter plot of the data.

x	y
0	280
1	295
2	322
3	395
4	425
5	471
6	511
7	548

Answers will vary.

a.



b. Sketch a line that appears to best fit the data

c. Choose two points that appear to lie on the line

$$\text{slope} = \frac{471 - 322}{5 - 2} = \frac{149}{3} = 49.\bar{6}$$

d. Write an equation of the line passing through the two points you chose in part (c). $y - 322 = 49.\bar{6}(x - 2)$

$$y - 322 = 49.7x - 99.4$$

e. Use your equation from part (d) to predict y when $x = 12$

$$y = 49.7(12) + 222.6$$

$$y = 596.4 + 222.6$$

c. $(2, 322)$ and $(5, 471)$

d. $y = 49.7x + 222.6$

e. $y \approx 819$