

Course: MFM2P Gr. 10 Applied

Lesson: 20

Unit: Linear Relations

Topic: Unit Review

✚ *homework check:* FM10 p. 133 # 1, 2, 5, 6, 7

✚ *note:* Unit Review

p. 146 #1 - 3a, 4, 7 - 11

p. 148 #1 - 4, 6 - 9

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Chapter 3 Review

Review of Key Terms

In your own words, define each of the Key Terms from this chapter.

1. a) rate of change b) slope
c) linear relation d) y-intercept
e) rise f) run
g) coefficient

Check your definitions with those provided in the chapter.

3.1 Slope as a Rate of Change,

pages 100 to 110

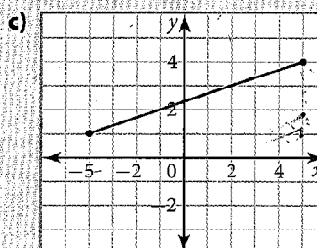
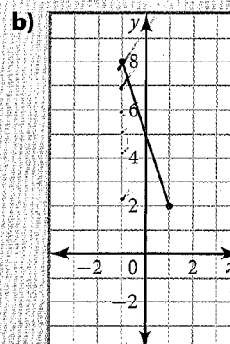
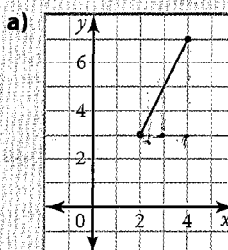
2. a) Copy and complete the table of values to find the rate of change.

x	y	Rate of Change
0	-2	
1	1	
2	4	
3	7	
4	10	
5	13	

- b) What is the relationship between the rate of change and the slope?
 - c) What is the slope?
 - d) What is the y-intercept?
 - e) Write the equation of the line that models this linear relation.
3. A downtown parking meter allows 15 min of parking time for \$0.25.
 - a) Create a table of values, in increments of 15 min, for the cost of parking up to 2 h.
 - b) Use a graphing calculator to create a scatter plot.

- c) Explain why this relationship can be modelled with a linear equation.

4. Use $m = \frac{\text{rise}}{\text{run}}$ to calculate the slope of each line segment.



3.2 Investigate Slope and y-Intercept Using Technology, pages 111 to 117

5. Use a graphing calculator. Press $\boxed{2\text{nd}} \boxed{[TBLSET]}$. Set the table to start at 0 and go up in increments of 1. Use G-T mode and standard window settings. Graph the following linear relations. Sketch the calculator display in your notes.

- a) $y = 3x - 5$
- b) $y = -x + 2$
- c) $y = -0.25x + 7$
- d) $y = \frac{3}{4}x - \frac{3}{2}$

3.3 Properties of Slopes of Lines, pages 118 to 127

6. Refer to your graphs from question 5.
- Which lines have a positive slope?
 - Which lines have a negative slope?
 - What is the y -intercept of each line?
 - Write an equation of a line that is parallel to each of the lines.
 - Write an equation of a line that is perpendicular to each of the lines.
 - List the equations in order from most steep to least steep.
7. Each table of values represents a linear relation. State whether the lines in each pair are parallel. Explain your answer.

a)

x	0	1	2	3	4
y	0	3	6	9	12

x	0	1	2	3	4
y	-12	-9	-6	-3	0

b)

x	0	1	2	3	4
y	10	7	4	1	-2

x	-1	-0.5	0	0.5	1
y	-10	-8.5	-7	-5.5	-4

3.4 Determine the Equation of a Line, pages 128 to 137

8. Determine the equation for each line in question 7.
9. Determine the equation of each line.
- slope is 4, y -intercept is -3
 - slope is -2.7 , y -intercept is 6.3
 - slope is 0, y -intercept is 2.5
 - slope is 2.5 , y -intercept is 0

10. Determine the equation of each line.

- slope is 2 and passes through $(3, 8)$
- slope is -3 and passes through $(2, 5)$
- slope is -2.5 , passing through the origin
- slope is $\frac{3}{4}$, passing through $(2, 2)$
- slope is -1.4 , passing through $(-7, 7.5)$

11. Determine the equation of each line.

- passing through $(-3, 6)$ and $(9, 0)$
- passing through $(1, -1)$ and $(5, 5)$
- passing through $(2, 500)$ and $(10, 500)$
- passing through $(-4.5, 8)$ and $(2.5, -6)$

3.5 Graph Linear Relations by Hand, pages 138 to 145

12. A \$200 bond earns simple interest at a rate of 3% per year for 5 years.
- How much interest does the bond earn each year? (Hint: Interest per year = amount invested multiplied by the interest rate expressed as a decimal.)
 - Create a table of values for the value of the bond at the end of each of the 5 years.
 - Graph the data from the table in part b).
 - Write the equation that models the value of the bond.
13. On the same set of axes, graph the pair of lines in question 7a).

