Chapter 3 Test – Linear Functions

Grade	8	Chapter	3	Lessons	3-1 to 3-6	Coursebook Pages	150-211

Student Name			Class		Date	

Multiple Choice: CALCULATOR <u>NOT</u> ALLOWED

1	Determine whether $y = -\frac{2}{3}x - \frac{5}{6}$ is a linear equation. If so, write the equation in standard form.
	A Yes; standard form for this linear equation is $2x + 18y = -5$.
	B Yes; standard form for this linear equation is $4x + 6y = -5$.
	C Yes; this linear equation is already in standard form.
	D No; this is not a linear equation.

2	If the line with equation $\frac{2}{5}x - \frac{1}{3}y = 2$ is graphed in an xy-plane, what is the x-intercept of the line?
	A -6
	B -2
	C 1
	D 5

3	Which equation corresponds to the table of values below?

x	1	2	3	4
y	-2	1	4	7

A	$y = x - 3$
B	$y = 2x - 4$
C	$y = 3x - 5$
D	$y = 4x - 6$

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4	An emperor penguin travels a distance of 70 miles each year back to the place of its birth. If that same penguin moves at a speed of 2.4 miles per hour, the function $d = 70 - 2.4t$ represents its distance d from its birthplace t hours after it has started its journey home. When will the penguin return home? Round to the nearest tenth if necessary.	
	A	0 miles
	B	29.2 hours
	C	67.6 hours
	D	70 miles

5	Describe the difference between positive and negative slopes?	
	A	For a positive slope, the function values are constant over the entire range. For a negative slope, the function values are constant over the entire domain.
	B	For a positive slope, the function values are constant over the entire domain. For a negative slope, the function values are constant over the entire range.
	C	For a positive slope, the function values increase over the entire domain. For a negative slope, the function values decrease over the entire domain.
	D	For a positive slope, the function values decrease over the entire domain. For a negative slope, the function values increase over the entire domain.

6	A line passes through (-1, 3) and (p, 7) and has a slope of $-\frac{4}{3}$. Find the value of p.	
	A	$p = -10$
	B	$p = -4$
	C	$p = -3$
	D	$p = -2$

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7	To graph a ____(1)____ variation described by an equation in the form $y = kx$, start at the ___(2)___ and use the slope ___(3)___ to reach the next point. Then draw a line through the points.	
	A	(1) direct (2) origin (3) k
	B	(1) direct (2) x-axis (3) proportionality
	C	(1) constant (2) origin (3) k
	D	(1) constant (2) y-axis (3) proportionality

8	Suppose y varies directly as x, and $y = 26$ when $x = 8$. Find x when $y = 65$.	
	A	$x = 3.25$
	B	$x = 20$
	C	$x = 47$
	D	$x = 211.25$

9	A train is heading to a new city. The arithmetic sequence 125, 150, 175, … represents the number of passengers in the first, second, and third carriages, etc. Using $f(n) = (n-1)d + a_1$, write a function to represent the sequence.	
	A	$f(n) = 125n + 175$
	B	$f(n) = 125n + 25$
	C	$f(n) = 25n + 125$
	D	$f(n) = 25n + 100$

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		A relationship is ___(1)___ if its equation is of the form ___(2)___, $k \neq 0$. The graph passes through the ___(3)___.
10	**A**	(1) non-proportional (2) $y = mx + b$ (3) x-intercept
	B	(1) proportional (2) $y = mx + b$ (3) origin
	C	(1) non-proportional (2) $y = kx$ (3) x-intercept
	D	(1) proportional (2) $y = kx$ (3) origin

|		Amna chooses a book from the library. The graph below shows the number of pages she reads each day.
11		
		Which of the following equations describes this relationship?
	A	$y = 60x$
	B	$y = 30x$
	C	$y = x + 60$
	D	$y = x + 30$

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Constructed Response: *CALCULATOR ALLOWED*

Two students solve $-4x + 6 = -2x + 12$ by graphing the related function. Is either student correct? Explain your reasoning.

Student 1

$-4x + 6 = -2x + 12$

$\qquad 6 = 2x + 12$

$\qquad 0 = 2x + 12 + 6$

$\qquad y = 2x + 18$

The x-intercept is -9,
making the solution $x = -9$.
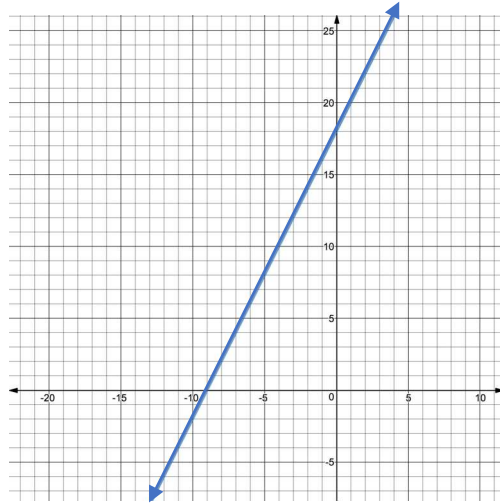
Student 2

