2-2 Solving One-Step Equations

Solve each equation. Check your solution.

1. \( g + 5 = 33 \)

   SOLUTION:
   
   \[
   g + 5 = 33 \quad \text{Original equation}
   \]
   
   \[
   g + 5 - 5 = 33 - 5 \quad \text{Subtract 5 from each side}
   \]
   
   \[
   g = 28 \quad \text{Simplify}
   \]

   Check:
   
   \[
   g + 5 = 33
   \]
   
   \[
   28 + 5 = 33
   \]
   
   \[
   33 = 33
   \]

2. \( 104 = y - 67 \)

   SOLUTION:
   
   \[
   104 = y - 67 \quad \text{Original equation}
   \]
   
   \[
   104 + 67 = y - 67 + 67 \quad \text{Add 67 to each side.}
   \]
   
   \[
   171 = y \quad \text{Simplify}
   \]

   Check:
   
   \[
   104 = y - 67
   \]
   
   \[
   171 = 104 - 67
   \]
   
   \[
   104 = 104
   \]

3. \( \frac{2}{3} + w = 1\frac{1}{2} \)

   SOLUTION:
   
   \[
   \frac{2}{3} + w = 1\frac{1}{2} \quad \text{Original equation}
   \]
   
   \[
   \frac{2}{3} - \frac{2}{3} + w = 1\frac{1}{2} - \frac{2}{3} \quad \text{Subtract \( \frac{2}{3} \) from each side}
   \]
   
   \[
   w = \frac{3}{2} - \frac{2}{3} \quad \text{Rewrite \( 1\frac{1}{2} \) as \( \frac{3}{2} \).}
   \]
   
   \[
   w = \frac{9}{6} - \frac{4}{6} \quad \text{The LCD of 2 and 3 is 6.}
   \]
   
   \[
   w = \frac{5}{6} \quad \text{Subtract \( \frac{4}{6} \) from \( \frac{9}{6} \).}
   \]

   Check:
   
   \[
   \frac{2}{3} + w = 1\frac{1}{2}
   \]
   
   \[
   \frac{2}{3} + \frac{5}{6} = 1\frac{1}{2}
   \]
   
   \[
   \frac{9}{6} = 1\frac{1}{2}
   \]
   
   \[
   \frac{1}{2} = \frac{1}{2}
   \]
2-2 Solving One-Step Equations

4. \(-4 + t = -7\)

**SOLUTION:**

\[
\begin{align*}
-4 + t &= -7 & \text{Original equation} \\
-4 + 4 + t &= -7 + 4 & \text{Add 4 to each side} \\
t &= -3 & \text{Simplify.}
\end{align*}
\]

Check:

\[
\begin{align*}
-4 + y &= -7 \\
-4 + (-3) &= -7 \\
-7 &= -7
\end{align*}
\]

5. \(a + 26 = 35\)

**SOLUTION:**

\[
\begin{align*}
a + 26 &= 35 & \text{Original equation.} \\
a + 26 - 26 &= 35 - 26 & \text{Subtract 26 from each side.} \\
a &= 9 & \text{Simplify.}
\end{align*}
\]

Check:

\[
\begin{align*}
a + 26 &= 35 \\
9 + 26 &= 35 \\
35 &= 35
\end{align*}
\]

6. \(-6 + c = 32\)

**SOLUTION:**

\[
\begin{align*}
-6 + c &= 32 & \text{Original equation} \\
-6 + 6 + c &= 32 + 6 & \text{Add 6 to each side} \\
c &= 38 & \text{Simplify.}
\end{align*}
\]

Check:

\[
\begin{align*}
-6 + c &= 32 \\
-6 + 38 &= 32 \\
32 &= 32
\end{align*}
\]
2-2 Solving One-Step Equations

7. \(1.5 = y - (-5.6)\)

**SOLUTION:**

\[
\begin{align*}
1.5 &= y - (-5.6) & \text{Original equation} \\
1.5 &= y + 5.6 & -( - 5.6) = + 5.6 \\
1.5 - 5.6 &= y + 5.6 - 5.6 & \text{Subtract 5.6} \\
-4.1 &= y & \text{Simplify.}
\end{align*}
\]

Check:

\[
\begin{align*}
1.5 &= y - (-5.6) \\
1.5 &= 4.1 + 5.6 \\
1.5 &= 1.5
\end{align*}
\]

8. \(3 + g = \frac{1}{4}\)

**SOLUTION:**

\[
\begin{align*}
3 + g &= \frac{1}{4} & \text{Original equation} \\
3 - 3 + g &= \frac{1}{4} - 3 & \text{Subtract 3 from each side.} \\
g &= \frac{1}{4} - \frac{12}{4} & \text{Rewrite } 3 \text{ as } \frac{12}{4}. \\
g &= -\frac{11}{4} & \text{Simplify.} \\
g &= -2\frac{3}{4} & \text{Rewrite } -\frac{11}{4} \text{ as } -2\frac{3}{4}.
\end{align*}
\]

Check:

\[
\begin{align*}
3 + g &= \frac{1}{4} \\
3 + \left(-2\frac{3}{4}\right) &= \frac{1}{4} \\
\frac{12}{4} + \frac{11}{4} &= \frac{1}{4} \\
\frac{23}{4} &= \frac{1}{4}
\end{align*}
\]
2-2 Solving One-Step Equations

9. \(x + 4 = \frac{3}{4}\)

**SOLUTION:**

\[
x + 4 = \frac{3}{4} \quad \text{Original equation}
\]

\[
x + 4 - 4 = \frac{3}{4} - 4 \quad \text{Subtract 4 from each side.}
\]

\[
x = \frac{3}{4} - \frac{16}{4} \quad \text{Rewrite 4 as} \frac{16}{4}.
\]

\[
x = -\frac{13}{4} \quad \text{Subtract} \frac{16}{4} \text{from} \frac{3}{4}.
\]

\[
x = -3\frac{1}{4} \quad \text{Rewrite} \frac{13}{4} \text{as} 3\frac{1}{4}.
\]

Check:

\[
x + 4 = \frac{3}{4}
\]

\[
-3\frac{1}{4} + 4 = -\frac{3}{4}
\]

\[
-\frac{13}{4} + \frac{16}{4} = \frac{3}{4}
\]

\[
\frac{3}{4} = \frac{3}{4}
\]

10. \(\frac{t}{7} = -5\)

**SOLUTION:**

\[
\frac{t}{7} = -5 \quad \text{Original equation}
\]

\[
7\left(\frac{t}{7}\right) = 7(-5) \quad \text{Multiply each side by 7.}
\]

\[
t = -35 \quad \text{Simplify.}
\]

Check:

\[
\frac{t}{7} = -5
\]

\[
-35 ?\quad \frac{-35}{7} = -5
\]

\[-5 = -5\]
2-2 Solving One-Step Equations

11. \( \frac{a}{36} = \frac{4}{9} \)

**SOLUTION:**

\[
\frac{a}{36} = \frac{4}{9} \quad \text{Original equation}
\]

\[
36 \left( \frac{a}{36} \right) = 36 \left( \frac{4}{9} \right) \quad \text{Multiply each side by 36}
\]

\[
a = \frac{144}{9} \quad \text{Simplify}
\]

\[
a = 16 \quad \text{Divide 144 by 9.}
\]

Check:

\[
\frac{a}{36} = \frac{4}{9}
\]

\[
16 \div 4
\]

\[
\frac{4}{36} \div 9
\]

\[
\frac{4}{9} \div 9
\]

12. \( \frac{2}{3}n = 10 \)

**SOLUTION:**

\[
\frac{2}{3}n = 10 \quad \text{Original equation}
\]

\[
\frac{2}{3} \left( \frac{2}{3}n \right) = \frac{2}{3} \left( 10 \right) \quad \text{Multiply each side by} \ \frac{3}{2}
\]

\[
n = \frac{30}{2} \quad \text{Simplify.}
\]

\[
n = 15 \quad \text{Divide 30 by 2.}
\]

Check:

\[
\frac{2}{3}n = 10
\]

\[
\frac{2}{3} \left( 15 \right) = 10
\]

\[
10 = 10
\]
13. $\frac{8}{9} = \frac{4}{5}k$

**SOLUTION:**

$\frac{8}{9} = \frac{4}{5}k$  
Original equation.

