1-5 Solving Inequalities

9. **YARD WORK** Tara is delivering bags of mulch. Each bag weighs 48 pounds, and the push cart weighs 65 pounds. If her flat-bed truck is capable of hauling 2000 pounds, how many bags of mulch can Tara safely take on each trip?

SOLUTION:

Let x be the number of bags of mulch.

$$\begin{aligned} 48x + 65 &\le 2000 \\ 48x + 65 - 65 &\le 2000 - 65 \\ 48x &\le 1935 \\ \frac{48x}{48} &\le \frac{1935}{48} \\ x &\le 40.3125 \end{aligned}$$

So, Tara can safely take 40 bags of mulch on each trip.

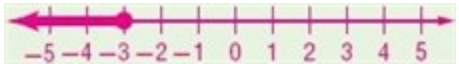
Solve each inequality. Then graph the solution set on a number line.

11. $n + 6 \le 3$

SOLUTION:

$$\begin{aligned} n + 6 &\le 3 \\ n + 6 - 6 &\le 3 - 6 \\ n &\le -3 \end{aligned}$$

To graph this inequality, draw a solid circle at -3 and draw an arrow extending to the left.



13. $-12t \ge -6$

SOLUTION:

$$\begin{aligned} -12t &\ge -6 \\ \frac{-12t}{-12} &\le \frac{-6}{-12} \\ t &\le \frac{1}{2} \end{aligned}$$

To graph this inequality, draw a solid circle at $\frac{1}{2}$ and draw an arrow extending to the left.

15. $\frac{k}{3} - 14 < -5$

SOLUTION:

$$\begin{aligned} \frac{k}{3} - 14 &< -5 \\ \frac{k}{3} - 14 + 14 &< -5 + 14 \\ \frac{k}{3} &< 9 \\ 3\left(\frac{k}{3}\right) &< 3(9) \\ k &< 27 \end{aligned}$$

To graph this inequality, draw an open circle at 27 and draw an arrow extending to the left.

17. $-6z - 14 > -32$

SOLUTION:

$$\begin{aligned} -6z - 14 &> -32 \\ -6z - 14 + 14 &> -32 + 14 \\ -6z &> -18 \\ \frac{-6z}{-6} &< \frac{-18}{-6} \\ z &< 3 \end{aligned}$$

To graph this inequality, draw an open circle at 3 and draw an arrow extending to the left.

19. $12 < -4(3c - 6)$

SOLUTION:

$$\begin{aligned} 12 &< -4(3c-6) \\ 12 &< -4(3c)+(-4)(-6) \\ 12 &< -12c+24 \\ 12-24 &< -12c+24-24 \\ -12 &< -12c \\ -12c &> -12 \\ \frac{-12c}{-12} &< \frac{-12}{-12} \\ c &< 1 \end{aligned}$$

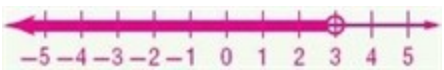
To graph this inequality, draw an open circle at 1 and draw an arrow extending to the left.

21. $\frac{9z+5}{4} + 18 < 26$

SOLUTION:

$$\begin{aligned} \frac{9z+5}{4}+18 &< 26 \\ \frac{9z+5}{4}+18-18 &< 26-18 \\ \frac{9z+5}{4} &< 8 \\ 4\left(\frac{9z+5}{4}\right) &< 4(8) \\ 9z+5 &< 32 \\ 9z+5-5 &< 32-5 \\ 9z &< 27 \\ \frac{9z}{9} &< \frac{27}{9} \\ z &< 3 \end{aligned}$$

To graph this inequality, draw an open circle at 3 and draw an arrow extending to the left.



Define a variable and write an inequality for each problem. Then solve.

23. Twelve less than the product of three and a number is less than 21.

SOLUTION:

Let x be the unknown number.

$$\begin{aligned} 3x-12 &< 21 \\ 3x-12+12 &< 21+12 \\ 3x &< 33 \\ \frac{3x}{3} &< \frac{33}{3} \\ x &< 11 \end{aligned}$$

25. The difference of 5 times a number and 6 is greater than the number.

SOLUTION:

Let x be the unknown number.

$$\begin{aligned} 5x-6 &> x \\ 5x-6+6 &> x+6 \\ 5x &> x+6 \\ 5x-x &> x+6-x \\ 4x &> 6 \\ \frac{4x}{4} &> \frac{6}{4} \\ x &> \frac{6}{4} \\ x &> \frac{3}{2} \\ x &> 1.5 \end{aligned}$$

27. **HIKING** Danielle can hike 3 miles in an hour, but she has to take a one-hour break for lunch and a one-hour break for dinner. If Danielle wants to hike at least 18 miles, solve $3(x-2) \geq 18$ to determine how many hours the hike should take.

SOLUTION:

$$\begin{aligned} 3(x-2) &\geq 18 \\ \frac{3(x-2)}{3} &\geq \frac{18}{3} \\ x-2 &\geq 6 \\ x-2+2 &\geq 6+2 \\ x &\geq 8 \end{aligned}$$

Danielle has to hike for at least 8 hours.