**State whether each sentence is true or false. If false, replace the underlined term to make a true sentence.**

1. The absolute value of a number is always negative.

*SOLUTION:*

The absolute value of a number is always nonnegative. So, the sentence is false.

2. $\sqrt{12}$ belongs to the set of rational numbers.

*SOLUTION:*

The sentence is false because $\sqrt{12}$ belongs to the set of irrational numbers.

3. An equation is a statement that two expressions have the same value.

*SOLUTION:*

The sentence is true.

4. A solution of an equation is a value that makes the equation false.

*SOLUTION:*

A solution of an equation is a value that makes the equation true. So, the sentence is false.

5. The empty set contains no elements.

*SOLUTION:*

The sentence is true.

6. A mathematical sentence containing one or more variables is called an open sentence.

*SOLUTION:*

The sentence is true.

7. The graph of a compound inequality containing *and* is the union of the solution sets of the two inequalities.

*SOLUTION:*

The graph of a compound inequality containing *or* is the union of the solution sets of the two inequalities. So, the sentence is false.

8. Variables are used to represent unknown quantities.

*SOLUTION:*

The sentence is true.

9. The set of rational numbers includes terminating and repeating decimals.

*SOLUTION:*

The sentence is true.

10. Expressions that contain at least one variable are called algebraic expressions.

*SOLUTION:*

The sentence is true.

**Evaluate each expression.**

11. $[28-(16+3)]\div 3$

*SOLUTION:*

$$\begin{aligned}\left[28-(16+3)\right]\div 3 &= \left[28-19\right]\div 3\\ &= 9\div 3\\ &= 3\end{aligned}$$

12. $\frac{2}{3}\left(3^3+12\right)$

*SOLUTION:*

$$\begin{aligned}\frac{2}{3}\left(3^3+12\right) &= \frac{2}{3}\left(3\cdot 3\cdot 3+12\right)\\ &= \frac{2}{3}(27+12)\\ &= \frac{2}{3}(39)\\ &= 2(13)\\ &= 26\end{aligned}$$

13. $\frac{15(9-7)}{3}$

*SOLUTION:*

$$\begin{aligned}\frac{15(9-7)}{3} &= \frac{15(2)}{3}\\ &= \frac{30}{3}\\ &= 3\end{aligned}$$

**Evaluate each expression if**

$w = 0.2, x = 10, y = \frac{1}{2}$, **and** $z = -4$

14. $4w - 8y$

*SOLUTION:*

$$\begin{aligned} 4w - 8y &= 4(0.2) - 8\left(\frac{1}{2}\right) \\ &= 0.8 - 4 \\ &= -3.2 \end{aligned}$$

15. $z^2 + xy$

*SOLUTION:*

$$\begin{aligned} z^2 + xy &= (-4)^2 + (10)\left(\frac{1}{2}\right) \\ &= 16 + 5 \\ &= 21 \end{aligned}$$

16. $\frac{5w - xy}{z}$

*SOLUTION:*

$$\begin{aligned} \frac{5w - xy}{z} &= \frac{5(0.2) - (10)\left(\frac{1}{2}\right)}{-4} \\ &= \frac{1 - 5}{-4} \\ &= \frac{-4}{-4} \\ &= 1 \end{aligned}$$

17. **GEOMETRY** The formula for the volume of a cylinder is $V = \pi r^2 h$, where $V$ is volume, $r$ is radius, and $h$ is the height. What is the volume of a cylinder that is 6 inches high and has a radius of 3 inches?

*SOLUTION:*

$$\begin{aligned} V &= \pi r^2 h \\ V &= \pi(3)^2(6) \\ &= \pi(9)(6) \\ &= 54\pi \\ &\approx 169.65 \end{aligned}$$

The volume of the cylinder is about 169.65 cubic inches.