$\frac{5}{4} \left( \frac{8}{9} \right) = \frac{5}{4} \left( \frac{4}{5}k \right)$  
Multiply each side by $\frac{5}{4}$.

$\frac{10}{9} = k$  
Simplify.

$\frac{10}{9} = k$  
Rewrite $\frac{10}{9}$ as $1\frac{1}{9}$.

Check:

$\frac{8}{9} = \frac{4}{5}k$

$\frac{8}{9} = \frac{4}{5} \left( \frac{10}{9} \right)$

$\frac{8}{9} = \frac{8}{9}$

14. $12 = \frac{x}{-3}$

**SOLUTION:**

$12 = \frac{x}{-3}$  
Original equation

$(-3)(12) = (-3) \left( \frac{x}{-3} \right)$  
Multiply by $-3$.

$-36 = x$  
Simplify.

Check:

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

$12 = -36$

$12 = \frac{-36}{-3}$

$12 = 12$
2-2 Solving One-Step Equations

15. $\displaystyle -\frac{r}{4} = \frac{1}{7}$

**SOLUTION:**

\[
-\frac{r}{4} = \frac{1}{7} \quad \text{Original equation}
\]

\[
(-4)\left(-\frac{r}{4}\right) = (-4)\left(\frac{1}{7}\right) \quad \text{Multiply by } -4.
\]

\[
r = -\frac{4}{7} \quad \text{Simplify.}
\]

**Check:**

\[
-\frac{r}{4} = \frac{1}{7}
\]

\[
4
\]

\[
-\frac{7}{7} \cdot \frac{1}{7}
\]

\[
-\frac{4}{7} \cdot -\frac{1}{7}
\]

\[
-\frac{7}{7} = \frac{1}{7}
\]

\[
\frac{1}{7} = \frac{1}{7}
\]

16. **FUNDRAISING** The television show “Idol Gives Back” raised money for relief organizations. During this show, viewers could call in and vote for their favorite performer. The parent company contributed $5 million for the 50 million votes cast. What did they pay for each vote?

**SOLUTION:**

Let $v$ represent the amount paid for each vote. Then $50,000,000v$ represents the amount paid for 50,000,000 votes. The total contribution was $5,000,000.

\[
50,000,000v = 5,000,000 \quad \text{Original equation}
\]

\[
\frac{50,000,000v}{50,000,000} = \frac{5,000,000}{50,000,000} \quad \text{Divide.}
\]

\[
v = 0.1 \quad \text{Simplify.}
\]

Therefore, the parent company paid $0.10 for each vote.
2-2 Solving One-Step Equations

17. CCSS REASONING Hana decides to buy her cat a bed from an online fund that gives \( \frac{7}{8} \) of her purchase to shelters that care for animals. How much of Hana’s money went to the animal shelter?

**SOLUTION:**

Let \( m \) represent the amount of money that goes to the shelter. Then \( \frac{7}{8} \) of the amount spent goes to the shelter.

\[
m = \frac{7}{8}(26.00) \quad \text{Original equation}
\]

\[
m = 22.75 \quad \text{Simplify.}
\]

Therefore, $22.75 went to the animal shelter.

Solve each equation. Check your solution.

18. \( v - 9 = 14 \)

**SOLUTION:**

\[
v - 9 = 14 \quad \text{Original equation}
\]

\[
v - 9 + 9 = 14 + 9 \quad \text{Add 9 to each side}
\]

\[
v = 23 \quad \text{Simplify.}
\]

Check:

\[
23 - 9 = 14
\]

\[
14 = 14
\]

19. \( 44 = t - 72 \)

**SOLUTION:**

\[
44 = t - 72 \quad \text{Original equation}
\]

\[
44 + 72 = t - 72 + 72 \quad \text{Add 72 to each side}
\]

\[
116 = t \quad \text{Simplify.}
\]

Check:

\[
44 = t - 72
\]

\[
44 = 116 - 72
\]

\[
44 = 44
\]
2-2 Solving One-Step Equations

20. \(-61 = d + (-18)\)

\textbf{SOLUTION:}

\begin{align*}
-61 &= d + (-18) & \text{Original equation} \\
-61 &= d - 18 & \text{Simplify.} \\
-61 + 18 &= d - 18 + 18 & \text{Add 18 to each side} \\
-43 &= d & \text{Simplify.}
\end{align*}

Check:

\begin{align*}
-61 &= d + (-18) \\
-61 &= -43 + (-18) \\
-61 &= -61
\end{align*}

21. \(18 + z = 40\)

\textbf{SOLUTION:}

\begin{align*}
18 + z &= 40 & \text{Original equation} \\
18 - 18 + z &= 40 - 18 & \text{Subtract 18.} \\
z &= 22 & \text{Simplify.}
\end{align*}

Check:

\begin{align*}
18 + z &= 40 \\
18 + 22 &= 40 \\
40 &= 40
\end{align*}

22. \(-4a = 48\)

\textbf{SOLUTION:}

\begin{align*}
-4a &= 48 & \text{Original equation} \\
\frac{-4a}{-4} &= \frac{48}{-4} & \text{Divide each side by } -4. \\
a &= -12 & \text{Simplify.}
\end{align*}

Check:

\begin{align*}
-4a &= 48 \\
-4(-12) &= 48 \\
48 &= 48
\end{align*}
2-2 Solving One-Step Equations

23. \(12t = -132\)

**SOLUTION:**
\[
12t = -132 \quad \text{Original equation.}
\]
\[
\frac{12t}{12} = \frac{-132}{12} \quad \text{Divide each side by 12.}
\]
\[
t = -11 \quad \text{Simplify.}
\]
Check:
\[
12(-11) = -132
\]
\[
-132 = -132
\]

24. \(18 - (-f) = 91\)

**SOLUTION:**
\[
18 - (-f) = 91 \quad \text{Original equation}
\]
\[
18 + f = 91 \quad \text{Simplify.}
\]
\[
18 - 18 + f = 91 - 18 \quad \text{Subtract 18 from each side.}
\]
\[
f = 73 \quad \text{Simplify.}
\]
Check:
\[
18 - (-f) = 91
\]
\[
18 - (-73) = 91
\]
\[
18 + 73 = 91
\]
\[
91 = 91
\]

25. \(-16 - (-t) = -45\)

