Unit 2 Exam Review

Linear Relationships

Part A: Multiple Choice

1. Which of the following is the equation \(4x - 5y + 12 = 0\) in the form \(y = mx + b\)?
   
   a) \(y = \frac{4}{5}x + \frac{12}{5}\)  
   b) \(y = \frac{5}{4}x - 3\)  
   c) \(y = 4x - 7\)  
   d) \(y = 5x + 16\)

2. Consider the relation \(y = -3x + 5\). Which of the following statements about the graph of this relationship is false?
   
   a) The slope is -3  
   b) The y-intercept is 5  
   c) For a rise of 3, the run is -1  
   d) The graph crosses the y-axis at (0,5)

3. Which of the following lines has a slope parallel to \(y = \frac{3}{5}x + 5\)?
   
   a) \(y = \frac{3}{5}x + 1\)  
   b) \(y = -\frac{5}{3}x + 5\)  
   c) \(y = 3x + 5\)  
   d) \(y = \frac{3}{5}x - 4\)

4. Which equation represents a line that has the same y-intercept as \(2x + 3y - 6 = 0\)?
   
   a) \(y = \frac{1}{2}x + 2\)  
   b) \(y = 2x - 2\)  
   c) \(y = -\frac{1}{2}x + 6\)  
   d) \(y = -2x - 6\)

5. Which linear relationship \textbf{does NOT} have an initial value of 50?
   
   a) \(y = 50\)  
   b) \(y = 50 + 8x\)  
   c) \(y = 50x\)  
   d) \(y = 50 - x\)

6. Which one of the following represents a linear relationship?
   
   a) \(y = 2^x\)  
   b) \(y = x^2 - 5\)  
   c) \(x^2 + y^2 - 25 = 0\)  
   d) \(2x + 3y - 5 = 0\)

7. Which of the following equations \textbf{does NOT} represent a linear relationship?
   
   a) \(x = 5\)  
   b) \(y = 10\)  
   c) \(xy = 10\)  
   d) \(5x - y + 10 = 0\)

8. A sports company uses the equation \(C = 8t + 5\) to represent the relationship between the total amount charged to rent a canoe, \(C\), in dollars and the rental time, \(t\), in hours. What is the initial charge to rent a canoe?
   
   a) $0  
   b) $5  
   c) $8  
   d) $13

9. The charges on a monthly water bill are $0.86 per m$^3$ of water used, \(w\), plus a service charge of $4.49. \(C\) represents the total charge in dollars. Which equation represents the relationship between \(C\) and \(w\)?
   
   a) \(C = 4.49x + 0.86w\)  
   b) \(C = 4.49w + 0.86\)  
   c) \(C = 4.49 + 0.86w\)  
   d) \(C = (4.49 + 0.86)w\)

10. Consider the equation \(y = mx + 5\)
    
    If (7, 3) is a point on the line represented by this equation, which of the following is true?
    
    a) The rise is 8 when the run is 7  
    b) The rise is 7 when the run is 8  
    c) The rise is -2 when the run is 7  
    d) The rise is 7 when the run is -2

11. Consider the graph shown. Which relationship is most likely to be represented by this graph? (\(y\) vs. \(x\))
   
   a) height vs. weight  
   b) pay vs. number of hours worked  
   c) gas remaining vs. distance travelled  
   d) volume of water in a bucket vs. its mass
12. A line of best fit is drawn on the scatter plot. Which equation represents the line?

a) \( y = 3x + 6 \)
b) \( y = 3x - 2 \)
c) \( y = -2x + 3 \)
d) \( y = -2x + 6 \)

13. Bruno leaves home and goes for a run along a straight path. He runs to the park, stops for a rest and returns home. Which graph best represents his run?

14. Which of the following represents the graph of the equation \( 2x - 4y = 8 \)?

15. The Line ‘P’ is shown on the graph. Which equation represents Line ‘P’?

a) \( x = 5 \)
b) \( y = 5 \)
c) \( y = x + 5 \)
d) \( x = y + 5 \)
16. Tyler walks along a line leading away from a motion sensor. The graph below shows information about Tyler’s walk.