**Name the sets of numbers to which each value belongs.**

18. $1.\overline{3}$

*SOLUTION:*

The number $1.\overline{3}$ is a real number. Since $1.\overline{3}$ can be expressed as a ratio $\frac{a}{b}$ where $a$ and $b$ are integers and $b$ is not 0 it is also a rational number. It is not a part of the set {…–2, –1, 0, 1, 2, …} so it is not an integer. Since it is not a part of the set {…0, 1, 2, 3, …} it is not a whole number or a natural number.
Q, R

19. $\sqrt{4}$

*SOLUTION:*

The number $\sqrt{4}$ = 2 which is a real number. Since 2 can be expressed as a ratio $\frac{a}{b}$ where $a$ and $b$ are integers and $b$ is not 0 it is also a rational number. It is part of the set {…–2, –1, 0, 1, 2, …} so it is an integer. It is part of the set {…0, 1, 2, 3, …} so it is a whole number and since it is not 0 it is also a natural number.
N, W, Z, Q, R

20. $-\frac{3}{4}$

*SOLUTION:*

The number $-\frac{3}{4}$ is a real number. Since $-\frac{3}{4}$ can be expressed as a ratio $\frac{a}{b}$ where *a* and *b* are integers and *b* is not 0 it is also a rational number. It is not a part of the set {…–2, –1, 0, 1, 2, …} so it is not an integer. Since it is not a part of the set {…0, 1, 2, 3, …} it is not a whole number or a natural number.
Q, R

**Simplify each expression.**

21. $4x-3y+7x+5y$

*SOLUTION:*

$$\begin{aligned}4x-3y+7x+5y &= 4x+7x-3y+5y\\ &= (4+7)x+(-3+5)y\\ &= 11x+2y\end{aligned}$$

22. $2(a+3)-4a+8b$

*SOLUTION:*

$$\begin{aligned}2(a+3)-4a+8b &= 2(a)+2(3)-4a+8b\\ &= 2a+6-4a+8b\\ &= 2a-4a+8b+6\\ &= (2-4)a+8b+6\\ &= -2a+8b+6\end{aligned}$$

23. $4(2m+5n)-3(m-7n)$

*SOLUTION:*

$$\begin{aligned}&4(2m+5n)-3(m-7n)\\ &= 4(2m)+4(5n)+(-3)(m)+(-3)(-7n)\\ &= 8m+20n-3m+21n\\ &= 8m-3m+20n+21n\\ &= (8-3)m+(20+21)n\\ &= 5m+41n\end{aligned}$$

24. **MONEY** At Fun City Amusement Park, hot dogs sell for $3.50 and sodas sell for $2.50. Dion bought 3 hot dogs and 3 sodas during one day at the park.
**a.** Illustrate the Distributive Property by writing two expressions to represent the cost of the hot dogs and the sodas.
**b**. Use the Distributive Property to find how much money Dion spent on food and drinks.

*SOLUTION:*

**a.** Since Dion bought 3 of each, you can write the expression in two ways. Either add the costs of 1 hot dog and 1 soda together and multiply by 3 or multiply the cost of each item by 3 and then add. The expressions are: 3(3.50 + 2.50) or 3(3.50) + 3(2.50).
**b.**

$$\begin{aligned}3(3.50+2.50) &= 3(3.50)+3(2.50)\\ &= 10.50+7.50\\ &= 18\end{aligned}$$

Dion spent $18 on food and drinks.

**Solve each equation. Check your solution.**

25. $8+5r=-27$

*SOLUTION:*

$$\begin{aligned}8+5r &= -27\\ 8+5r-8 &= -27-8\\ 5r &= -35\\ \frac{5r}{5} &= -\frac{35}{5}\\ r &= -7\end{aligned}$$

Check:

$$8+5(-7) \stackrel{?}{=} -27$$

$$8-35 \stackrel{?}{=} -27$$

$$-27 = -27 \checkmark$$

So, the solution of the equation is $r = -7$.

26. $4w+10=6w-13$

*SOLUTION:*

$$\begin{aligned} 4w+10&=6w-13\\ 4w+10-10&=6w-13-10\\ 4w&=6w-23\\ 4w-6w&=6w-23-6w\\ -2w&=-23\\ \frac{-2w}{-2}&=\frac{-23}{-2}\\ w&=\frac{23}{2} \end{aligned}$$

Check:

$$4\left(\frac{23}{2}\right)+10\overset{?}{=}6\left(\frac{23}{2}\right)-13$$

$$2(23)+10\overset{?}{=}3(23)-13$$

$$46+10\overset{?}{=}69-13$$

$$56=56\checkmark$$

So, the solution of the equation is $w=\frac{23}{2}$.