**SOLUTION:**
\[
-16 - (-t) = -45 \quad \text{Original equation}
\]
\[
-16 + t = -45 \quad \text{Simplify.}
\]
\[
-16 + 16 + t = -45 + 16 \quad \text{Add 16 to each side}
\]
\[
t = -29 \quad \text{Simplify.}
\]
Check:
\[
-16 - (-t) = -45
\]
\[
-16 - (-(-29)) = -45
\]
\[
-16 - 29 = -45
\]
\[
-45 = -45
\]
2-2 Solving One-Step Equations

26. \( \frac{1}{3}v = -5 \)

**SOLUTION:**
\[
\frac{1}{3}v = -5 \quad \text{Original equation.}
\]
\[
\frac{3}{1}\left(\frac{1}{3}v\right) = \frac{3}{1}(-5) \quad \text{Multiply each side by 3.}
\]
\[
v = -15 \quad \text{Simplify.}
\]
Check:
\[
\frac{1}{3}v = -5
\]
\[
\frac{1}{3}(-15) = -5
\]
\[-5 = -5\]

27. \( \frac{u}{8} = -4 \)

**SOLUTION:**
\[
\frac{u}{8} = -4 \quad \text{Original equation.}
\]
\[
8\left(\frac{u}{8}\right) = 8(-4) \quad \text{Multiply each side by 8.}
\]
\[
u = -32 \quad \text{Simplify.}
\]
Check:
\[
\frac{u}{8} = -4
\]
\[
-32 \div 8 = -4
\]
\[-4 = -4\]

28. \( \frac{a}{6} = -9 \)

**SOLUTION:**
\[
\frac{a}{6} = -9 \quad \text{Original equation}
\]
\[
6\left(\frac{a}{6}\right) = 6(-9) \quad \text{Multiply each side by 6.}
\]
\[
a = -54 \quad \text{Simplify}
\]
Check:
\[
\frac{a}{6} = -9
\]
\[
-54 \div 6 = -9
\]
\[-9 = -9\]
2-2 Solving One-Step Equations

29. \( \frac{-k}{5} = \frac{7}{5} \)

**SOLUTION:**

\[
\begin{align*}
\frac{-k}{5} &= \frac{7}{5} \\
5 \left( \frac{-k}{5} \right) &= 5 \left( \frac{7}{5} \right) \\
-k &= 7 \\
\frac{-k}{-1} &= \frac{7}{-1} \\
k &= -7
\end{align*}
\]

Simplify.

Divide each side by \(-1\).

Check:

\[
\begin{align*}
\frac{k}{5} &= \frac{7}{5} \\
\frac{-7}{5} &= \frac{7}{5} \\
\frac{7}{5} &= \frac{7}{5}
\end{align*}
\]

30. \( \frac{3}{4} = w + \frac{2}{5} \)

**SOLUTION:**

\[
\begin{align*}
\frac{3}{4} &= w + \frac{2}{5} \\
\frac{3}{4} - \frac{2}{5} &= w + \frac{2}{5} - \frac{2}{5} \\
\frac{15}{20} - \frac{8}{20} &= w \\
\frac{7}{20} &= w
\end{align*}
\]

Subtract \( \frac{2}{5} \) from each side.

Rewrite \( \frac{3}{4} \) as \( \frac{15}{20} \) and \( \frac{2}{5} \) as \( \frac{8}{20} \).

Simplify.

Check:

\[
\begin{align*}
\frac{3}{4} &= w + \frac{2}{5} \\
\frac{3}{4} &= \frac{7}{20} + \frac{2}{5} \\
\frac{3}{4} &= \frac{15}{20} \\
\frac{3}{4} &= \frac{3}{4}
\end{align*}
\]
2-2 Solving One-Step Equations

31. \(-\frac{1}{2} + a = \frac{5}{8}\)

**SOLUTION:**

\[-\frac{1}{2} + a = \frac{5}{8} \quad \text{Original equation}\]

\[-\frac{1}{2} + \frac{1}{2} + a = \frac{5}{8} + \frac{1}{2} \quad \text{Subtract} \; \frac{1}{2} \text{ from each side.}\]

\[a = \frac{5}{8} + \frac{4}{8} \quad \text{Add.}\]

\[a = \frac{9}{8} \quad \text{Simplify.}\]

\[a = 1\frac{1}{8} \quad \text{Rewrite} \; \frac{9}{8} \text{ as} \; 1\frac{1}{8}\]

Check:

\[-\frac{1}{2} + a = \frac{5}{8}\]

\[-\frac{1}{2} + \frac{9}{8} = \frac{5}{8}\]

\[\frac{4}{8} + \frac{9}{8} = \frac{5}{8}\]

\[\frac{5}{8} = \frac{5}{8}\]

32. \(-t = \frac{1}{15}\)

**SOLUTION:**

\[-\frac{t}{7} = \frac{1}{15} \quad \text{Original equation}\]

\[-7\left(-\frac{t}{7}\right) = -7\left(\frac{1}{15}\right) \quad \text{Multiply each side by} \; -7.\]

\[t = -\frac{7}{15} \quad \text{Simplify.}\]

Check:

\[-\frac{t}{7} = \frac{1}{15}\]

\[-\frac{7}{15} \cdot \frac{1}{15} = \frac{1}{15}\]

\[-\frac{7}{15} \cdot \frac{1}{15} = \frac{7}{15}\]

\[-\frac{1}{15} \cdot \frac{1}{15} = \frac{1}{15}\]
2-2 Solving One-Step Equations

33. \( \frac{-5}{7} = y - 2 \)

**SOLUTION:**

\[
\begin{align*}
\frac{-5}{7} &= y - 2 & \text{Original equation} \\
\frac{-5}{7} + 2 &= y - 2 + 2 & \text{Add 2 to each side.} \\
\frac{-5}{7} + \frac{14}{7} &= y & \text{Rewrite } 2 \text{ as } \frac{14}{7}. \\
\frac{9}{7} &= y & \text{Simplify.} \\
\frac{12}{7} &= y & \text{Rewrite } \frac{9}{7} \text{ as } \frac{12}{7}.
\end{align*}
\]

Check:

\[
\begin{align*}
\frac{-5}{7} &= y - 2 \\
\frac{-5}{7} + \frac{2}{7} &= \frac{-3}{7} - 2 \\
\frac{-5}{7} + \frac{9}{7} &= \frac{4}{7} \\
\frac{-5}{7} &= \frac{5}{7} \\
\frac{6}{7} &= \frac{6}{7}
\end{align*}
\]

34. \( v + 914 = -23 \)

**SOLUTION:**

\[
\begin{align*}
v + 914 &= -23 \\
v + 914 - 914 &= -23 - 914 \\
v &= -937
\end{align*}
\]

Check:

\[
\begin{align*}
v + 914 &= -23 \\
-937 + 914 &= -23 \\
-23 &= -23
\end{align*}
\]

35. \( 447 + x = -261 \)

**SOLUTION:**

\[
\begin{align*}
447 + x &= -261 \\
447 - 447 + x &= -261 - 447 \\
x &= -708
\end{align*}
\]

Check:

\[
\begin{align*}
447 + x &= -261 \\
447 - 708 &= -261 \\
-261 &= -261
\end{align*}
\]
2-2 Solving One-Step Equations

36. \(-\frac{1}{7}c = 21\)

**SOLUTION:**

\(-\frac{1}{7}c = 21\) \hspace{1cm} \text{Original equation}

\((-7)\left(-\frac{1}{7}c\right) = (-7)(21)\) \hspace{1cm} \text{Multiply each side by } -7.

\[ c = -147 \] \hspace{1cm} \text{Simplify.}

Check:

\[-\frac{1}{7}c = 21\]

\[-\frac{1}{7}(-147) = 21\]

\[ 21 = 21 \]

37. \(-\frac{2}{3}g = -22\)

**SOLUTION:**

\(-\frac{2}{3}g = -22\) \hspace{1cm} \text{Original equation}

\((-\frac{3}{2})\left(-\frac{2}{3}g\right) = \left(-\frac{3}{2}\right)(-22)\) \hspace{1cm} \text{Multiply by } -\frac{3}{2}.

\[ g = \frac{66}{2} \] \hspace{1cm} \text{Simplify.}

\[ g = 33 \] \hspace{1cm} \text{Divide } 66 \text{ by } 2.

