TOTAL = _____ = _____
60 100

Name: _____

Group: _____

Date: _____

563306 – Mathematics – Chapter 4 – Relations and Functions
Practice Test - Version B

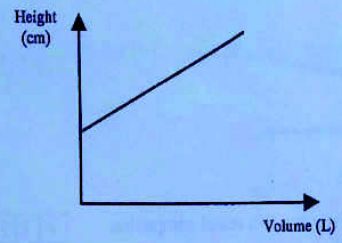
PART 1: MULTIPLE CHOICE (EACH QUESTION IS WORTH 4 MARKS)

1 As water is poured into a container, the height of the water is measured. Here are the results: 4 | 0

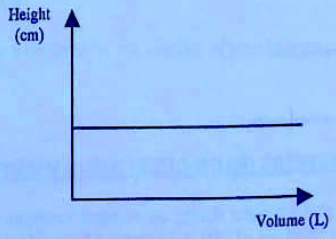
Volume (L)	2	4	6	8	10
Height (cm)	11	15	19	23	27

Which graph represents this situation?

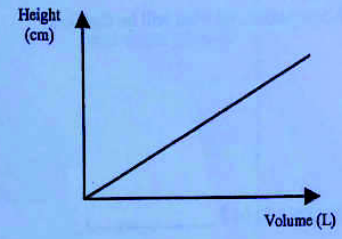
A)



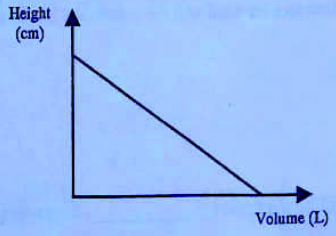
C)



B)



D)



2 A tank containing 3000 litres of heating oil is being emptied using a pump that can deliver 40 litres per minute. Consider the relation between the quantity of heating oil (Q) remaining in the tank and the number of minutes (n) that the pump has been operating. Which equation below represents this relation? 4 | 0

A) $Q = 40n$

B) $Q = 3000 + 40n$

C) $Q = 3000 - 40n$

D) $Q = 3000n - 40$

3 Debra wanted to know how the phone company had calculated her telephone bill. The company sent her the information shown in the table below. 4 | 0

Number of minutes	0	5	10	15	20
Cost ($)	12	14.10	16.20	18.30	20.40

Which of the following rules describes the above situation?

A) $y = 2.10x + 12$

B) $y = 0.42x + 12$

C) $y = 2.10 + 12x$

D) $y = 0.42 + 12x$

4 Hannah lives in Gatineau and decides to go to Montreal with friends to attend a concert. The cost of gas is $70. This amount will be shared equally with her friends. 4 | 0
What is the rule of the function which associates, to the number of passengers (x), the amount (y) that each passenger must pay?

A) $y = 70x$

B) $y = \frac{x}{70}$

C) $y = 70x^2$

D) $y = \frac{70}{x}$

5 The weekly salary (y) in dollars of an employee depends on the amount (x) in dollars of sales made during the week. 4 | 0
Two options are available to an employee:
Option A: $y = 0.05x + 250$
Option B: $y = 0.10x + 150$
For what amount of sales will both options offer the same salary to an employee?

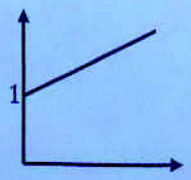
A) $350

B) $1000

C) $2000

D) $2500

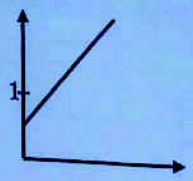
6 A linear function is represented in the graph at right.



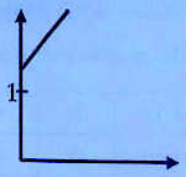
4 0

If the rate of change increases and the initial value decreases, which of the graphs below corresponds to this change?