27. $\frac{x}{6}+\frac{x}{3}=\frac{3}{4}$

*SOLUTION:*

$$\begin{aligned} \frac{x}{6}+\frac{x}{3}&=\frac{3}{4}\\ \frac{x+x(2)}{6}&=\frac{3}{4}\\ \frac{3x}{6}&=\frac{3}{4}\\ \frac{x}{2}&=\frac{3}{4}\\ 2\left(\frac{x}{2}\right)&=2\left(\frac{3}{4}\right)\\ x&=\frac{3}{2} \end{aligned}$$

Check:

$$\frac{\left(\frac{3}{2}\right)}{6}+\frac{\left(\frac{3}{2}\right)}{3}\overset{?}{=}\frac{3}{4}$$

$$\frac{3}{2}\left(\frac{1}{6}\right)+\frac{3}{2}\left(\frac{1}{3}\right)\overset{?}{=}\frac{3}{4}$$

$$\frac{1}{4}+\frac{1}{2}\overset{?}{=}\frac{3}{4}$$

$$\frac{1+1(2)}{3}\overset{?}{=}\frac{3}{4}$$

$$\frac{1+2}{4}\overset{?}{=}\frac{3}{4}$$

$$\frac{3}{4}=\frac{3}{4}\checkmark$$

So, the solution of the equation is $x=\frac{3}{2}$.

28. $6b-5=3(b+2)$

*SOLUTION:*

$$\begin{aligned} 6b-5&=3(b+2)\\ 6b-5&=3(b)+3(2)\\ 6b-5&=3b+6\\ 6b-5+5&=3b+6+5\\ 6b&=3b+11\\ 6b-3b&=3b+11-3b\\ 3b&=11\\ \frac{3b}{3}&=\frac{11}{3}\\ b&=\frac{11}{3} \end{aligned}$$

Check:

$$\begin{aligned} 6\left(\frac{11}{3}\right)-5&\stackrel{?}{=}3\left(\frac{11}{3}+2\right)\\ 2(11)-5&\stackrel{?}{=}3\left(\frac{11+2(3)}{3}\right)\\ 22-5&\stackrel{?}{=}3\left(\frac{11+6}{3}\right)\\ 17&\stackrel{?}{=}3\left(\frac{17}{3}\right)\\ 17&=17\checkmark \end{aligned}$$

So, the solution of the equation is $b=\frac{11}{3}$.

29. **MONEY** It cost Lori \$14 to go to the movies. She bought popcorn for \$3.50 and a soda for \$2.50. How much was her ticket?

*SOLUTION:*

$$\begin{aligned} 14-3.50-2.50&=14-(3.50+2.50)\\ &=14-(6)\\ &=8 \end{aligned}$$

The cost of the ticket was \$8.

**Solve each equation or formula for the specified variable.**

30. $2k-3m=16$ for $k$

*SOLUTION:*

$$\begin{aligned} 2k-3m&=16\\ 2k-3m+3m&=16+3m\\ 2k&=16+3m\\ \frac{2k}{2}&=\frac{16+3m}{2}\\ k&=\frac{16+3m}{2} \end{aligned}$$

31. $\frac{r+5}{mn}=p$ for $m$

*SOLUTION:*

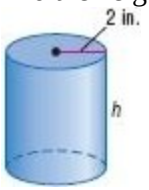
$$\begin{aligned} \frac{r+5}{mn}&=p\\ m\left(\frac{r+5}{mn}\right)&=mp\\ \frac{r+5}{n}&=mp\\ \frac{\left(\frac{r+5}{n}\right)}{p}&=\frac{mp}{p}\\ \frac{r+5}{np}&=m \end{aligned}$$

32. $A=\frac{1}{2}h(a+b)$ for $h$

*SOLUTION:*

$$\begin{aligned} A&=\frac{1}{2}h(a+b)\\ 2A&=2\left[\frac{1}{2}h(a+b)\right]\\ 2A&=h(a+b)\\ \frac{2A}{(a+b)}&=\frac{h(a+b)}{(a+b)}\\ \frac{2A}{(a+b)}&=h \end{aligned}$$

33. **GEOMETRY** Yu-Jun wants to fill the water container at the right. He knows that the radius is 2 inches and the volume is 100.48 cubic inches. What is the height of the water bottle? Use the formula for the volume of a cylinder, $V = \pi r^2 h$, to find the height of the bottle.




*SOLUTION:*

Substitute $r = 2$, and $V = 100.48$ in the formula $V = \pi r^2 h$.

$$V = \pi r^2 h$$
$$100.48 = \pi(2)^2 h$$
$$100.48 = 4\pi h$$
$$\frac{100.48}{4\pi} = \frac{4\pi h}{4\pi}$$
$$h \approx 8$$

The height of the bottle is about 8 inches.

