Write an algebraic expression for each verbal expression.
1. six more than a number

**SOLUTION:**
Let \( n \) represent a number. The phrase *more than* suggests addition. So, the verbal expression *six more than a number* can be written as the algebraic expression \( n + 6 \).

2. twelve less than the product of three and a number

**SOLUTION:**
Let \( n \) represent a number. The phrase *less than* suggests subtraction, and the word *product* suggests multiplication. So, the verbal expression *twelve less than the product of three and a number* can be written as the algebraic expression \( 3n - 12 \).

3. four divided by the difference between a number and seven

**SOLUTION:**
Let \( n \) represent a number. The phrase *divided by* suggests division, and the word *difference* suggests subtraction. So, the verbal expression *four divided by the difference between a number and seven* can be written as the algebraic expression \( \frac{4}{n-7} \).

Evaluate each expression.

4. \( 32 + 4 + 2^3 - 3 \)

**SOLUTION:**
\[
32 + 4 + 2^3 - 3 \\
= 32 + 4 + 8 - 3 \quad \text{Evaluate powers} \\
= 8 + 8 - 3 \quad \text{Divide 32 by 4.} \\
= 16 - 3 \quad \text{Add 8 and 8.} \\
= 13 \quad \text{Subtract 3 for 16.}
\]

5. \( \frac{(2+4)^2}{7+3^2} \)

**SOLUTION:**
\[
\frac{(2+4)^2}{7+3^2} = \frac{(8)^2}{7+9} \quad \text{Multiply 2 by 4.} \\
= \frac{(8)^2}{7+9} \quad \text{Evaluate powers} \\
= \frac{64}{7+9} \quad \text{Evaluate powers} \\
= \frac{64}{16} \quad \text{Add 7 and 9.} \\
= 4 \quad \text{Simplify.}
\]
6. **MULTIPLE CHOICE** Find the value of the expression $a^2 + 2ab + b^2$ if $a = 6$ and $b = 4$.

A 68

B 92

C 100

D 121

**SOLUTION:**

\[
a^2 + 2ab + b^2 = (6)^2 + 2(6)(4) + (4)^2
\]

\[
= 36 + 48 + 16
\]

\[
= 100
\]

So, choice C is the correct answer.

**Evaluate each expression. Name the property used in each step.**

7. $13 + (16 - 4^2)$

**SOLUTION:**

\[
13 + (16 - 4^2)
\]

\[
= 13 + (16 - 16) \quad \text{Substitution}
\]

\[
= 13 + 0 \quad \text{Additive Inverse}
\]

\[
= 13 \quad \text{Additive Identity}
\]

8. $\frac{2}{9}[9 ÷ (7 - 5)]$

**SOLUTION:**

\[
\frac{2}{9}[9 ÷ (7 - 5)]
\]

\[
= \frac{2}{9}[9 ÷ 2] \quad \text{Substitution}
\]

\[
= \frac{2}{9} \cdot \frac{9}{2} \quad \text{Substitution}
\]

\[
= 1 \quad \text{Multiplicative Inverse}
\]

9. $37 + 29 + 13 + 21$

**SOLUTION:**

\[
37 + 29 + 13 + 21
\]

\[
= 37 + 13 + 29 + 21 \quad \text{Comm. Prop. (+)}
\]

\[
= (37 + 13) + (29 + 21) \quad \text{Assoc. Prop. (+)}
\]

\[
= 50 + 50 \quad \text{Substitution}
\]

\[
= 100 \quad \text{Substitution}
\]
Rewrite each expression using the Distributive Property. Then simplify.

10. \(4(x + 3)\)

\[\text{SOLUTION:}\]
\[4(x + 3) = 4(x) + 4(3)\]
\[= 4x + 12\]

11. \((5p - 2)(-3)\)

\[\text{SOLUTION:}\]
\[(5p - 2)(-3) = 5p(-3) - 2(-3)\]
\[= -15p + 6\]

12. **MOVIE TICKETS** A company operates three movie theaters. The chart shows the typical number of tickets sold each week at the three locations. Write and evaluate an expression for the total typical number of tickets sold by all three locations in four weeks.

<table>
<thead>
<tr>
<th>Location</th>
<th>Tickets Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>438</td>
</tr>
<tr>
<td>B</td>
<td>374</td>
</tr>
<tr>
<td>C</td>
<td>512</td>
</tr>
</tbody>
</table>

\[\text{SOLUTION:}\]
To find the number of tickets sold in one week by all three locations, find the sum of the tickets sold or \(438 + 374 + 512\). To find the number of tickets sold by all three locations in four weeks, multiply the expression for one week by 4.

\[4(438 + 374 + 512) = 4(1324)\]
\[= 5296\]

So, 5296 tickets are sold by all three locations in 4 weeks.

**Find the solution of each equation if the replacement sets are** \(x: \{1, 3, 5, 7, 9\}\) and \(y: \{2, 4, 6, 8, 10\}\).