Check:

\[-\frac{2}{3}g = -22\]

\[-\frac{2}{3}(33) = -22\]

\[ -22 = -22 \]

38. \(\frac{3}{5}q = -15\)

**SOLUTION:**

\(\frac{3}{5}q = -15\) \hspace{1cm} \text{Original equation}

\[ \frac{5}{3}\left(\frac{3}{5}q\right) = \frac{5}{3}(-15) \] \hspace{1cm} \text{Multiply each side by } \frac{5}{3}.

\[ q = -25 \] \hspace{1cm} \text{Simplify.}

Check:

\[ \frac{3}{5}q = -15\]

\[ \frac{3}{5}(-25) = -15 \]

\[ -15 = -15 \]
2-2 Solving One-Step Equations

39. \( \frac{n}{8} = -\frac{1}{4} \)

\textbf{SOLUTION:}
\[
\frac{n}{8} = -\frac{1}{4} \quad \text{Original equation}
\]

\[8\left(\frac{n}{8}\right) = 8\left(-\frac{1}{4}\right) \quad \text{Multiply each side by 8.}
\]

\[n = -2 \quad \text{Simplify.}
\]

Check:
\[
\frac{n}{8} = -\frac{1}{4} \\
-2 \div \frac{1}{4} = -\frac{1}{4} \\
\frac{1}{4} = -\frac{1}{4}
\]

40. \( \frac{c}{4} = \frac{-9}{8} \)

\textbf{SOLUTION:}
\[
\frac{c}{4} = \frac{-9}{8} \quad \text{Original equation}
\]

\[4\left(\frac{c}{4}\right) = 4\left(\frac{-9}{8}\right) \quad \text{Multiply each side by 4.}
\]

\[c = -\frac{9}{2} \quad \text{Simplify.}
\]

\[c = -4\frac{1}{2} \quad \text{Rewrite } -\frac{9}{2} \text{ as } -4\frac{1}{2}.
\]

Check:
\[
\frac{c}{4} = \frac{-9}{8} \\
\frac{-9}{4} \div \frac{1}{8} = \frac{-9}{4} \\
\frac{-9}{4} \div \frac{8}{8} = \frac{-9}{8} \\
\frac{9}{8} = \frac{9}{8}
\]
2-2 Solving One-Step Equations

41. \( \frac{2}{3} + r = \frac{-4}{9} \)

**SOLUTION:**
\[
\begin{align*}
\frac{2}{3} + r &= \frac{-4}{9} \quad \text{Original equation} \\
\frac{2}{3} - \frac{2}{3} + r &= \frac{-4}{9} - \frac{2}{3} \quad \text{Add } \frac{2}{3} \text{ to each side.} \\
r &= \frac{-4}{9} - \frac{6}{9} \quad \text{Rewrite } \frac{2}{3} \text{ as } \frac{6}{9} \\
r &= \frac{-10}{9} \quad \text{Simplify.} \\
r &= \frac{-11}{9} \quad \text{Rewrite } \frac{-10}{9} \text{ as } \frac{-11}{9}
\end{align*}
\]
Check:
\[
\begin{align*}
\frac{2}{3} + r &= \frac{-4}{9} \\
\frac{2}{3} + \frac{-10}{9} &= \frac{-4}{9} \\
\frac{6}{9} + \frac{-10}{9} &= \frac{-4}{9} \\
\frac{-4}{9} &= \frac{-4}{9}
\end{align*}
\]

42. **Cats** A domestic cat can run at speeds of 27.5 miles per hour when chasing prey. A cheetah can run 42.5 miles per hour faster when chasing prey. How fast can the cheetah go?

**SOLUTION:**
Let \( c \) represent the speed of the cheetah. The speed of a cat is 27.5 mph. A cheetah’s speed would be the speed of a cat and the additional speed of 42.5 mph.

\[
c = 27.5 + 42.5 \\
c = 70
\]
The cheetah can run 70 miles per hour.

43. **Cars** The average time \( t \) it takes to manufacture a car in the United States is 24.9 hours. This is 8.1 hours longer than the average time it takes to manufacture a car in Japan. Write and solve an equation to find the average time in Japan.

**SOLUTION:**
Let \( r \) represent the average time to manufacture a car in Japan. The time to manufacturer a car in the U.S. is 8.1 hours plus the time to manufacture a car in Japan.

\[
24.9 = 8.1 + t \quad \text{Original equation} \\
24.9 - 8.1 = 8.1 - 8.1 + t \quad \text{Subtract } 8.1. \\
16.8 = t \quad \text{Simplify.}
\]
The average time to manufacture a car in Japan is 16.8 hours.
2-2 Solving One-Step Equations

Solve each equation. Check your solution.

44. \( \frac{x}{9} = 10 \)

**SOLUTION:**

\[
\frac{x}{9} = 10 \quad \text{Original equation}
\]

\[
9\left(\frac{x}{9}\right) = 9(10) \quad \text{Multiply each side by 9.}
\]

\[
x = 90 \quad \text{Simplify.}
\]

Check:

\[
\frac{x}{9} = 10
\]

\[
\frac{90}{9} = 10
\]

\[10 = 10\]

45. \( \frac{b}{7} = -11 \)

**SOLUTION:**

\[
\frac{b}{7} = -11 \quad \text{Original equation}
\]

\[
7\left(\frac{b}{7}\right) = 7(-11) \quad \text{Multiply each side by 7.}
\]

\[
b = -77 \quad \text{Simplify.}
\]

Check:

\[
\frac{b}{7} = -11
\]

\[
\frac{-77}{7} = -11
\]

\[-11 = -11\]
2-2 Solving One-Step Equations

46. \( \frac{3}{4} = \frac{c}{24} \)

**SOLUTION:**

\[
\frac{3}{4} = \frac{c}{24} \quad \text{Original equation}
\]

\[
24\left(\frac{3}{4}\right) = 24\left(\frac{c}{24}\right) \quad \text{Multiply each side by 24}
\]

\[
18 = c \quad \text{Simplify.}
\]

Check:

\[
\frac{3}{4} = \frac{18}{24} = \frac{3}{4}
\]

47. \( \frac{2}{3} = \frac{1}{8}y \)

**SOLUTION:**

\[
\frac{2}{3} = \frac{1}{8}y \quad \text{Original equation}
\]

\[
8\left(\frac{2}{3}\right) = 8\left(\frac{1}{8}y\right) \quad \text{Multiply each side by 8}
\]

\[
\frac{16}{3} = y \quad \text{Simplify.}
\]

\[
5\frac{1}{3} = y \quad \text{Rewrite} \frac{16}{3} \text{as} \ 5\frac{1}{3}.
\]