**Solve each equation. Check your solution.**

34. $|r+5| = 12$

*SOLUTION:*

Case 1:
$$r + 5 = 12$$
$$r + 5 - 5 = 12 - 5$$
$$r = 7$$

Case 2:
$$r + 5 = -12$$
$$r + 5 - 5 = -12 - 5$$
$$r = -17$$

There appear to be two solutions, 7 and –17.
Check: Substitute each value in the original equation.

$$|r+5| = 12 \qquad |r+5| = 12$$
$$|7+5| \stackrel{?}{=} 12 \qquad |-17+5| \stackrel{?}{=} 12$$
$$|12| \stackrel{?}{=} 12 \qquad |-12| \stackrel{?}{=} 12$$
$$12 = 12\checkmark \qquad 12 = 12\checkmark$$

The solution set is $\{7, -17\}$.

35. $4|a-6| = 16$

*SOLUTION:*

$$4|a-6| = 16$$
$$\frac{4|a-6|}{4} = \frac{16}{4}$$
$$|a-6| = 4$$

Case 1:
$$a - 6 = 4$$
$$a - 6 + 6 = 4 + 6$$
$$a = 10$$

Case 2:
$$a - 6 = -4$$
$$a - 6 + 6 = -4 + 6$$
$$a = 2$$

There appear to be two solutions, 2 and 10.
Check: Substitute each value in the original equation.

$$4|a-6| = 16 \qquad 4|a-6| = 16$$
$$4|10-6| \stackrel{?}{=} 16 \qquad 4|2-6| \stackrel{?}{=} 16$$
$$4|4| \stackrel{?}{=} 16 \qquad 4|-4| \stackrel{?}{=} 16$$
$$4(4) \stackrel{?}{=} 16 \qquad 4(4) \stackrel{?}{=} 16$$
$$16 = 16\checkmark \qquad 16 = 16\checkmark$$

The solution set is $\{2, 10\}$.

36. $|3x+7|=-15$

*SOLUTION:*

| Case 1: | Case 2: |
|---|---|
| $3x+7=-15$ | $3x+7=15$ |
| $3x+7-7=-15-7$ | $3x+7-7=15-7$ |
| $3x=-22$ | $3x=8$ |
| $\frac{3x}{3}=-\frac{22}{3}$ | $\frac{3x}{3}=\frac{8}{3}$ |
| $x=-\frac{22}{3}$ | $x=\frac{8}{3}$ |

There appear to be two solutions, $-\frac{22}{3}$ and $\frac{8}{3}$.

Check: Substitute each value in the original equation.

| | |
|---|---|
| $\lvert 3x+7\rvert=-15$ | $\lvert 3x+7\rvert=-15$ |
| $\left\lvert 3\left(-\frac{22}{3}\right)+7\right\rvert \stackrel{?}{=}-15$ | $\left\lvert 3\left(\frac{8}{3}\right)+7\right\rvert \stackrel{?}{=}-15$ |
| $\lvert -22+7\rvert \stackrel{?}{=}-15$ | $\lvert 8+7\rvert \stackrel{?}{=}-15$ |
| $\lvert -15\rvert \stackrel{?}{=}-15$ | $\lvert 15\rvert \stackrel{?}{=}-15$ |
| $15\neq -15$ | $15\neq -15$ |

Because $15\neq -15$, the solution set is $\varnothing$.

37. $|b+5|=2b-9$

*SOLUTION:*

| Case 1: | Case 2: |
|---|---|
| $b+5=2b-9$ | $b+5=-(2b-9)$ |
| $b+5-5=2b-9-5$ | $b+5=-2b+9$ |
| $b=2b-14$ | $b+5-5=-2b+9-5$ |
| $b-2b=2b-14-2b$ | $b=-2b+4$ |
| $-b=-14$ | $b+2b=-2b+4+2b$ |
| $\frac{-b}{-1}=\frac{-14}{-1}$ | $3b=4$ |
| $b=14$ | $\frac{3b}{3}=\frac{4}{3}$ |
| | $b=\frac{4}{3}$ |

There appear to be two solutions, $14$ and $\frac{4}{3}$.