$-4x + 6 = -2x + 12$

$\qquad 6 = 2x + 12$

$\qquad 0 = 2x + 6$

$\qquad y = 2x + 6$

The x-intercept is -3,
making the solution $x = -3$.
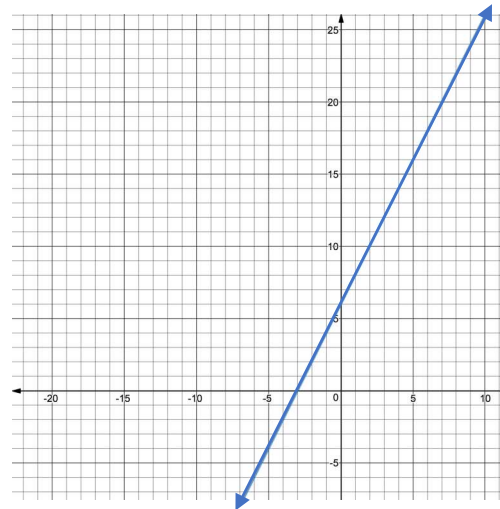
12

_____

_____

_____

_____ (/2 marks)

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a) What is the slope of a horizontal line? _____ (/1 mark)

b) Explain the type of function a horizontal line represents.

_____

_____ (/1 mark)

14

x	-9	-3	3	9
y	-10	-6	-2	2

Use the table above to complete the following:

a) Determine the constant rate of change.

_____

_____

_____

_____ (/1 mark)

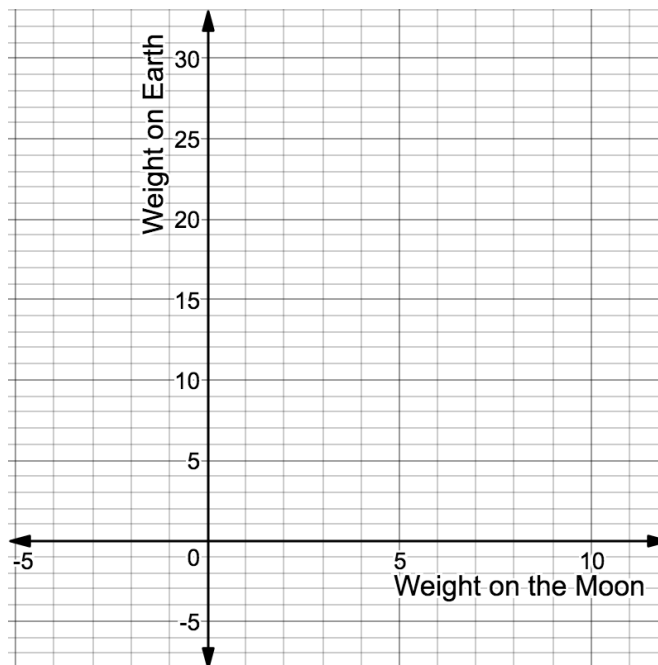b) What type of function is this? _____ (/1 mark)

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The weight of an object on Earth varies directly as the weight of the same object on the moon.
A 300-pound object on Earth would weigh 48 pounds on the moon.

a) Write a direct variation equation for the weight on Earth as it relates
to the weight on the moon.

_____

_____

_____ (/1 mark)

b) Graph the equation. (/1 mark)

How much would a 65-pound object weigh on the moon?

_____

_____

_____ (/1 mark)

15

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$$-12, -5, 2, 9, ...$$

Use the sequence above to complete the following:

a) Is the sequence an arithmetic sequence? _____ (/1 mark)

b) If it is an arithmetic sequence, find the common difference.
If not, explain why it is not an arithmetic sequence.

16

_____

_____ (/1 mark)

c) Find the 15th term in the sequence.
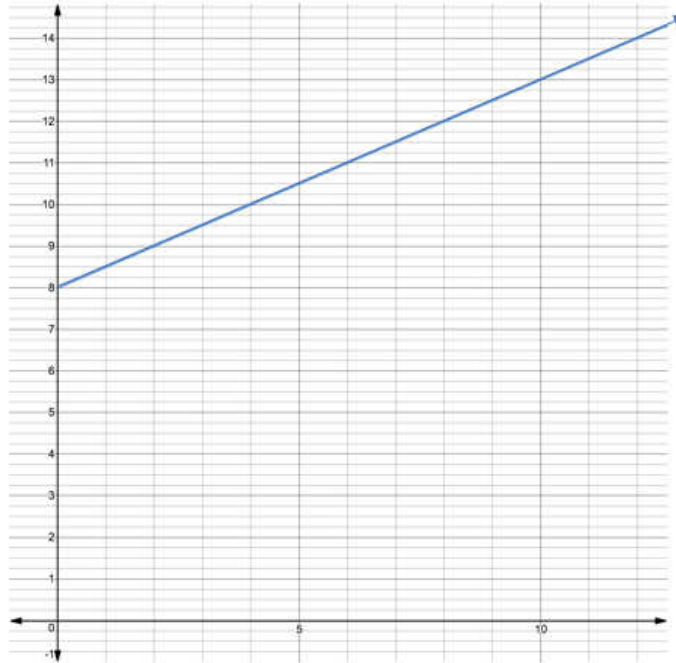
_____

_____

_____ (/1 mark)

Note: There is another question on the next page!

