

Unit 5 Practice Test

Math 10

Linear Relations Practice Test

Name: _____

/50

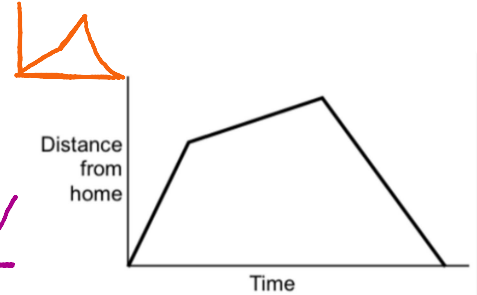
1. Which story is a possible scenario to produce the graph shown? [1]

a) Kenneth took his dog for a walk to the park. He set off slowly at a constant speed and then increased his pace. At the park he turned around and walked back home at a decreasing speed.

* constant pace

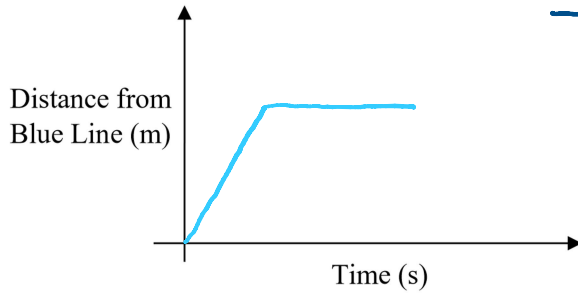
b) Rowan rode her bike from her home up a steep hill. After a while the slope eased off. At the top she raced down the other side.

c) Keneisha was training in the alley behind her house. For each rep she sprinted the first 50 m, walked the remaining 50 m, then jogged back to the start.

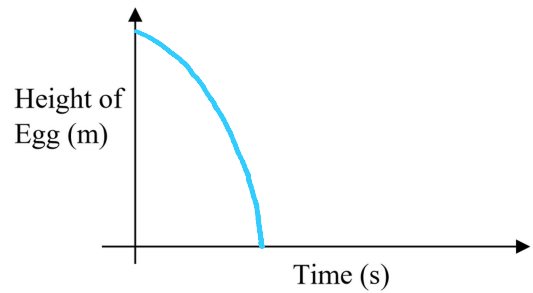


2. Draw a distance-time graph for each situation. [4]

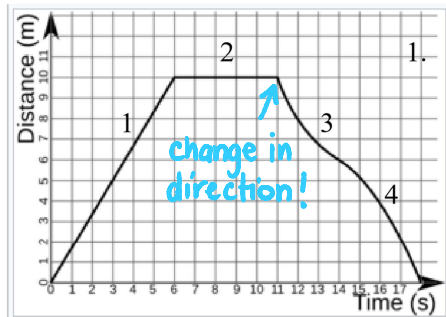
a) A puck is shot from the blue line to the net and deflects off the goalie's stick to the side boards. (The puck travels parallel to the blue line.)



b) An egg dropped from a height of 8 m steadily increases in speed until it hits the ground.



3. Describe a situation that could match this graph. (There are four parts to explain.) [4]



- Person leaves home/school/etc at a constant pace.
- Person stops (red light, buying something...)
- Person turns around and heads back home, with decreasing speed /slowing down.
- Person continues home but increases speed.



4. Identify the independent and dependent variable in each pair. [3]

	Independent Variable	Dependent Variable
hours worked and money earned	hours worked	money earned
mark earned and hours studied	hours studied	mark earned
cost of a car and age of a car	age of car	cost of car

5. State whether the graph of each relation would be discrete or continuous. Justify your answer. [3]

a) the height of a hot air balloon as it ascends over a 5-minute time period

continuous - both time and (distance) height don't have gaps between values

b) the number of tickets sold at an event and revenue

discrete - can't buy half of a ticket

c) the volume of the noise a crowd makes at an arena throughout a game

continuous - both level of volume (noise level) and time are continuous

6. A car uses, on average, 6 L of fuel per 100 km driven. Pedro drives to his cottage and back, a total distance of 800 km.

a) Assign a variable to represent each quantity in the relation. What variable is the dependent variable? Which is the independent variable? [1]

L = fuel ; dependent

d = distance ; independent

b) Create a table of values for this relation using appropriate values. [1]

independent (always on the left)	d	L	dependent always on the right
	0	0	
	100	6	
	200	12	
	300	18	
	400	24	
	500	30	
	600	36	
	700	42	
	800	48	

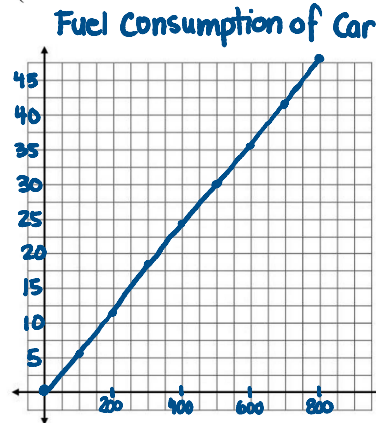
$$L = \frac{6}{100} d$$

* horizontal axis is always independent

dependent (always on side)

c) Create a graph for the relation. [2]

