Unit 4 Linear Relations Practice Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. The cost to rent a piece of equipment is $27, plus $6.27 per hour. Calculate the cost of renting the equipment for 7 h.
   a. $40.27    b. $70.89    c. $1185.03    d. $232.89

2. Determine an equation that relates the number of circles, C, to the figure number, n.
   a. \( C = 2n - 1 \)   \( C = n \times n - 1 \)   \( C = 2n + 1 \)   \( C = n + 1 \)

3. Sean cycles at an average speed of 3 m/s. He travels a distance, \( d \) metres, in \( t \) seconds. Write an equation that relates \( d \) and \( t \).
   a. \( d = t + 3 \)   \( d = 3t \)   \( d = \frac{t}{3} \)   \( t = 3d \)

4. For the equation \( 5x - 2y = 10 \), make a table of values for \( x = -2, 0, 2 \).
   a. & b. & c. & d.
      \[ \begin{array}{c|c|c|c}
        x & -2 & 0 & 2 \\
        y & 0 & -5 & 10 \\
      \end{array} \] & \[ \begin{array}{c|c|c|c}
        x & -2 & 0 & 2 \\
        y & -10 & -5 & 0 \\
      \end{array} \]

5. Which equation describes a horizontal line?
   i) \( x + 7 = 2 \)
   ii) \( y + x = 7 \)
   iii) \( y - x = 0 \)
   iv) \( y + 2 = 7 \)
   a. iii   b. ii   c. iv   d. i
6. Which equation describes the graph?
   i)  \( x + y = 3 \)
   ii) \( x - y = 3 \)
   iii) \( y - x = 3 \)
   iv) \( x + y = -3 \)

   _____  a. iii  b. ii  c. iv  d. i

7. This graph represents a linear relation. Determine the value of \( y \) when \( x = 6 \).

   _____  a. 14  b. 2  c. 8  d. 0
8. This graph represents a linear relation. Determine the value of $x$ when $y = 5$.

![Graph]

- $x = 3$
- $x = 2$
- $x = 5$
- $x = 8$

Short Answer

9. This pattern of unit squares continues. Determine an equation that relates the number of unit squares, $n$, to the figure number, $f$.

![Figures]

10. The pattern in this table continues. Write an equation that relates the term value to the term number.

<table>
<thead>
<tr>
<th>Term Number, $t$</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term Value, $w$</td>
<td>5</td>
<td>8</td>
<td>11</td>
<td>14</td>
<td>17</td>
</tr>
</tbody>
</table>

11. Shirley has $550 in her bank account. She withdraws $55 each week to cover her expenses.
   a) Write an equation that relates the amount of money in her account, $A$ dollars, after $n$ weeks.
   b) Determine the amount of money in Shirley’s account after 7 weeks.
12. This table shows the perimeters and areas of squares with different side lengths.

<table>
<thead>
<tr>
<th>Side Length, ( n ) (cm)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter, ( P ) (cm)</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Area, ( A ) (cm(^2))</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
</tbody>
</table>

a) Write an equation that relates the perimeter, \( P \), to the side length, \( n \).
b) Write an equation that relates the area, \( A \), to the side length, \( n \).
c) Determine the perimeter and the area of a square with side length 16 cm.

13. Match each equation with a graph on the grid below.
   i) \( 2x = 9 \)
   ii) \( 2y = -5 \)
   iii) \( y = 2x \)
Problem

14.  a) Create a table of values for the relation \( y = 0.5x + 2 \), then graph the relation. Use 0, 2, 4, 6, 8, 10 as values of \( x \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Is the relation linear? How do you know?

c) What is the value of \( y \) when \( x = 28 \)?
15. Match each equation with a graph on the grid below. Justify your answer.
   i) \( x = 5 \)
   ii) \( y = 4 \)
   iii) \( x + y = -1 \)
Unit 4 Linear Relations Practice Test
Answer Section

MULTIPLE CHOICE

1. ANS: B  
   PTS: 1  
   DIF: Moderate  
   REF: 4.1 Writing Equations to Describe Patterns  
   TOP: Patterns and Relations (Patterns)  
   KEY: Procedural Knowledge

