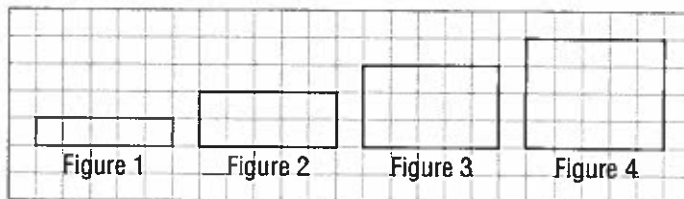


Unit 4 Study Guide

Skill	Description	Example								
Generalize a pattern	Recognize and extend a pattern using a drawing and a table of values. Describe the pattern. Write an equation for the pattern.	<p>Figure 1 Figure 2 Figure 3</p> <table border="1"> <thead> <tr> <th>Figure Number, n</th> <th>Figure Value, v</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2</td> </tr> <tr> <td>2</td> <td>4</td> </tr> <tr> <td>3</td> <td>6</td> </tr> </tbody> </table> <p>As the figure number increases by 1, the figure value increases by 2. The pattern is: multiply the figure number by 2 to get the figure value. An equation is: $v = 2n$</p>	Figure Number, n	Figure Value, v	1	2	2	4	3	6
Figure Number, n	Figure Value, v									
1	2									
2	4									
3	6									
Linear relations	The points on the graph of a linear relation lie on a straight line. To graph a linear relation, create a table of values first. In a linear relation, a constant change in x produces a constant change in y .	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>0</td> </tr> <tr> <td>-1</td> <td>1</td> </tr> <tr> <td>0</td> <td>2</td> </tr> </tbody> </table> <p>As x increases by 1, y increases by 1.</p>	x	y	-2	0	-1	1	0	2
x	y									
-2	0									
-1	1									
0	2									
Horizontal and vertical lines	A vertical line has equation $x = a$ A horizontal line has equation $y = b$	<p>The graph of $x = 2$ is a vertical line. Every point on the line has x-coordinate 2. The graph of $y = -1$ is a horizontal line. Every point on the line has y-coordinate -1.</p>								
Interpolation and extrapolation	When we estimate values between 2 given points on a graph, we use interpolation. When we estimate values beyond given points on a graph, we use extrapolation.	<p>When $y = 3$, $x = 1$ Extend the graph to find that, when $x = 3$, $y = 5$</p>								

Practice Test

1. Here is a pattern made from square tiles.



- Make a table that shows how the number of square tiles, s , in a figure relates to the figure number, f .
 - Write an expression for the number of square tiles in terms of f .
 - Write an equation that relates s and f .
Verify the equation by substituting the values from the table.
 - How are the expression and equation alike? How are they different?
 - Which figure has 225 tiles? Explain how you know.
2. a) Make a table of values for this equation: $y = -2x + 7$
 b) Graph the relation.
 c) Explain how the patterns in the graph match those in the table.

3. Does each equation describe a vertical, a horizontal, or an oblique line? How do you know?

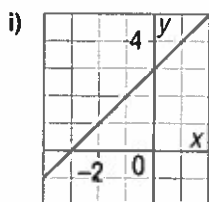
a) $x = 6$

b) $2y - 7 = 3$

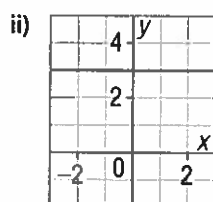
c) $2x + 9 = 0$

4. Match each equation with its graph below. Explain your strategy.

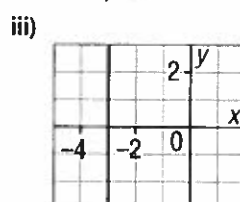
a) $y = x + 3$



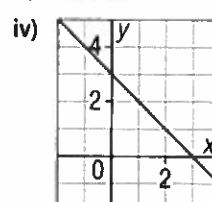
b) $y = 3$



c) $x + y = 3$



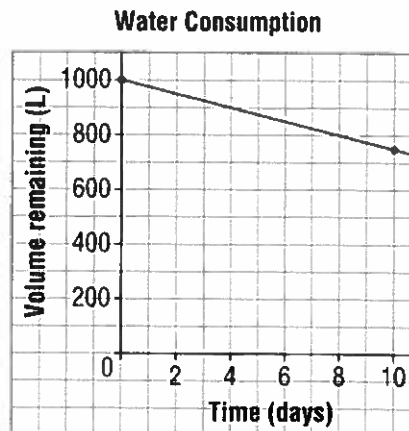
d) $x = -3$



5. A family uses a cistern for drinking water at its cabin.

The graph shows how the volume of drinking water in the cistern changes during a 10-day period. Suppose the pattern in the water usage continues.