13. \(3x - 9 = 12\)

\[\text{SOLUTION:}\]

<table>
<thead>
<tr>
<th>(x)</th>
<th>(3x - 9 = 12)</th>
<th>True or False?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3(1) - 9 = 12</td>
<td>False</td>
</tr>
<tr>
<td>3</td>
<td>3(3) - 9 = 12</td>
<td>False</td>
</tr>
<tr>
<td>5</td>
<td>3(5) - 9 = 12</td>
<td>False</td>
</tr>
<tr>
<td>7</td>
<td>3(7) - 9 = 12</td>
<td>True</td>
</tr>
<tr>
<td>9</td>
<td>3(9) - 9 = 12</td>
<td>False</td>
</tr>
</tbody>
</table>
Practice Test - Chapter 1

14. \( y^2 - 5y - 11 = 13 \)

**SOLUTION:**

<table>
<thead>
<tr>
<th>( y )</th>
<th>( y^2 - 5y - 11 = 13 )</th>
<th>True or False?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>( (2)^2 - 5(2) - 11 = 13 )</td>
<td>False</td>
</tr>
<tr>
<td>4</td>
<td>( (4)^2 - 5(4) - 11 = 13 )</td>
<td>False</td>
</tr>
<tr>
<td>6</td>
<td>( (6)^2 - 5(6) - 11 = 13 )</td>
<td>False</td>
</tr>
<tr>
<td>8</td>
<td>( (8)^2 - 5(8) - 11 = 13 )</td>
<td>True</td>
</tr>
<tr>
<td>10</td>
<td>( (10)^2 - 5(10) - 11 = 13 )</td>
<td>False</td>
</tr>
</tbody>
</table>

15. **CELL PHONES** The ABC Cell Phone Company offers a plan that includes a flat fee of $29 per month plus a $0.12 charge per minute. Write an equation to find \( C \), the total monthly cost for \( m \) minutes. Then solve the equation for \( m = 50 \).

**SOLUTION:**

Write an equation to represent the cost. The cost has two parts; a fixed cost of $29 and variable cost of $0.12 per minute.

\[
C = 29 + 0.12m
\]

\[
C = 29 + 0.12(50)
\]

\[
= 29 + 6
\]

\[
= 35
\]

So, the total monthly cost for 50 minutes is $35.

**Express the relation shown in each table, mapping, or graph as a set of ordered pairs.**

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>-2</td>
</tr>
</tbody>
</table>

16. **SOLUTION:**

To express the relation as a set of ordered pairs, write the \( x \)-coordinates followed by the corresponding \( y \)-coordinates. So, the ordered pairs are \{(-2, 4), (1, 2), (3, 0), (4, -2)\}.
17. **SOLUTION:**
To express the relation as a set of ordered pairs, write the x-coordinates followed by the corresponding y-coordinates. So, the ordered pairs are {(-3, 2), (-3, 4), (-1, 0), (1, -2), (3, 0)}.

18. **MULTIPLE CHOICE** Determine the domain and range for the relation {(2, 5), (1, -3), (0, -1), (3, 3), (-4, -2)}.

   F: D: {2, -1, 0, 3, -4}, R: {5, 3, -1, 3, -2}
   G: D: {5, 3, -1, 3, -2}, R: {2, -1, 0, 3, 4}
   H: D: {0, 1, 2, 3, 4}, R: {-4, -3, -2, -1, 0}
   J: D: {2, -1, 0, 3, -4}, R: {2, -1, 0, 3, 4}

   **SOLUTION:**
The domain is the list of x-values, D: {2, -1, 0, 3, -4}. The range is the list of y-values, R: {5, 3, -1, 3, -2}. So, choice F is the correct answer.

19. Determine whether the relation {(2, 3), (-1, 3), (0, 4), (3, 2), (-2, 3)} is a function.

   **SOLUTION:**
A function is a relationship between input and output. In a function, there is exactly one output for each input. So, this relation is a function.

   If \( f(x) = 5 - 2x \) and \( g(x) = x^2 + 7x \), find each value.

20. **g(3)**

   **SOLUTION:**
\[
g(3) = (3)^2 + 7(3) \quad \text{Replace } x \text{ with } 3.
   \]
\[
= 9 + 7(3) \quad \text{Evaluate Powers.}
   \]
\[
= 9 + 21 \quad \text{Multiply 7 and 3.}
   \]
\[
= 30 \quad \text{Add 9 and 21}
   \]

21. **f(-6y)**

   **SOLUTION:**
\[
f(-6y) = 5 - 2(-6y) \quad \text{Replace } x \text{ with } -6y.
   \]
\[
= 5 + 12y \quad \text{Multiply } -2 \text{ by } (-6y)
   \]
22. 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.

**SOLUTION:**

**Linear or Nonlinear:** The graph is not a line, so the function is nonlinear.

**x- and y-Intercepts:** The x- and y-intercepts are 0. This means that no gadgets have been sold prior to being released.

**Symmetry:** The graph has no line symmetry.

**Positive/Negative:** The function is positive for all values of $x$, so the total number of gadgets sold is always positive.

**Increasing/Decreasing:** The function is increasing for all values of $x$ so the total number of gadgets sold is always increasing.

**Extrema:** There are no relative maximum or relative minimum values.

**End Behavior:** As $x$ increases, $y$ increases. As time increases, the total number of gadgets sold continues to increase, but at a much slower rate than during months 0 to 24.