Check: Substitute each value in the original equation.

| | |
|---|---|
| $\lvert b+5\rvert=2b-9$ | $\lvert b+5\rvert=2b-9$ |
| $\lvert 14+5\rvert \stackrel{?}{=}2(14)-9$ | $\left\lvert \frac{4}{3}+5\right\rvert \stackrel{?}{=}2\left(\frac{4}{3}\right)-9$ |
| $\lvert 19\rvert \stackrel{?}{=}28-9$ | $\left\lvert \frac{4+5(3)}{3}\right\rvert \stackrel{?}{=}\frac{8}{3}-9$ |
| $19\stackrel{?}{=}19$ | $\left\lvert \frac{4+15}{3}\right\rvert \stackrel{?}{=}\frac{8-9(3)}{3}$ |
| | $\left\lvert \frac{19}{3}\right\rvert \stackrel{?}{=}\frac{8-27}{3}$ |
| | $\frac{19}{3}\neq\frac{-19}{3}$ |

Because $\frac{19}{3}\neq -\frac{19}{3}$, $b=\frac{4}{3}$ is an extraneous solution.

So, the solution set is $\{14\}$.

38. **MEASUREMENT** Marcos is cutting ribbons for a craft project. Each ribbon needs to be $\frac{3}{4}$ yard long. If each piece is always within plus or minus $\frac{1}{16}$ yard, how long are the shortest and longest pieces of ribbon?

*SOLUTION:*

Let $x$ be the length of the shortest and longest pieces of ribbon.

$$\left|x-\frac{3}{4}\right|=\frac{1}{16}$$

Solve the equation $\left|x-\frac{3}{4}\right|=\frac{1}{16}$.

| Case 1: | Case 2: |
|---|---|
| $x-\frac{3}{4}=\frac{1}{16}$ | $x-\frac{3}{4}=-\frac{1}{16}$ |
| $x-\frac{3}{4}+\frac{3}{4}=\frac{1}{16}+\frac{3}{4}$ | $x-\frac{3}{4}+\frac{3}{4}=-\frac{1}{16}+\frac{3}{4}$ |
| $x=\frac{1+4(3)}{16}$ | $x=\frac{-1+3(4)}{16}$ |
| $x=\frac{1+12}{16}$ | $x=\frac{11}{16}$ |
| $x=\frac{13}{16}$ | |

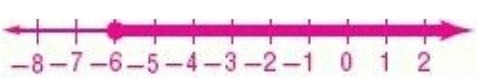
**Solve each inequality. Then graph the solution set on a number line.**

39. $-4a \le 24$

*SOLUTION:*

$$-4a \le 24$$
$$\frac{-4a}{-4} \ge \frac{24}{-4}$$
$$a \ge -6$$

To graph this inequality, draw a solid circle at –6 and draw an arrow extending to the right.




40. $\frac{r}{5}-8>3$

*SOLUTION:*

$$\frac{r}{5}-8>3$$
$$\frac{r}{5}-8+8>3+8$$
$$\frac{r}{5}>11$$
$$5\left(\frac{r}{5}\right)>5(11)$$
$$r>55$$

To graph this inequality, draw an open circle at 55 and draw an arrow extending to the right.


41. $4-7x \ge 2(x+3)$

*SOLUTION:*

$$4-7x \ge 2(x+3)$$
$$4-7x \ge 2(x)+2(3)$$
$$4-7x \ge 2x+6$$
$$4-7x-4 \ge 2x+6-4$$
$$-7x \ge 2x+2$$
$$-7x-2x \ge 2x+2-2x$$
$$-9x \ge 2$$
$$\frac{-9x}{-9} \le \frac{2}{-9}$$
$$x \le -\frac{2}{9}$$

To graph this inequality, draw a solid circle at $-\frac{2}{9}$ and draw an arrow extending to the left.

42. $-p-13<3(5+4p)-2$

*SOLUTION:*

$$\begin{aligned}
-p-13&<3(5+4p)-2\\
-p-13&<3(5)+3(4p)-2\\
-p-13&<15+12p-2\\
-p-13&<13+12p\\
-p-13+13&<13+12p+13\\
-p&<12p+26\\
-p-12p&<12p+26-12p\\
-13p&<26\\
\frac{-13p}{-13}&>\frac{26}{-13}\\
p&>-2
\end{aligned}$$

To graph this inequality, draw an open circle at –2 and draw an arrow extending to the right.