Check:

\[
\frac{2}{3} = \frac{1}{8}y
\]

\[
\frac{2 \cdot 16}{3 \cdot 8} = \frac{2}{3}
\]
2-2 Solving One-Step Equations

48. \( \frac{2}{3} n = 14 \)

**SOLUTION:**

\[
\frac{2}{3} n = 14 \quad \text{Original equation}
\]

\[
\frac{3}{2} \left( \frac{2}{3} n \right) = \frac{3}{2} (14) \quad \text{Multiply each side by} \frac{3}{2}
\]

\[
n = 21 \quad \text{Simplify.}
\]

Check:

\[
\frac{2}{3} n = 14
\]

\[
\frac{2}{3} (21) = 14
\]

\[
14 = 14
\]

49. \( \frac{3}{5} g = -6 \)

**SOLUTION:**

\[
\frac{3}{5} g = -6 \quad \text{Original equation}
\]

\[
\frac{5}{3} \left( \frac{3}{5} g \right) = \frac{5}{3} (-6) \quad \text{Multiply each side by} \frac{5}{3}
\]

\[
g = -10 \quad \text{Simplify.}
\]

Check:

\[
\frac{3}{5} g = -6
\]

\[
\frac{3}{5} (-10) = -6
\]

\[-6 = -6\]
50. \( \frac{4}{5} = 3p \)

**SOLUTION:**

\[
\begin{align*}
4\frac{1}{5} &= 3p & \text{Original equation} \\
\frac{41}{5} &= 3p & \text{Divide each side by 3.}
\end{align*}
\]

\[
\begin{align*}
\frac{21}{5} \cdot \frac{1}{3} &= p & \text{Rewrite} \quad \frac{41}{5} \quad \text{as} \quad \frac{21}{5} \cdot \frac{1}{3} \\
\frac{7}{5} &= p & \text{Simplify} \\
\frac{12}{5} &= p & \text{Rewrite} \quad \frac{7}{5} \quad \text{as} \quad \frac{12}{5}.
\end{align*}
\]

Check:

\[
\begin{align*}
4\frac{1}{5} &= 3p \\
4\frac{1}{5} &= 3 \cdot \frac{7}{5} \\
4\frac{1}{5} &= \frac{21}{5} \\
4\frac{1}{5} &= 4\frac{1}{5}
\end{align*}
\]

51. \(-5 = 3\frac{1}{2}x\)

**SOLUTION:**

\[
\begin{align*}
-5 &= 3\frac{1}{2}x & \text{Original equation} \\
-5 &= \frac{7}{2}x & \text{Rewrite} \quad 3\frac{1}{2} \quad \text{as} \quad \frac{7}{2}. \\
\frac{2}{7}(-5) &= \frac{2}{7} \left( \frac{7}{2}x \right) & \text{Multiply each side by} \quad \frac{2}{7}. \\
-\frac{10}{7} &= x & \text{Simplify.} \\
-\frac{3}{7} &= x & \text{Rewrite} \quad \frac{10}{7} \quad \text{as} \quad \frac{3}{7}.
\end{align*}
\]

Check:

\[
\begin{align*}
-5 &= 3\frac{1}{2}x \\
-5 &= 3\frac{1}{2} \left( -\frac{10}{7} \right) \\
-5 &= \frac{7}{2} \left( -\frac{10}{7} \right) \\
-5 &= -5
\end{align*}
\]
52. \(6 = -\frac{1}{2}n\)

**SOLUTION:**

\[
6 = -\frac{1}{2}n \quad \text{Original equation}
\]

\[
-\frac{2}{1}(6) = \left(-\frac{2}{1}\right)\left(-\frac{1}{2}n\right) \quad \text{Multiply by } -2.
\]

\[-12 = n \quad \text{Simplify.}
\]

Check:

\[
6 = -\frac{1}{2}n
\]

\[
6 = -\frac{1}{2}(-12)
\]

\[6 = 6\]

53. \(\frac{-2}{5} = \frac{z}{45}\)

**SOLUTION:**

\[
\frac{-2}{5} = -\frac{z}{45} \quad \text{Original equation}
\]

\[
(-45)\left(-\frac{2}{5}\right) = (-45)\left(-\frac{z}{45}\right) \quad \text{Multiply by } -45.
\]

\[18 = z \quad \text{Simplify.}
\]

Check:

\[
\frac{2}{5} = \frac{z}{45}
\]

\[
\frac{2}{5} = \frac{18}{45}
\]

\[
\frac{2}{5} = \frac{2}{5}\]
2-2 Solving One-Step Equations

54. \(-\frac{g}{24} = \frac{5}{12}\)

**SOLUTION:**
\[-\frac{g}{24} = \frac{5}{12}\] Original equation

\((-24)\left(-\frac{g}{24}\right) = (-24)\left(\frac{5}{12}\right)\) Multiply by \(-24\).

\[g = -10\] Simplify.

Check:
\[-\frac{g}{24} = \frac{5}{12}\]
\[-10 = \frac{5}{12}\]

55. \(-\frac{v}{5} = -45\)

**SOLUTION:**
\[-\frac{v}{5} = -45\] Original equation

\[-5\left(-\frac{v}{5}\right) = -5(-45)\] Multiply by \(-5\).

\[v = 225\] Simplify.

Check:
\[-\frac{v}{5} = -45\]
\[-\frac{225}{5} = -45\]

Write an equation for each sentence. Then solve the equation.

56. Six times a number is 132.

**SOLUTION:**
\[6n = 132\] Original equation

\[\frac{6n}{6} = \frac{132}{6}\] Divide each side by 6.

\[n = 22\] Simplify.
2-2 Solving One-Step Equations

57. Two thirds equals negative eight times a number.

**SOLUTION:**

\[
\frac{2}{3} = -8n \quad \text{Original equation}
\]

\[
\frac{2}{3} = \frac{-8n}{-8} \quad \text{Divide each side by } -8.
\]

\[
\frac{2}{3} \cdot \frac{1}{8} = n \quad \text{Rewrite } \frac{2}{3} \text{ as } \frac{2}{3} \cdot \frac{1}{8}
\]

\[
-\frac{1}{12} = n \quad \text{Simplify.}
\]

58. Five elevenths times a number is 55.

**SOLUTION:**

\[
\frac{5}{11}n = 55 \quad \text{Original equation}
\]

\[
\frac{11}{5} \left( \frac{5}{11}n \right) = \left( \frac{11}{5} \right)55 \quad \text{Multiply each side by } \frac{11}{5}
\]

\[
n = 121 \quad \text{Simplify.}
\]

59. Four fifths is equal to ten sixteenths of a number.

**SOLUTION:**

\[
\frac{4}{5} = \frac{10}{16}n \quad \text{Original equation}
\]

\[
\frac{16}{10} \left( \frac{4}{5} \right) = \frac{16}{10} \left( \frac{10}{16}n \right) \quad \text{Multiply each side by } \frac{16}{10}
\]

\[
\frac{32}{25} = n \quad \text{Simplify}
\]

\[
1\frac{7}{25} = n \quad \text{Rewrite } \frac{32}{25} \text{ as } 1\frac{7}{25}.
\]