- How many days did it take to use 200 L of water?
- Estimate the volume of water in the cistern after 22 days.
- Estimate how much water is used in the first 14 days.
- What assumptions did you make?



Ch.4 Exam: Linear Relations

Calculator Allowed

		1 A B C D 2 A B C C		
MUL 3 A B C D 4 A B C D 5 A B C D 6 A B C D 7 A B C C 8 A B C D 9 A B C D 10 A B C D	CHOICE	NUMERICAL RESPONSE		
		1	2	3
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1.

Nathan completed a 5 km run on his first day of training for a cross-country race. He increased the length of his next training runs by 1.5 km each time.

Which of the following equations could be used to determine the distance (d) that Nathan ran on each training run (r)?

- A. $d = 1.5r$
- B. $d = 5r$
- C. $d = 1.5 + 3.5r$
- D. $d = 3.5 + 1.5r$

2.

The relationship between two variables is given in the equation $35 + 15n = A$.

Which of the following situations could be represented using the equation above?

- A. The price of a caterer for a party is \$35 for each dinner ordered and \$15 for each dessert ordered.
- B. The bill for framing a painting is \$35 for each square metre of glass required and \$15 for the wooden frame.
- C. The fee for a computer consultant is \$15 for an administration charge and \$35 for each hour worked.
- D. The cost of silk screening a design on T-shirts is \$15 for each shirt created and a \$35 design fee.

3.

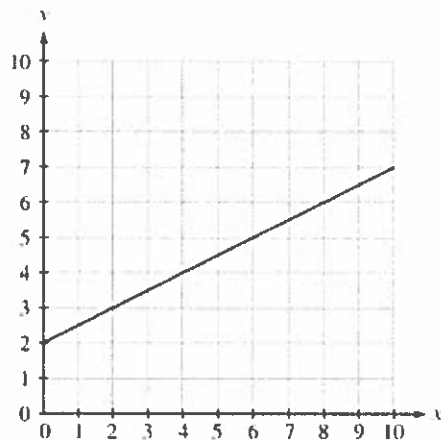
Connie buys a horse for \$750 (including GST). She considers the two payment plans shown below.

Plan 1	Pay \$150 now and \$25 each month
Plan 2	Pay \$200 now and \$55 each month

How many fewer monthly payments could Connie make if she selects Plan 2?

- A. 10
- B. 14
- C. 20
- D. 24

4.



100 The line created by the relation $y = 5 - x$ will intersect the line shown on the graph above at

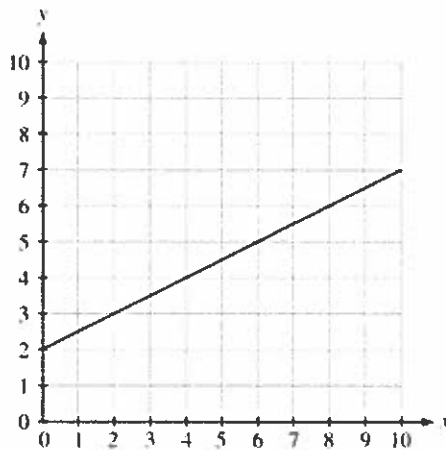
- A. (0, 5)
- B. (5, 0)
- C. (2, 3)
- D. (3, 2)

5.

Emily's cellphone plan charges her \$0.05 per text message, \$0.06 per minute of voice usage and a \$5.00 base fee each month.

- 100 What is Emily's cellphone bill if she sent 33 text messages and talked for 47 minutes in one month?
- A. \$5.11
 - B. \$6.65
 - C. \$7.82
 - D. \$9.47

6.



☐ The equation representing the linear relation on the graph shown above is

- A. $y = 0.5x + 2$
- B. $y = 0.5x - 2$
- C. $y = 2x + 4$
- D. $y = 2x - 4$

7.