43. **MONEY** Ms. Hawkins is taking her science class on a field trip to a museum. She has $572 to spend on the trip. There are 52 students that will go to the museum. The museum charges $5 per student, and Ms. Hawkins gets in for free. If the students will have slices of pizza for lunch that cost $2 each, how many slices can each student have?

*SOLUTION:*

Let $x$ be the number of slices can each student have.

$$\begin{aligned}
52(5+2x)&\le 572\\
52(5)+52(2x)&\le 572\\
260+104x&\le 572\\
260+104x-260&\le 572-260\\
104x&\le 312\\
\frac{104x}{104}&\le\frac{312}{104}\\
x&\le 3
\end{aligned}$$

Therefore, each student can have 3 or fewer slices.

**Solve each inequality. Graph the solution set on a number line.**

44. $2m+4<7$ or $3m+5>14$

*SOLUTION:*

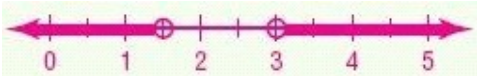
$$\begin{aligned}
2m+4&<7\\
2m+4-4&<7-4\\
2m&<3\\
\frac{2m}{2}&<\frac{3}{2}\\
m&<\frac{3}{2}
\end{aligned}$$

or

$$\begin{aligned}
3x+5&>14\\
3x+5-5&>14-5\\
3x&>9\\
\frac{3x}{3}&>\frac{9}{3}\\
mx&>3
\end{aligned}$$

The solution set is $\left\{m \,\middle|\, m<\frac{3}{2} \text{ or } m>3\right\}$.

To graph, draw an open circle at $\frac{3}{2}$ and an arrow extending to the left and an open circle at 3 and an arrow extending to the right.



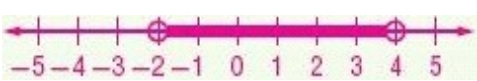

45. $-5<4x+3<19$

*SOLUTION:*

$$\begin{aligned}
-5<4x+3&<19\\
-5-3<4x+3-3&<19-3\\
-8<4x&<16\\
\frac{-8}{4}<\frac{4x}{4}&<\frac{16}{4}\\
-2<x&<4
\end{aligned}$$

The solution set is $\{x \mid -2<x<4\}$.

To graph, draw an open circle at –2 and an open circle at 4 and draw a line to connect the circles.



46. $6y-1>17$ or $8y-6\le -10$

*SOLUTION:*

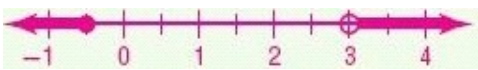
$$\begin{aligned} 6y-1&>17\\ 6y-1+1&>17+1\\ 6y&>18\\ \frac{6y}{6}&>\frac{18}{6}\\ y&>3 \end{aligned}$$

or

$$\begin{aligned} 8y-6&\le -10\\ 8y-6+6&< -10+6\\ 8y&< -4\\ \frac{8y}{8}&<\frac{-4}{8}\\ y&< -\frac{1}{2} \end{aligned}$$

The solution set is $\left\{y \,\middle|\, y\le -\frac{1}{2} \text{ or } y>3\right\}$.

To graph, draw a solid circle at $-\frac{1}{2}$ and an arrow extending to the left and an open circle at 3 and an arrow extending to the right.



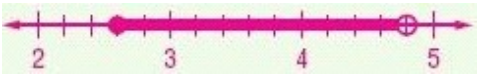

47. $-2\le 5(m-3)<9$

*SOLUTION:*

$$\begin{aligned} -2\le 5(m-3)&<9\\ -2\le 5(m)+5(-3)&<9\\ -2\le 5m-15&<9\\ -2+15\le 5m-15+15&<9+15\\ 13\le 5m&<24\\ \frac{13}{5}\le \frac{5m}{5}&<\frac{24}{5}\\ \frac{13}{5}\le m&<\frac{24}{5} \end{aligned}$$

The solution set is $\left\{m \,\middle|\, \frac{13}{5}\le m<\frac{24}{5}\right\}$.

To graph, draw a solid circle at $\frac{13}{5}$ and an open circle at $\frac{24}{5}$ and draw a line to connect the circles.



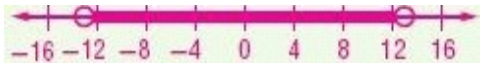

48. $|a|+2<15$

*SOLUTION:*

$$\begin{aligned} |a|+2&<15\\ |a|+2-2&<15-2\\ |a|&<13\\ -13<a&<13 \end{aligned}$$

The solution set is $\{a \mid -13<a<13\}$.

