

Example 2

m : morning hours

$$4(m+2) = 12$$

$$4 \cdot m + 4 \cdot 2 = 12$$

$$\boxed{4m} + \textcircled{8} = \textcircled{12}$$
$$\begin{array}{r} -8 \\ \hline 4m = 4 \end{array}$$

$$\frac{4m}{4} = \frac{4}{4} \quad \boxed{m=1}$$

She swam
for 1 hour
each
morning.

- ① Distributive prop
(arrows \rightarrow multiply)
- ② Box + circle
- ③ Subtract 8 from
both sides.
- ④ Divide both sides
by 4.

Date: _____

Exercises 1-5

Solve each equation algebraically, using inverse operations to justify each step.

1. $5x + 4 = 19$

$$\begin{array}{l} \boxed{5x+4} = \boxed{19} \\ -4 \quad -4 \\ \hline 5x = 15 \\ \div 5 \quad \div 5 \\ \hline \boxed{x=3} \end{array}$$

2. $15x + 14 = 19$

$$\begin{array}{l} \boxed{15x+14} = \boxed{19} \\ -14 \quad -14 \\ \hline 15x = 5 \\ \div 15 \quad \div 15 \\ \hline \boxed{x = \frac{1}{3} \text{ or } \frac{1}{3}} \end{array}$$

① Box + circle

② Subtract 4 from both sides

③ Divide both sides by 5.

① Box + circle

② Subtract 14 from both sides

③ Divide both sides by 15

3. Claire's mom found a very good price on a large computer monitor. She paid \$325 for a monitor that was only \$65 more than half the original price. What was the original price?

$$\begin{array}{r} \boxed{\frac{1}{2}x} + \textcircled{65} = \textcircled{325} \\ -65 \quad -65 \\ \hline \frac{1}{2}x = \frac{260}{2} \\ x = 520 \end{array}$$

- ① Box + circle
 - ② Subtract 65 from both sides.
 - ③ Divide both sides by $\frac{1}{2}$.
- The original price was \$520.

4. $2(x + 4) = 18$

$$\begin{array}{r} 2 \cdot x + 2 \cdot 4 = 18 \\ \boxed{2x} + \textcircled{8} = \textcircled{18} \\ -8 \quad -8 \\ \hline 2x = 10 \\ \frac{2x}{2} = \frac{10}{2} \\ x = 5 \end{array}$$

- ① Distributive prop. (multiply)
- ② Box + circle
- ③ Subtract 8 from both sides
- ④ Divide both sides by 2.

5. Ben's family left for vacation after his Dad came home from work on Friday. The entire trip was 600 mi. Dad was very tired after working a long day and decided to stop and spend the night in a hotel after 4 hours of driving. The next morning, Dad drove the remainder of the trip. If the average speed of the car was 60 miles per hour, what was the remaining time left to drive on the second part of the trip? Remember: Distance = rate multiplied by time.

$$D = R \times t$$

or $R \cdot t = D$

$$60(h + 4) = 600$$

$$60 \cdot h + 60 \cdot 4 = 600$$

$$\boxed{60h} + 240 = 600$$

$$- 240 \quad | \quad - 240$$

$$60h = \frac{360}{60}$$

$$\boxed{h = 6}$$

① Distributive prop.

② Box + circle

③ Subtract 240 from both sides

④ Divide both sides by 60.

The remaining time was 6 hours.

Lesson Summary

We work backwards to solve an algebraic equation. For example, to find the value of the variable in the equation $6x - 8 = 40$:

1. Use the Addition Property of Equality to add the opposite of -8 to each side of the equation to arrive at $6x - 8 + 8 = 40 + 8$.
2. Use the Additive Inverse Property to show that $-8 + 8 = 0$ and so $6x + 0 = 48$.
3. Use the Additive Identity Property to arrive at $6x = 48$.
4. Then use the Multiplication Property of Equality to multiply both sides of the equation by $\frac{1}{6}$ to get:
$$\left(\frac{1}{6}\right)6x = \left(\frac{1}{6}\right)48.$$
5. Then use the Multiplicative Inverse Property to show that $\frac{1}{6}(6) = 1$ and so $1x = 8$.
6. Use the Multiplicative Identity Property to arrive at $x = 8$.

Problem Set

For each problem below, explain the steps in finding the value of the variable. Then find the value of the variable, showing each step. Write if then statements to justify each step in solving the equation.

*Show all work.
Use looseleaf.*

1. $7(m + 5) = 21$

$7 \cdot m + 7 \cdot 5 = 21$

$7m + 35 = 21$

$7m = -14$

$m = -2$

2. $-2v + 9 = 25$

$$\begin{array}{r} -9 \quad | \quad -9 \\ \hline -2v = 16 \\ \hline v = -8 \end{array}$$

3. $\frac{1}{3}y - 18 = 2$

$$\begin{array}{r} +18 \quad | \quad +18 \\ \hline \frac{1}{3}y = 20 \\ \hline y = 60 \end{array}$$

$$4. \quad \begin{array}{r} \textcircled{6} + 8p = \textcircled{38} \\ \hline \cancel{6} = \cancel{38} - 6 \\ \phantom{\cancel{6} +} 8p = \phantom{\cancel{38} -} 32 \\ \hline \phantom{\cancel{6} +} \frac{8p}{8} = \frac{32}{8} \\ \phantom{\cancel{6} +} p = 4 \end{array}$$

$$5. \quad \begin{array}{r} \textcircled{15} = \textcircled{5k} - \textcircled{13} \\ +13 +13 \\ \hline 28 = \frac{5k}{5} \\ \hline 5.6 = k \end{array}$$