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Chapter 3 Practice Test

1. State the slope, m , and the y -intercept, b , for each linear relation.

a) $y = 2x + 5$

b) $y = -\frac{1}{2}x + 3$

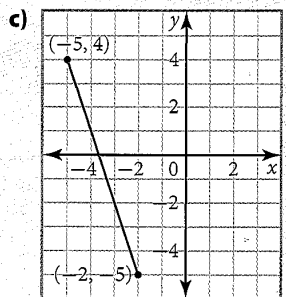
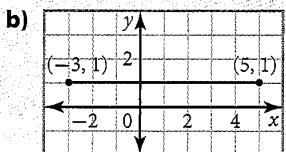
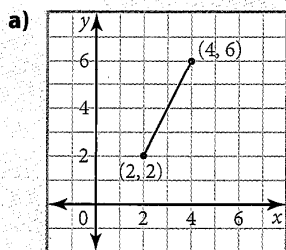
c) $y = x - 7$

d) $y = -3x - 2.5$

e) $y = 32 + 1.8x$

f) $y = 6$

2. Use $m = \frac{\text{rise}}{\text{run}}$ to determine the slope of each line segment.



3. Determine the equation of each line.

a) $m = 3, b = 1$

b) slope is -2 , y -intercept is 4

c) a horizontal line passing through $(0, -9)$

4. On grid paper, graph each linear relation.

a) $y = 2x - 1$

b) $y = -3x + 5$

c) $y = 3$

5. Surfing lessons cost \$40 per half hour with a maximum lesson time of 2 h. There is a \$5 surfboard rental fee for each lesson, regardless of the length of the lesson.

a) Create a table of values comparing the total cost to the length of the lesson.

b) Use a graphing calculator to create a scatter plot of the data from the table in part a).

c) Write an equation relating C , the cost in dollars of a surfing lesson, to t , the length of the lesson in hours. Enter this equation into Y1, then press **GRAPH**.

d) While on vacation, Jesse had half-hour lessons on Monday and Tuesday, an hour-long lesson on Wednesday, and 90-min lessons on Thursday and Friday. How much were the surfing lessons?

6. Determine the equation of each line.

a) $m = 2$, passing through $(-3, -5)$

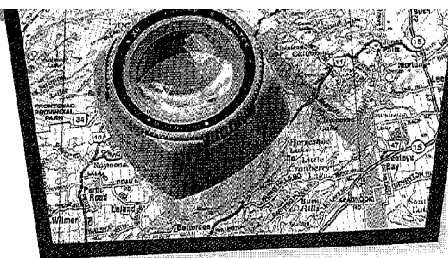
b) passing through $(-6, 3)$ and $(4, 1)$

c) a horizontal line passing through $(2, 5)$

Chapter Problem Wrap-Up

Jim has used linear relations to calculate earnings, costs, distances, and the steepness of a hill. Now, he will use linear relations to interpret a map.

Jim is travelling a new route today. He checks the map to plan his route and determine where he will stop for meals. The scale on the map is 1 cm represents 5 km.



- a) Is the relationship between the distance on the map and the actual distance linear? Explain.
- b) Write an equation to model the relationship between the distance on the map and the actual distance. Let x represent the distance on the map and y represent the actual distance.
- c) Graph the relation.
- d) Interpret the meaning of the slope and the y -intercept in this situation.

7. Determine the equation of each line.

- a) $m = -\frac{3}{4}$, passing through (8, 8)
- b) passing through (-4, 3) and (6, 5)

8. A salesperson earns \$200 per week plus 5% of total sales for sales up to \$10 000. Let x represent total sales in dollars and y represent weekly earnings.

- a) Write an equation to represent this relation.
- b) What is the y -intercept? What does this value represent?
- c) What is the slope of this relation? What does it represent in this scenario?
- d) How much has to be sold to ensure an income of at least \$550 per week?

9. While driving to Barrie, one of the tires on Moh's car picked up a nail. When he left his home, his tire was inflated to 240 kPa (kilopascals). The nail caused air to leak out of the tire at a rate of 0.8 kPa per minute.

- a) Write an equation that models P , tire pressure, related to t , the time in minutes since the nail entered the tire.
- b) Use a graphing calculator to display the graph and the table of values for the equation from part a). Adjust the window settings to view a graph for 2 hours from the time of picking up the nail. Sketch the calculator display.
- c) What will the tire pressure be 1 hour after picking up the nail?
- d) If the air continues to leak at the same rate, how long would it take for the tire to become completely flat, that is, have no air left in it?