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A certain taxi company charges AED 8 initially and AED 0.50 per kilometer for a taxi ride. This is represented by the graph below.

a) Is this a *proportional* or a *non-proportional* relationship?

_____ (/1 mark)

b) Write a function that describes this relationship.

_____

_____

_____ (/1 mark)

Multiple Choice	/11
Constructed Response	/14
Total Marks	/25
Percentage	/100%

Grade	8	Lesson(s)	**Lesson 3-1:** Graphing Linear Equations **Lesson 3-2:** Solving Linear Equations by Graphing **Lesson 3-3:** Rate of Change and Slope **Lesson 3-4:** Direct Variation **Lesson 3-5:** Arithmetic Sequences as Linear Functions **Lesson 3-6:** Proportional and Non-Proportional Relationships

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Answer Key

Multiple Choice

Q1	B
Q2	D
Q3	C
Q4	B
Q5	C
Q6	B
Q7	A
Q8	B
Q9	D
Q10	D
Q11	A

Constructed Response

12	One mark should be awarded for stating that Student 2 is correct. *If the student gives the answer of $y = 2x + 6$ being correct, still award the mark.* One mark should be awarded for an explanation showing that Student 1 is incorrect because 6 was added to 12 instead of subtracted from 12. 2 marks

13	a) One mark should be awarded for "zero slope." *If the student gives the answer of "no slope," the mark should **not** be awarded.* b) One mark should be awarded for an explanation surrounding constant values. *If the student equates it to a vertical line, the mark should **not** be awarded.* 2 marks

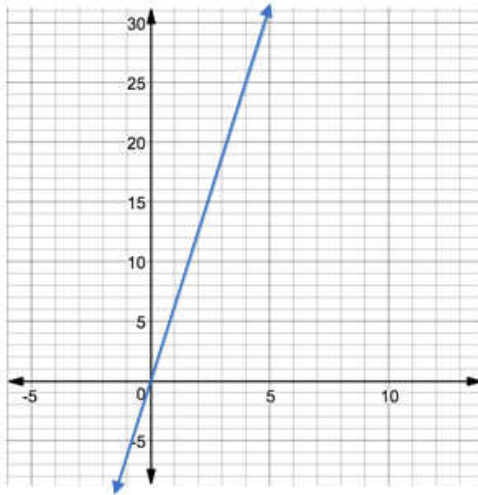| 14	a) One mark should be awarded for the constant rate of change of $\frac{2}{3}$. *If the student states that the constant rate of change as an equivalent fraction to $\frac{2}{3}$, still award the mark.* b) One mark should be awarded for an explanation surrounding the function being a linear function because the rate of change is constant. *If the student simply states that the function is linear, still award the mark.* 2 marks

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a) One mark should be awarded for $y = \frac{25}{4}x$ or $y = 6.25x$.

If the student uses an equivalent fraction to $\frac{25}{4}$, still award the mark.

If the student writes $y = \frac{4}{25}x$ or an equivalent, do __not__ award the mark.

b) One mark should be awarded for the graph shown below.
If the student gets the equation in part a wrong but graphs their equation correctly, still award the mark.

15

c) One mark should be awarded for 10.4 pounds.

If the student gives a fraction equivalent to $\frac{52}{5}$, still award the mark.
If the student does not give the unit, still award the mark.

3 marks

16

a) One mark should be awarded for "yes."
If the student states "arithmetic sequence," still award the mark.

b) One mark should be awarded for a common difference of 7.

c) One mark should be awarded for a 15th term of 86.

3 marks

17

a) One mark should be awarded for "non-proportional."

b) One mark should be awarded for $f(x) = \frac{1}{2}x + 8$ or $f(x) = 0.5x + 8$.

If the student writes $y = \frac{1}{2}x + 8$ or $y = 0.5x + 8$, still award the mark.

If the student writes the function using a fraction equivalent to $\frac{1}{2}$, still award the mark.

2 marks

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Data Analysis Information

Use the information below to help you determine which student learning outcomes are not being met by the majority of your students. This will help you make determinations about re-teaching, spiraling content not mastered, and implementing other interventions without interrupting the scheme of work.

Question	Lesson	Student Learning Outcome(s)
1	3-1	Identify linear equations, intercepts, and zeros.
2	3-1	Identify linear equations, intercepts, and zeros.
3	3-1	Graph linear equations.
4	3-2	Solve linear equations by graphing.
5	3-3	Find the slope of a line.
6	3-3	Find the slope of a line.
7	3-4	Write and graph direct variation equations.
8	3-4	Write and graph direct variation equations.
9	3-5	Relate arithmetic sequences to linear functions.
10	3-6	Write an equation for a proportional relationship.
11	3-6	Write an equation for a proportional relationship.
12	3-2	Solve linear equations by graphing.
13	3-3	Find the slope of a line.
14	3-3	Use rate of change to solve problems.
15	3-4	Solve problems involving direct variation.
16	3-5	Recognize arithmetic sequences.
17	3-6	Write an equation for a non-proportional relationship.