60. Three and two thirds times a number equals two ninths.

**SOLUTION:**

\[
3\frac{2}{3}n = \frac{2}{9} \quad \text{Original equation}
\]

\[
\frac{11}{3}n = \frac{2}{9} \quad \text{Rewrite } 3\frac{2}{3} \text{ as } \frac{11}{3}
\]

\[
\frac{3}{11} \left( \frac{11}{3}n \right) = \frac{3}{11} \left( \frac{2}{9} \right) \quad \text{Multiply each side by } \frac{3}{11}
\]

\[
n = \frac{2}{33} \quad \text{Simplify.}
\]
2-2 Solving One-Step Equations

61. Four and four fifths times a number is one and one fifth.

**SOLUTION:**

\[ \frac{4}{5} n = \frac{1}{5} \]  \hspace{1cm} \text{Original equation.}

\[ \frac{24}{5} n = \frac{6}{5} \]  \hspace{1cm} \text{Rewrite } \frac{4}{5} \text{ as } \frac{24}{5}.

\[ \frac{5}{24} \left( \frac{24}{5} n \right) = \frac{5}{24} \left( \frac{6}{5} \right) \]  \hspace{1cm} \text{Multiply each side by } \frac{5}{24}.

\[ n = \frac{1}{4} \]  \hspace{1cm} \text{Simplify.}

62. **CCSS PRECISION** Adelina is comparing prices for two brands of health and energy bars at the local grocery store. She wants to get the best price for each bar.

![Image of Feel Great bars](image)

**SOLUTION:**

a. Write an equation to find the price for each bar of the Feel Great brand.

b. Write an equation to find the price of each bar for the Super Power brand.

c. Which bar should Adelina buy? Explain.

**SOLUTION:**

a. Let \( p \) represent the price per bar. The box costs $18 and contains 12 bars. \( 12p = 18 \)

b. Let \( P \) represent the price per bar. The box costs $21.75 and contains 15 bars. \( 15P = 21.75 \)

c. First, find the price per bar for Feel Great brand.

\[ 12p = 18 \]

\[ \frac{12p}{12} = \frac{18}{12} \]

\[ p = 1.5 \]

The price of a Feel Great bar is $1.50.

Next, find the price per bar for Super Power brand.

\[ 15P = 21.75 \]

\[ \frac{15P}{15} = \frac{21.75}{15} \]

\[ P = 1.45 \]

The price of a Super Power bar is $1.45. Adelina should buy a Super Power bar because it is cheaper.
2-2 Solving One-Step Equations

63. MEDIA The world’s largest passenger plane, the Airbus A380, was first used by Singapore Airlines in 2005. The following description appeared on a news Web site after the plane was introduced. “That airline will see the A380 transporting some 555 passengers, 139 more than a similarly set-up 747.” How many passengers will a similarly set-up 747 transport?

SOLUTION:
Let \( p \) represent the number of passengers on a 747. The number of passengers on a Airbus A360 would be the number passengers on a 747 plus 139.

\[
555 = 139 + p
\]
\[
555 - 139 = 139 - 139 + p
\]
\[
416 = p
\]

The 747 is able to transport 416 passengers.

64. FUEL In 2004, approximately 5 million cars and trucks were classified as flex-fuel, which means they could run on gasoline or ethanol. In 2009, that number increased to about 8 million. How many more cars and trucks were flex-fuel in 2009?

SOLUTION:
Let \( c \) represent the additional number of cars and trucks (in millions) from 2004 to 2009.

\[
5 + c = 8
\]
\[
5 - 5 + c = 8 - 5
\]
\[
c = 3
\]

In 2009, 3 million more cars and trucks were classified as flex-fuel than in 2004.

65. CHEERLEADING At a certain cheerleading competition, the maximum time per team, including the set up, is 3 minutes. The Ridgeview High School squad’s performance time is 2 minutes and thirty four seconds. How much time does the squad have left for their set up?

SOLUTION:
Let \( t \) equal the amount of time left for set up. Then the total time would equal set up time and performance time. Convert the units to seconds. Three minutes is equal to 180 seconds, and 2 minutes and thirty four seconds is equal to 120 + 34 or 154 seconds.

\[
180 = t + 154
\]
\[
180 - 154 = t + 154 - 154
\]
\[
26 = t
\]

There are 26 seconds left for set up.
2-2 Solving One-Step Equations

66. **COMIC BOOKS** An X-Men #1 comic book in mint condition recently sold for $45,000. An Action Comics #63 (Mile High), also in mint condition, sold for $15,000. How much more did the X-Men comic book sell for than the Action Comics book?

**SOLUTION:**
Let \( t \) equal the difference in the price of the comic books. The Action Comics book minus the difference equals the cost of the X-men book.

\[
45,000 = 15,000 + t
\]

\[
45,000 - 15,000 = 15,000 - 15000 + t
\]

\[
30,000 = t
\]

The X-men comic book sold for $30,000 more than the Action Comic book.

67. **MOVIES** A certain movie made $1.6 million in ticket sales. Its sequel made $0.8 million in ticket sales. How much more did the first movie make than the sequel?

**SOLUTION:**
Let \( m \) represent the difference in the amount made by the movies, in millions. Then the sales of the original movie minus the difference equals the sales from the sequel.

\[
1.6 - m = 0.8 \quad \text{Original equation}
\]

\[
1.6 - 1.6 - m = 0.8 - 1.6 \quad \text{Subtract 1.6 from each side.}
\]

\[
- m = - 0.8 \quad \text{Simplify.}
\]

\[
\frac{-m}{-1} = \frac{-0.8}{-1} \quad \text{Divide each side by } -1.
\]

\[
m = 0.8 \quad \text{Simplify.}
\]

Therefore, $0.8 million more was made on the first movie.

68. **CAMERAS** An electronics store sells a certain digital camera for $126. This is \( \frac{2}{3} \) of the price that a photography store charges. What is the cost of the camera at the photography store?

**SOLUTION:**
Let \( c \) represent the cost of the camera at the photography store. Then, the electronic store charges \( \frac{2}{3}c \).

\[
126 = \frac{2}{3}c \quad \text{Original equation}
\]

\[
\frac{3}{2} (126) = \frac{3}{2} \left( \frac{2}{3}c \right) \quad \text{Multiply each side by } \frac{3}{2}.
\]

\[
189 = c \quad \text{Simplify.}
\]

The cost of the camera at the photography store is $189.
2-2 Solving One-Step Equations

69. BLOGS In 2006, 57 million American adults read online blogs. However, 45 million fewer American adults say that they maintain their own blog. How many American adults maintain a blog?

**SOLUTION:**
Let $b$ represent the number of adults who keep a blog, in millions.

\[
57 - 45 = b \\
12 = b
\]

Therefore, 12 million American adults keep a blog.

70. SCIENCE CAREERS According to the Bureau of Labor and Statistics, approximately 140,000,000 people were employed in the United States in 2009.

a. The number of people in production occupations times 20 is the number of working people. Write an equation to represent the number of people employed in production occupations in 2009. Then solve the equation.

b. The number of people in repair occupations is 2,300,000 less than the number of people in production occupations. How many people are in repair occupations?

**SOLUTION:**

a. Let $p$ be the number of people in production occupations. We are told that 20 times this is equal to the total number of working people, which can be represented mathematically as: $20p = 140,000,000$.

\[
20p = 140,000,000 \\
p = \frac{140,000,000}{20} \\
p = 7,000,000
\]

There are 7,000,000 people working in production occupations.

b. Let $n$ be the number of people in repair occupations. We are told that $n$ is 2,300,000 less than the number of people in production occupations, which means that $n + 2,300,000 = p$ or $n + 2,300,000 = 7,000,000$.

\[
n + 2,300,000 = 7,000,000 \\
n = 7,000,000 - 2,300,000 \\
p = 4,700,000
\]

There are 4,700,000 people working in repair occupations.
71. **DANCES** Student Council has a budget of $1000 for the homecoming dance. So far, they have spent $350 dollars for music.