2. ANS: A  
   PTS: 1  
   DIF: Easy  
   REF: 4.1 Writing Equations to Describe Patterns  
   TOP: Patterns and Relations (Patterns)  
   KEY: Conceptual Understanding

3. ANS: B  
   PTS: 1  
   DIF: Moderate  
   REF: 4.2 Linear Relations  
   TOP: Patterns and Relations (Patterns)  
   KEY: Conceptual Understanding

4. ANS: C  
   PTS: 1  
   DIF: Easy  
   REF: 4.3 Another Form of the Equation for a Linear Relation  
   TOP: Patterns and Relations (Patterns)  
   KEY: Procedural Knowledge

5. ANS: C  
   PTS: 1  
   DIF: Moderate  
   REF: 4.3 Another Form of the Equation for a Linear Relation  
   TOP: Patterns and Relations (Patterns)  
   KEY: Conceptual Understanding

6. ANS: D  
   PTS: 1  
   DIF: Moderate  
   REF: 4.3 Another Form of the Equation for a Linear Relation  
   TOP: Patterns and Relations (Patterns)  
   KEY: Procedural Knowledge

7. ANS: B  
   PTS: 1  
   DIF: Easy  
   REF: 4.5 Using Graphs to Estimate Values  
   TOP: Patterns and Relations (Patterns)  
   KEY: Procedural Knowledge

8. ANS: B  
   PTS: 1  
   DIF: Easy  
   REF: 4.5 Using Graphs to Estimate Values  
   TOP: Patterns and Relations (Patterns)  
   KEY: Procedural Knowledge

SHORT ANSWER

9. ANS:  
   \[ n = 6 + f \]  
   PTS: 1  
   DIF: Moderate  
   REF: 4.1 Writing Equations to Describe Patterns  
   TOP: Patterns and Relations (Patterns)  
   KEY: Conceptual Understanding

10. ANS:  
    \[ w = 3t + 2 \]  
    PTS: 1  
    DIF: Moderate  
    REF: 4.1 Writing Equations to Describe Patterns  
    TOP: Patterns and Relations (Patterns)  
    KEY: Conceptual Understanding
11. ANS:
a) \( A = 550 - 55n \)
b) $\$165

PTS: 1    DIF: Moderate    REF: 4.1 Writing Equations to Describe Patterns
LOC: 9.PR1    TOP: Patterns and Relations (Patterns)
KEY: Conceptual Understanding | Procedural Knowledge

12. ANS:
a) \( P = 4n \)
b) \( A = n^2 \)
c) Perimeter: 64 cm
   Area: 256 cm\(^2\)

PTS: 1    DIF: Moderate    REF: 4.1 Writing Equations to Describe Patterns
LOC: 9.PR1    TOP: Patterns and Relations (Patterns)
KEY: Conceptual Understanding | Procedural Knowledge

13. ANS:
Graph A: \( y = 2x \)
Graph B: \( 2y = -5 \)
Graph C: \( 2x = 9 \)

PTS: 1    DIF: Moderate    REF: 4.4 Matching Equations and Graphs
LOC: 9.PR2    TOP: Patterns and Relations (Patterns)    KEY: Procedural Knowledge
14. **ANS:**
   a)  
<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
   b) The relation is linear because the points on the graph lie on a straight line.  
   c) When $x = 28$, $y = 16$.  
   
   **PTS:** 1  
   **DIF:** Moderate  
   **REF:** 4.2 Linear Relations  
   **LOC:** 9.PR2  
   **TOP:** Patterns and Relations (Patterns)  
   **KEY:** Procedural Knowledge | Communication

15. **ANS:**  
   The graph of $x = 5$ is a vertical line. Graph A is the only vertical line, so the equation must be $x = 5$.  
   The graph of $y = 4$ is a horizontal line. Graph C is the only horizontal line, so the equation must be $y = 4$.  
   The remaining line, $x + y = -1$, has to be Graph B.  
   
   **PTS:** 1  
   **DIF:** Moderate  
   **REF:** 4.4 Matching Equations and Graphs  
   **LOC:** 9.PR2  
   **TOP:** Patterns and Relations (Patterns)  
   **KEY:** Problem-Solving Skills | Communication