(Hint: Are the data discrete or continuous?)



distance (km) independent (always on bottom)

7. Determine whether each relation is linear. Justify your answer. [3]

S	P	S	A
1	4	1	1
2	8	2	4
3	12	3	9

Handwritten notes: $4 \rightarrow +4$, $8 \rightarrow +4$, $1 \rightarrow +3$, $4 \rightarrow +3$, $9 \rightarrow +5$. \therefore non-linear

a) the relationship between the perimeter of a square and its side length

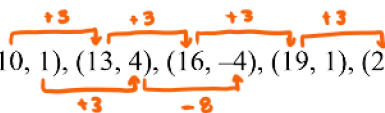
linear - each unit increase in side length is a 4 unit increase in perimeter
 $P = 4s$

b) the relation described by the equation $y = 6 - 4x^2$

non-linear - degree is greater than 1

c) the relation described by the set of ordered pairs $\{(10, 1), (13, 4), (16, -4), (19, 1), (22, 2)\}$

non-linear - y-values don't increase by a constant value



8. Write the following set notation as interval notation. [2]

a) $\{x \mid -3 < x \leq 7, x \in \mathbb{R}\}$

$(-3, 7]$

b) $\{y \mid y \geq -12, y \in \mathbb{R}\}$

$[-12, \infty)$

9. a) State the domain and range of each relation using either a list or set notation. [8]

b) State whether each relation is a function or non-function. **Indicate how you know.** [4]

i) $\{(-1, 10), (0, 5), (1, 0), (2, 3), (0, -2)\}$

D: $\{-1, 0, 1, 2\}$

R: $\{-2, 0, 3, 5, 10\}$

function or non-function *0* shows up twice in x-values

ii)

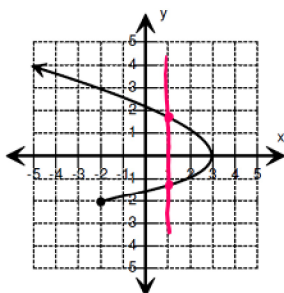
x	y
-7	2
3	4
10	2
12	0

D: $\{-7, 3, 10, 12\}$

R: $\{0, 2, 4\}$

function or non-function
 x-value don't repeat

iii)

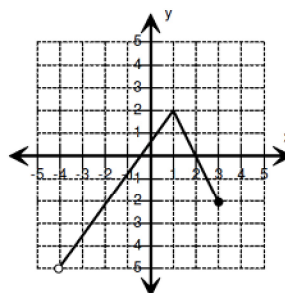


D: $\{x \mid x \leq 3, x \in \mathbb{R}\}$

R: $\{y \mid y \geq -2, y \in \mathbb{R}\}$

function or non-function
 fails the vertical line test

iv)



D: $\{x \mid -4 < x \leq 3, x \in \mathbb{R}\}$

R: $\{y \mid -5 < y \leq 2, y \in \mathbb{R}\}$

function or non-function
 passes the vertical line test

10. Consider the function $f(x) = 3x - 2$. Calculate each of the following: [3]

a) $f(5) = 3(5) - 2$
 $= 15 - 2$
 $= 13$

b) $f(-2) = 3(-2) - 2$
 $= -6 - 2$
 $= -8$

c) x when $f(x) = 10$
 $f(x) = 3x - 2$
 $10 = 3x - 2$
 $+2 \quad +2$
 $\frac{12}{3} = \frac{3x}{3}$
 $4 = x$

11. The formula for the surface area of a sphere is $A = 4\pi r^2$.

a) Write the formula in function notation. [1]

$$A(r) = 4\pi r^2$$

$$y = 5x + 11$$

$$f(x) = 5x + 11$$

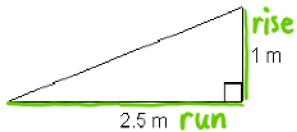
b) Determine the area when the radius is 3 cm. [1]

$$A(3) = 4\pi(3)^2$$

$$= 4\pi(9)$$

$$= 36\pi \approx 113.1 \text{ cm}^2$$

12. What is the slope of the ramp? [1]



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{1 \text{ m}}{2.5 \text{ m}} = 0.4$$

* slope has no units

13. The equations of four lines are given. Which of these represents: [4]

fixed term/constant = y-intercept
 slope = rate of change
 = coefficient of variable

$y = -2x + 3$	$y = 3x - 1$	$y = 5$	$x = 2$
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- a) a line with a positive slope? $y = 3x - 1$ b) a line with an undefined slope? $x = 2$
- c) a line with a negative slope? $y = -2x + 3$ d) a line with a slope of zero? $y = 5$

14. Determine the slope of the line passing through the points $(-3, 8)$ and $(10, 2)$. [2]

$$\frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 8}{10 - (-3)}$$

$$= \frac{-6}{13}$$

15. The point $(1, 5)$ is on a line that has a slope of $-\frac{3}{4}$. Find the coordinates of two other points on the line. [2]

$-\frac{3}{4} \rightarrow$ subtract 3 from y ; add 4 to x $\frac{3}{4} \rightarrow$ add 3 to y ; subtract 4 from x