**a.** Write an equation to represent the amount of money left to spend. Then solve the equation.

**b.** They then spent $225 on decorations. Write an equation to represent the amount of money left.

**c.** If the Student Council spent their entire budget, write an equation to represent how many $6 tickets they must sell to make a profit.

**SOLUTION:**

**a.** Let \( m \) represent the amount of money remaining. Then the total amount would be the 350 plus the amount remaining \( m \).

\[
350 + m = 1000
\]

\[
350 - 350 + m = 1000 - 350
\]

\[
m = 650
\]

Student Council has $650 remaining to spend on decorations and food.

**b.** Let \( m \) represent the amount of money. The total amount of money would be the 350 plus 225 and amount remaining \( m \).

\[
350 + 225 + m = 1000
\]

\[
575 + m = 1000
\]

\[
575 - 575 + m = 1000 - 575
\]

\[
m = 425
\]

Student Council now has $425 to spend on food.

**c.** Let \( t \) represent the number of tickets. Then $6 a ticket would equal 1000.

\[
6t = 1000 \quad \text{Original equation}
\]

\[
\frac{6t}{6} = \frac{1000}{6} \quad \text{Divide each side by 6.}
\]

\[
t = 166\frac{2}{3} \quad \text{Simplify.}
\]

\[
t \approx 167 \quad \text{Round to nearest ticket}
\]

Student Council must sell 167 tickets to make a profit.
2-2 Solving One-Step Equations

72. WHICH ONE DOESN’T BELONG? Identify the equation that does not belong with the other three. Explain your reasoning.

\[ n + 14 = 27 \quad 12 + n = 25 \]
\[ n - 16 = 29 \quad n - 4 = 9 \]

**SOLUTION:**

Solve each of the equations.

<table>
<thead>
<tr>
<th>[ n + 14 = 27 ]</th>
<th>[ 12 + n = 25 ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ n + 14 - 14 = 27 - 14 ]</td>
<td>[ 12 - 12 + n = 25 - 12 ]</td>
</tr>
<tr>
<td>[ n = 13 ]</td>
<td>[ n = 13 ]</td>
</tr>
<tr>
<td>[ n - 16 = 29 ]</td>
<td>[ n - 4 = 9 ]</td>
</tr>
<tr>
<td>[ n - 16 + 16 = 29 + 16 ]</td>
<td>[ n - 4 + 4 = 9 + 4 ]</td>
</tr>
<tr>
<td>[ n = 45 ]</td>
<td>[ n = 13 ]</td>
</tr>
</tbody>
</table>

The equation that does not belong is \( n - 16 = 29 \). The solution for the other three equations is \( n = 13 \). However, the solution for \( n - 16 = 29 \) is \( n = 45 \).

73. OPEN ENDED Write an equation involving addition and demonstrate two ways to solve it.

**SOLUTION:**

Sample answer: \( 12 + n = 25 \)

The equation can be solved by either subtracting 12 or adding \(-12\) to both sides of the equation.

Case1:

\[ 12 - 12 + n = 25 - 12 \]
\[ n = 13 \]

Case2:

\[ 12 + (-12) + n = 25 + (-12) \]
\[ n = 13 \]
74. **REASONING** For which triangle is the height not \( \frac{1}{2} \cdot b \), where \( b \) is the length of the base?

<table>
<thead>
<tr>
<th>Triangle</th>
<th>Base (cm)</th>
<th>Height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \triangle ABC )</td>
<td>3.8</td>
<td>17.1</td>
</tr>
<tr>
<td>( \triangle MQP )</td>
<td>5.4</td>
<td>24.3</td>
</tr>
<tr>
<td>( \triangle RST )</td>
<td>6.3</td>
<td>28.5</td>
</tr>
<tr>
<td>( \triangle TRW )</td>
<td>1.6</td>
<td>7.2</td>
</tr>
</tbody>
</table>

**SOLUTION:**

Multiply the base times \( \frac{1}{2} \) or 4.5 and compare that value to the height.

\[
3.8 \cdot 4.5 = 17.1 \\
5.4 \cdot 4.5 = 24.3 \\
6.3 \cdot 4.5 = 28.35 \\
1.6 \cdot 4.5 = 7.2
\]

\( \triangle RST \) does not show this relationship.

75. **CCSS STRUCTURE** Determine whether each sentence is sometimes, always, or never true. Explain your reasoning.

- **a.** \( x + x = x \)
- **b.** \( x + 0 = x \)

**SOLUTION:**

- **a.** \( x + x = x \) is sometimes true. When \( x = 0 \), the statement is true. For any other values, it is false. Example: \( 0 + 0 = 0 \) but \( 2 + 2 \neq 2 \).

- **b.** \( x + 0 = x \) is always true. This is the Additive Identity Property. For any value of \( x \), the statement is always true.
2-2 Solving One-Step Equations

76. REASONING Determine the value for each statement below.
   a. If \( x - 7 = 14 \), what is the value of \( x - 2 \)?
   b. If \( t + 8 = -12 \), what is the value of \( t + 1 \)?

SOLUTION:
   a. 
      \[ x - 7 = 14 \]  \hspace{1cm} \text{Original equation}
      \[ x - 7 + 7 = 14 + 7 \]  \hspace{1cm} \text{Add 7 to each side}
      \[ x = 21 \]  \hspace{1cm} \text{Simplify.}

So, \( x - 2 = 21 - 2 = 19 \).

b. 
   \[ t + 8 = -12 \]  \hspace{1cm} \text{Original equation}
   \[ t + 8 - 8 = -12 - 8 \]  \hspace{1cm} \text{Subtract 8 from each side.}
   \[ t = -20 \]  \hspace{1cm} \text{Simplify.}

So, \( t + 1 = -20 + 1 = -19 \).
2-2 Solving One-Step Equations

77. CHALLENGE Solve each equation for \( x \). Assume that \( a \neq 0 \).

a. \( ax = 12 \)

b. \( x + a = 155 \)

c. \( -5 = x - a \)

d. \( \frac{1}{a}x = 10 \)

**SOLUTION:**

a. \( ax = 12 \)  
   \[ x = \frac{12}{a} \]  
   Divide by \( a \).

b. \( x + a = 15 \)  
   \[ x = 15 - a \]  
   Subtract \( a \).

c. \( -5 = x - a \)  
   \[ -5 + a = x \]  
   Add \( a \).
   \[ x = a - 5 \]  
   Rewrite equation.

d. \( \frac{1}{a}x = 10 \)  
   \[ x = 10a \]  
   Multiply by \( a \).
2-2 Solving One-Step Equations

78. WRITING IN MATH Consider the Multiplication Property of Equality and the Division Property of Equality. Explain why they can be considered the same property. Which one do you think is easier to use?

SOLUTION:
Sample answer: Dividing by a number is the same as multiplying by the reciprocal, so the same rules would apply. In this problem, the number is divided.

\[
5x = 35
\]

\[
\frac{5x}{5} = \frac{35}{5}
\]

\[
x = 7
\]

In this problem, the number is multiplied by the reciprocal.

\[
5x = 35
\]

\[
\frac{1}{5} (5x) = \frac{1}{5} (35)
\]

\[
x = 7
\]

The answers are the same. Check students answers to see which method they think is easier.