Catherine sells cupcakes, c , for \$1.50 each. The ingredients for each cupcake cost her \$0.30, and the sum of all of her other expenses is \$20.00/month.

☐ Which of the following expressions represents Catherine's profit each month?

- A. $1.5c - (20 + 0.3c)$
- B. $20c - (1.5 + 0.3c)$
- C. $(20 + 0.3c) - 1.5c$
- D. $(1.5 + 0.3c) - 20c$

8.

Jennifer's goal is to save \$1 200. Each week she saves 20% of her weekly income of \$576.

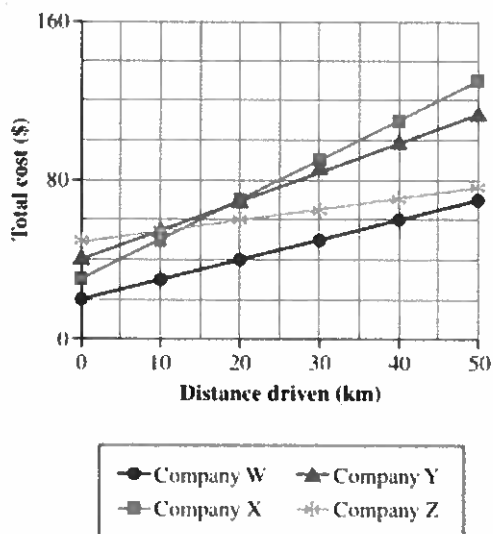
☐ How many weeks will it take Jennifer to reach her goal?

- A. 10
- B. 11
- C. 24
- D. 29

9.

The cost of renting a car includes the base fee and a charge for each kilometre driven. The graph below represents the total cost of renting a vehicle at four different rental car companies.

Cost of a Rental Car



Which rental car company has the smallest charge for each kilometre driven?

- A. Company W
- B. Company X
- C. Company Y
- D. Company Z

10.

Alice works 8 hours a day as a waitress in a restaurant. She earns \$12.50 an hour plus money received from tips, t .

Which of the following equations represents Alice's total earnings, E , for one day of work?

- A. $E = 8(12.50) + t$
- B. $E = 8(12.50 + t)$
- C. $E = 8t + 12.50$
- D. $E = 8 + 12.50t$

Members of a recreation centre pay a one-time registration fee in addition to a fixed monthly fee of \$15. The following table shows the total amount paid to be a member of the centre for a certain number of months.

Number of Months	Total Amount Paid
4	\$135
6	\$165
12	\$255

Numerical Response

According to the information above, what is the cost of the one-time registration fee?

Answer: _____ dollars

(Record your answer in the numerical-response section on the answer sheet.)

2.

Patricia wants to buy a new pair of ice skates that cost \$250 including GST. She already has \$86 she plans to use towards this purchase. She earns \$10.25/hour at her part-time job.

Numerical Response

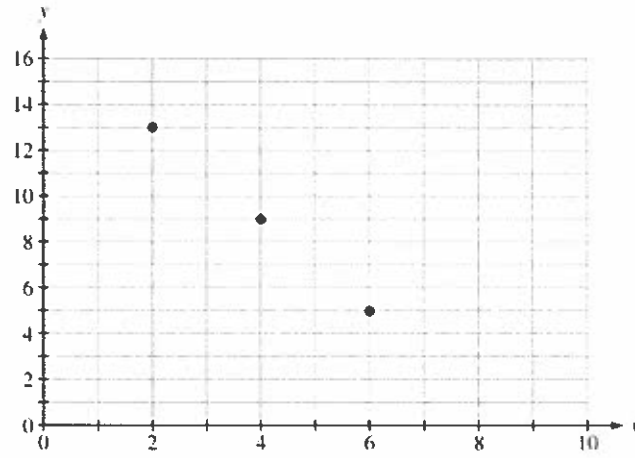
What is the minimum number of hours that she must work to save enough money to purchase the pair of ice skates?

Answer: _____ hours

(Record your answer in the numerical-response section on the answer sheet.)

3.

The following graph represents a linear relation.



Numerical Response

Based on the linear relation shown above, when the y-coordinate is 3, the x-coordinate is _____.

(Record your answer in the numerical-response section on the answer sheet.)