Which of the following is closest to Tyler’s speed in metres per second as he walks towards the motion sensor?

a) 2.0  
b) 1.3  
c) 0.8  
d) 0.5

17. Last weekend, Jeremy travelled from his home to a friend’s house. The graph shown represents the relation between $D$, the distance from Jeremy’s home, and $t$, the time spent travelling to his friend’s house.

This weekend, Jeremy travels to his friend’s house, but leaves from school. Jeremy’s school is between his house and his friend’s house. This new situation can be represented by a new line.

Compared to the line shown, the new line will:

a) start at a higher point and be steeper
b) start at a higher point and be less steep
c) start at the current point and be steeper
d) start at the current point and be less steep

18. Two Internet service providers are competing. The equation $C = 0.04t + 10$ represents the relationship between the total cost, $C$, charged by the Internet Connections Company, and the time, $t$. It is shown on the graph.

Surf Away wants to ALWAYS be cheaper than Internet Connections. Which of the equations below would represent this situation for them?

a) $C = 15$  
b) $C = 0.02t + 11$  
c) $C = 0.03t + 9$  
d) $C = 0.05t + 8$
19. The graph shows the quadrilateral ABCD
Which of the following statements is \textbf{false}?

a) AD is parallel to BC
b) DC is parallel to AB
c) CB is perpendicular to AB
d) DA is perpendicular to AB

20. Nevenka and Juan scuba dive. The graph below represents the relationship between the distance from the surface, in metres, and time, in minutes, for both divers as they swim down from the surface and then swim back up.

Which statement below is \textbf{true}?

a) Juan swims back up at a rate of 0.5m/min
b) Nevenka swims back up at a rate of 4.5m/min
c) Nevenka swims down faster than she swims back up.
d) Juan swims down and back up at the same rate.
Part B: Open Response Answers
21. Alvin is researching the population of Canada. He finds data for the year 2001 and predictions for every 5 years after that, as shown below.

<table>
<thead>
<tr>
<th>Number of years since 2000, $t$</th>
<th>Population (in millions), $P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31.1</td>
</tr>
<tr>
<td>6</td>
<td>32.2</td>
</tr>
<tr>
<td>11</td>
<td>32.4</td>
</tr>
<tr>
<td>16</td>
<td>34.4</td>
</tr>
<tr>
<td>21</td>
<td>35.4</td>
</tr>
<tr>
<td>26</td>
<td>36.2</td>
</tr>
</tbody>
</table>

![Graph showing population vs. number of years since 2000](image)

a) Plot the data and create a line of best fit for the data (2K&A)

b) Describe the correlation of the data. (2K&A)

c) Create an equation for your line of best fit and use it to make a prediction for the population of Canada in 2036. (4T)
22. The graph shows the cost to print a document at the Graphics Shop.

![Graph showing cost vs. number of pages]

Line A represents the cost of printing the document in colour.
Line B represents the cost to print it with black ink only.

- **a)** Create an equation to represent the costs for printing with coloured ink (2K&A)
- **b)** Create an equation to represent the cost for printing with black ink (2K&A)
  - Define Variables

**c)** For a 500 page document, how much more will it cost to print in colour than with black ink only? (4T)
  - Show Equations
  - Show Calculations
  - Final Statement

23. Serge is choosing a cell phone plan and wants the lowest cost.

Cell-a-Bration charges $12 per month plus $0.05 per minute for cell phone service.
E-Phone charges $28 per month for unlimited minutes.

- **a)** Graph each of the options on the graph provided. Clearly label each. (4K&A)

- **b)** Under which conditions should Serge choose;
  - (i) Cell-a-Bration? (1K&A)
  - (ii) E-Phone? (1K&A)
24. The equation $C = 20n + 35$ represents the relationship between the cost of school volleyball uniforms, $C$, in dollars, and the number of uniforms ordered, $n$.

- The uniform company requires that the school order a minimum of 20 uniforms.
- The school has a maximum of $900 to spend on the uniforms.

What are the possible values for $n$ and $C$? Show your work. (4K&A)

25. A boat is travelling from Point C toward Point D, which is on the shoreline. The shoreline is represented by the line through points A and B.

Is the path from C to D perpendicular to the shoreline?

YES or NO (circle one) (1T)

Explain or show the work you did to determine your response. (3T)