To graph, draw an open circle at –13 and an open circle at 13 and draw a line to connect the circles.



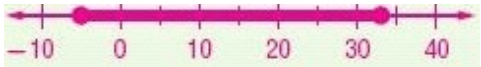

49. $|p-14|\le 19$

*SOLUTION:*

$$\begin{aligned} |p-14|&\le 19\\ -19\le (p-14)&\le 19\\ -19+14\le p-14+14&\le 19+14\\ -5\le p&\le 33 \end{aligned}$$

The solution set is $\{p \mid -5\le p\le 33\}$.

To graph, draw a solid circle at –5 and a solid circle at 33 and draw a line to connect the circles.



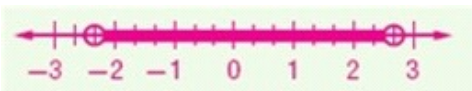
50. $|6k-1|<15$

*SOLUTION:*

$$\begin{aligned}|6k-1|&<15\\ -15<(6k-1)&<15\\ -15+1<6k-1+1&<15+1\\ -14<6k&<16\\ \frac{-14}{6}<\frac{6k}{6}&<\frac{16}{6}\\ -\frac{7}{3}<k&<\frac{8}{3}\end{aligned}$$

The solution set is $\left\{k \middle| -\frac{7}{3}<k<\frac{8}{3}\right\}$.

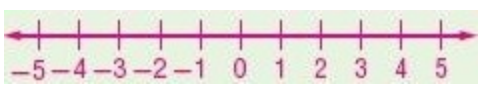
To graph, draw an open circle at $-\frac{7}{3}$ and an open circle at $\frac{8}{3}$ and draw a line to connect the circles.




51. $|2r+7|<-1$

*SOLUTION:*

Since the absolute value of a number is always positive, the solution set of the inequality is $\varnothing$. Since there are no solutions, leave the graph blank.



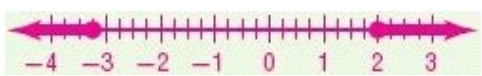

52. $\frac{1}{3}|8q+5|\geq 7$

*SOLUTION:*

$$\begin{aligned}\frac{1}{3}|8q+5|&\geq 7\\ 3\left(\frac{1}{3}|8q+5|\right)&\geq 3(7)\\ |8q+5|&\geq 21\\ -|8q+5|&\leq -21\\ -(-21)\leq -(8q+5)&\leq -21\\ 21\leq -(8q+5)&\leq -21\\ -21\geq 8q+5&\geq 21\\ -21-5\geq 8q+5-5&\geq 21-5\\ -26\geq 8q&\geq 16\\ \frac{-26}{8}\geq \frac{8q}{8}&\geq \frac{16}{8}\\ -\frac{13}{4}\geq q&\geq 2\\ -\frac{13}{4}\geq q \text{ or } q&\geq 2\\ q\leq -\frac{13}{4} \text{ or } q&\geq 2\end{aligned}$$

The solution set is $\left\{q \middle| q\leq -\frac{13}{4} \text{ or } q\geq 2\right\}$.

To graph, draw a solid circle at $-\frac{13}{4}$ and an arrow extending to the left and a solid circle at 2 and an arrow extending to the right.



53. **MONEY** Cara is making a beaded necklace for a gift. She wants to spend between \$20 and \$30 on the necklace. The bead store charges \$2.50 for large beads and \$1.25 for small beads. If she buys 3 large beads, how many small beads can she buy to stay within her budget? Write and solve a compound inequality to describe the range of possible beads.

*SOLUTION:*

Let $b$ represent the number of small beads she can buy to stay within the budget.

$$20 \le 3(2.50) + b(1.25) \le 30$$

Solve the compound inequality.

$$\begin{aligned} 20 \le 3(2.50) + b(1.25) &\le 30 \\ 20 \le 7.50 + 1.25b &\le 30 \\ 20 - 7.50 \le 1.25b &\le 30 - 7.50 \\ 12.50 \le 1.25b &\le 22.50 \\ \frac{12.50}{1.25} \le \frac{1.25b}{1.25} &\le \frac{22.50}{1.25} \\ 10 \le b &\le 18 \end{aligned}$$

The range of number of possible beads is $10 \le b \le 18$.