79. Which of the following best represents the equation \( w - 15 = 33 \)?
A Jake added \( w \) ounces of water to his bottle, which originally contained 33 ounces of water. How much water did he add?
B Jake added 15 ounces of water to his bottle, for a total of 33 ounces of water. How much water \( w \) was originally in the bottle?
C Jake drank 15 ounces of water from his bottle and 33 ounces were left. How much water \( w \) was originally in the bottle?
D Jake drank 15 ounces of water from his bottle, which originally contained 33 ounces. How much water \( w \) was left?

SOLUTION:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Jake added ( w ) ounces of water to his bottle, which originally contained 33 ounces of water.</td>
<td>( w + 33 )</td>
</tr>
<tr>
<td>B</td>
<td>Jake added 15 ounces of water to his bottle, for a total of 33 ounces.</td>
<td>( w + 15 = 33 )</td>
</tr>
<tr>
<td>C</td>
<td>Jake drank 15 ounces of water from his bottle and 33 ounces were left.</td>
<td>( w - 15 = 33 )</td>
</tr>
<tr>
<td>D</td>
<td>Jake drank 15 ounces of water from his bottle, which originally contained 33 ounces.</td>
<td>( 33 - 15 = w )</td>
</tr>
</tbody>
</table>

Choice C is correct.
2-2 Solving One-Step Equations

80. SHORT RESPONSE Charlie’s company pays him for every mile that he drives on his trip. When he drives 50 miles, he is paid $30. To the nearest tenth, how many miles did he drive if he was paid $275?

SOLUTION:
Let \( m \) represent the price per mile.

\[
30 = 50m
\]
\[
\frac{30}{50} = \frac{50m}{50}
\]
\[
0.6 = m
\]

Now, let \( x \) represent the number miles Charlie drove.

\[
275 = 0.6x
\]
\[
\frac{275}{0.6} = \frac{0.6x}{0.6}
\]
\[
458.3 = x
\]

Therefore, Charlie drove about 458.3 miles.

81. The table shows the results of a survey given to 500 international travelers. Based on the data, which statement is true?

<table>
<thead>
<tr>
<th>Vacation Plans</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Tropics</td>
<td>37</td>
</tr>
<tr>
<td>Europe</td>
<td>19</td>
</tr>
<tr>
<td>Asia</td>
<td>17</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
</tr>
<tr>
<td>No Vacation</td>
<td>10</td>
</tr>
</tbody>
</table>

F Fifty have no vacation plans.
G Fifteen are going to Asia.
H One third are going to the tropics.
J One hundred are going to Europe.

SOLUTION:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Fifty have no vacation plans.</td>
</tr>
<tr>
<td>G</td>
<td>Fifteen are going to Asia.</td>
</tr>
<tr>
<td>H</td>
<td>One third are going to the tropics.</td>
</tr>
<tr>
<td>J</td>
<td>One hundred are going to Europe.</td>
</tr>
</tbody>
</table>

Choice F is correct.
2-2 Solving One-Step Equations

82. GEOMETRY The amount of water needed to fill a pool represents the pool’s _____.
   A volume  
   B surface area  
   C circumference  
   D perimeter  

   SOLUTION:  
   Circumference is the distance around a circle and perimeter is the distance around a figure. Surface area is the area of the surfaces of the pool. Volume represents everything inside the pool.

   To fill a pool means you want its volume. Choice A is correct.

   Translate each sentence into an equation.

83. The sum of twice $r$ and three times $k$ is identical to thirteen.  

   SOLUTION:  
   Rewrite the verbal sentence so it is easier to translate. The sum of twice $r$ and three times $k$ is identical to thirteen is the same as $2$ times $r$ plus $3$ times $k$ equals $13$.

   \[
   \begin{align*}
   \text{2 times } r & \quad \text{plus} \quad 3 \times k \\
   \text{equals} & \quad 13
   \end{align*}
   \]

   The equation is $2r + 3k = 13$.

84. The quotient of $t$ and forty is the same as twelve minus half of $u$.

   SOLUTION:  
   Rewrite the verbal sentence so it is easier to translate. The quotient of $t$ and forty is the same as $12$ minus half of $u$ is the same as $t$ divided by $40$ equals $12$ minus one half times $u$.

   \[
   \begin{align*}
   \text{t divided} & \quad \text{equals} \quad 12 \quad \text{minus} \quad \frac{1}{2} \quad \times \quad \text{u} \\
   \text{by 40} & \quad \frac{t}{40}
   \end{align*}
   \]

   The equation is $\frac{t}{40} = 12 - \frac{1}{2}u$.

85. The square of $m$ minus the cube of $p$ is sixteen.

   SOLUTION:  
   The square of $m$ minus the cube of $p$ is sixteen.

   \[
   \begin{align*}
   \text{of m} & \quad \text{minus} \quad \text{of p} \\
   m^2 & \quad - \quad p^3
   \end{align*}
   \]

   The equation is $m^2 - p^3 = 16$.
86. **TOYS** Identify the function graphed as linear or nonlinear. Then estimate and interpret the intercepts of the graph, any symmetry, where the function is positive, negative, increasing, and decreasing, the x-coordinate of any relative extrema, and the end behavior of the graph.

![Distance from Toy Car](image)

**SOLUTION:**
Since the graph is a straight line the graph is linear.

The graph intersects the y-axis at (0, 30), so the y-intercept is 30, so the distance to the car was 30 centimeters when the measurement started.

The graph intersects the x-axis at (3.75, 0), so the x-intercept is 3.75, so after about 3.75 seconds, the distance to the car was 0. A distance of 0 indicates that the toy car reaches the point of reference for the measurements.

The graph has no line symmetry.

The function lies above the x-axis, or is positive, when \( x \leq 3.75 \). The function lies below the x-axis, or is negative, when \( x \geq 3.75 \).

The function is going down and is therefore decreasing for all values of \( x \).

There are no maximum or minimum points.

The end behavior for the function is described by: As the time increases, the distance will continue to decrease.

87. **COMMUNICATION** Sato communicates with friends for a project. He averages 5 hours using email, 8 hours on the phone, and 2 hours with them in person the first week. If this trend continues, write and evaluate an expression to predict how many hours he will spend communicating with friends over the next 12 weeks.

**SOLUTION:**
\[
12(5 + 8 + 2) = 12(15) = 180
\]
Sato will spend 180 hours communicating with his friends over the next 12 weeks.
2-2 Solving One-Step Equations

88. **PETS** The Poochie Pet Supply Store has the following items on sale. Write and evaluate an expression to find the total cost of purchasing 1 collar, 2 T-shirts, 3 kerchiefs, 1 leash, and 4 flying disks.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>studded collar</td>
<td>4.50</td>
</tr>
<tr>
<td>kerchief</td>
<td>3.00</td>
</tr>
<tr>
<td>doggy T-shirt</td>
<td>6.25</td>
</tr>
<tr>
<td>leash</td>
<td>5.50</td>
</tr>
<tr>
<td>flying disk</td>
<td>3.25</td>
</tr>
</tbody>
</table>

**SOLUTION:**

\[
1(4.50) + 2(6.25) + 3(3.00) + 1(5.50) + 4(3.25)
\]

\[
= 4.50 + 12.50 + 9.00 + 5.50 + 13.00
\]

\[
= 44.50
\]

The total cost is $44.50.