BELL WORK

Come up with 3 formulas from previous math classes. Then state what each variable represents.

\[ a^2 + b^2 = c^2 \]

\[ V = l \cdot w \cdot h \]

\[ A = lw \]

Practice Answers

Lesson practice pg. 27: 15-21

21. a. \(3x + 6 = 3x + 7\); Subtract 3x from both sides: \(6 = 7\). The statement \(6 = 7\) is false, so the original equation has no solutions.
b. \(3x + 6 = 3x + 6\); Subtract 3x from both sides: \(6 = 6\). The statement \(6 = 6\) is true for any value of the variable, so the original equation has infinitely many solutions.
LESSON 2-4 PRACTICE
Solve each equation. If an equation has no solutions or if an equation has infinitely many solutions, explain how you know.
15. \(3x - x - 5 = 2(x + 2) - 9\)
16. \(7x - 3x + 7 = 3(x - 4) + 20\)
17. \(-2(x - 2) - 4x = 3(x + 1) - 9x\)
18. \(5(x + 2) - 3 = 3x - 8x + 7\)
19. \(4(x + 3) - 4 = 8x + 10 - 4x\)
20. \(3(x + 2) + 4x - 5 = 7(x + 1) - 6\)
21. Construct viable arguments. Justify your response for each of the following.
   a. Write an equation with no solutions that has the expression \(3x + 6\) on the left side of the equal sign. Demonstrate that your equation has no solutions.
   b. Write an equation with infinitely many solutions that has the expression \(3x + 6\) on the left side of the equal sign. Demonstrate that your equation has infinitely many solutions.

Activity 2
Solving literal equations for a variable
Lesson 2-5

Learning Targets:
• Solve literal equations for specified variables.
• Use a formula that has been solved for a specified variable to determine an unknown quantity.

- Whiteboard Problem
A literal equation has more than one variable, and the equation can be solved for a specific variable. Formulas are examples of literal equations. A formula is an equation written using symbols that describes the relationship between different quantities.

A formula describes how two or more quantities are related. Formulas are important in many disciplines: geometry, physics, economics, sports, and medicine are just a few examples of fields in which formulas are widely used. A formula is an example of a literal equation. A literal equation contains more than one variable. Literal equations and formulas can be solved for a specific variable using the same procedures as equations containing one variable.

**Example A**
Solve the equation $4x + b = 12$ for $x$.

\[
4x + b = 12 \quad \text{solve for } x
\]

\[
4x = 12 - b
\]

\[
\frac{4x}{4} = \frac{12 - b}{4}
\]

\[
x = \frac{3 - \frac{b}{4}}{}
\]

**Try These A**
Solve each equation for $x$.

a. $ax + 7 = 3$

\[
ax = -4
\]

\[
x = \frac{-4}{a}
\]

c. $-3x + d = -9$

**Work with Partner.**
Check Your Understanding

1. Is the equation $2x + 4 = 5x - 6$ a literal equation? Explain.
2. Describe the similarities and differences between solving an equation containing one variable and solving a literal equation for a variable.

Discussion groups

Example B

The equation $v = v_0 + at$ gives the velocity in meters per second of an object after $t$ seconds, where $v_0$ is the object's initial velocity in meters per second and $a$ is its acceleration in meters per second squared.

a. Solve the equation for $a$.

b. Determine the acceleration for an object whose velocity after 15 seconds is 25 meters per second and whose initial velocity was 15 meters per second.

\[ a = \frac{v - v_0}{t} \]

\[ t = 15; \ v = 25; \ v_0 = 15 \]

\[ a = \frac{25 - 15}{15} \]

\[ a = \frac{2}{3} \text{ m/s}^2 \]
Work with Partner.

Try These B
The equation \( t = 13p + 108 \) can be used to estimate the cooking time \( t \) in minutes for a stuffed turkey that weighs \( p \) pounds. Solve the equation for \( p \). Then find the weight of a turkey that requires 285 minutes to cook.

\[
\begin{align*}
\text{Solve for } P: & \quad t = 13p + 108 \\
-108 & \quad -108 \\
\frac{t - 108}{13} & = p \\
\frac{285 - 108}{13} & = 13.6116 \\
p & = \frac{177}{13}
\end{align*}
\]

3. Reason abstractly. Solve for the indicated variable in each formula.

<table>
<thead>
<tr>
<th>Name</th>
<th>Formula</th>
<th>Solve for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>( d = rt ), where ( d ) is the distance an object travels, ( r ) is the average rate of speed, and ( t ) is the time traveled</td>
<td>( r )</td>
</tr>
<tr>
<td>Pressure</td>
<td>( p = \frac{F}{A} ), where ( p ) is the pressure on a surface, ( F ) is the force applied, and ( A ) is the area of the surface</td>
<td>( F )</td>
</tr>
<tr>
<td>Kinetic energy</td>
<td>( k = \frac{1}{2}mv^2 ), where ( k ) is the kinetic energy of an object, ( m ) is its mass, and ( v ) is its velocity</td>
<td>( m )</td>
</tr>
<tr>
<td>Gravitational energy</td>
<td>( U = mgh ), where ( U ) is the gravitational energy of an object, ( m ) is its mass, ( g ) is the acceleration due to gravity, and ( h ) is the object's height</td>
<td>( h )</td>
</tr>
<tr>
<td>Boyle's Law</td>
<td>( p_1V_1 = p_2V_2 ), where ( p_1 ) and ( V_1 ) are the initial pressure and volume of a gas and ( p_2 ) and ( V_2 ) are the final pressure and volume of the gas when the temperature is kept constant</td>
<td>( V_2 )</td>
</tr>
</tbody>
</table>

Chunk: draw a line after #3

T-P-S: do work on notes page.
EXIT SLIP

DO NOT need to write the problem only # and answer.

Check Your Understanding

4. Solve the equation \( w + i = \frac{5}{c} \) for \( c \).
5. Why do you think being able to solve a literal equation for a variable would be useful in certain situations?

Homework:
- Lesson 2-5 practice
pg. 30: 6-10