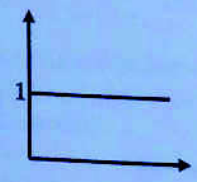
A)



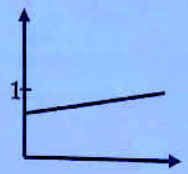
C)



B)



D)



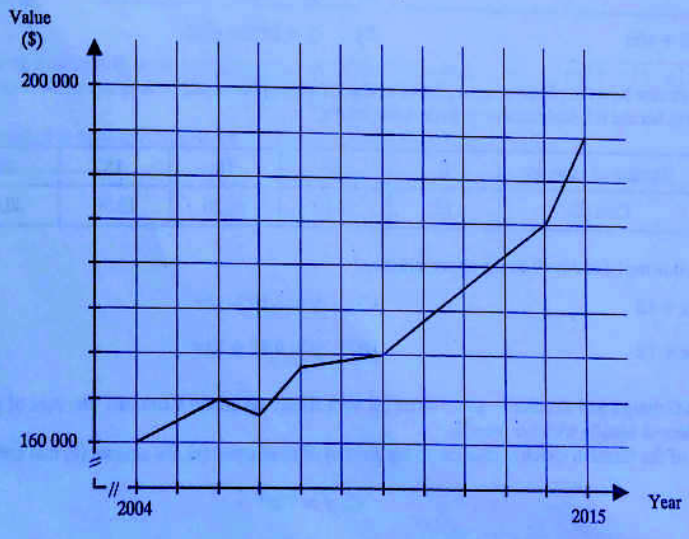
PART 2: SHORT ANSWERS (EACH QUESTION IS WORTH 4 MARKS)

7 Rebecca wants to rent a scooter during her summer vacation. She hesitates between two rental companies. 4 3 2 1 0
The first charges a fixed fee of $50 and charges $0.30 per kilometer traveled.
The second charges a fixed fee of $130 and charges $0.10 per kilometer traveled.
For how many kilometers traveled will the rental cost be the same from both companies and what will be that cost?

The rental cost will be the same for _____ kilometers traveled and the cost will be $ _____.

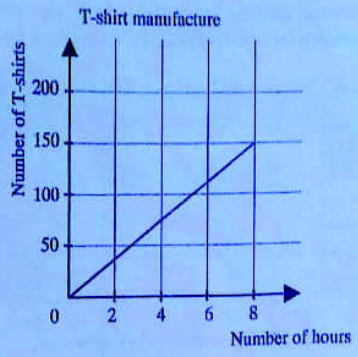
8 According to the graph below, what was the average yearly rate of change in the value of a single-family home between 2010 and 2014? 4 3 2 1 0

COST OF SINGLE-FAMILY HOMES
2004 TO 2015



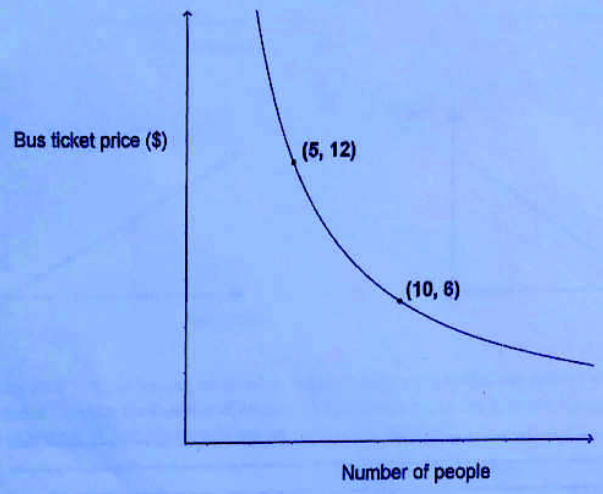
Between 2010 and 2014, the average yearly rate of change in value was $_____.

9 The graph below shows the number of T-shirts manufactured in a shop. What is the rule of the function corresponding to this situation? | 4 | 3 | 2 | 1 | 0 |



The rule of the function is _____.

10 The graph below shows the price of a bus ticket in dollars (y) as a function of the number of people going on the trip (x). | 4 | 3 | 2 | 1 | 0 |



What is the price of a bus ticket if 15 people attend the trip?

The price of the ticket is _____$.

PART 3: EXTENDED ANSWERS (EACH QUESTION IS WORTH 10 MARKS)

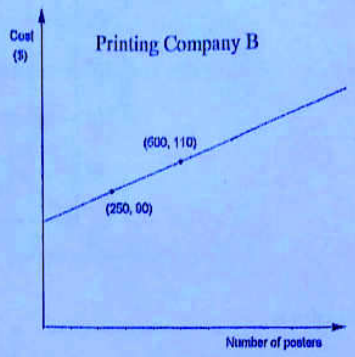
11 Jordan would like to print posters advertising his new fitness center. He has the choice between two printing companies.The pricing for both companies is represented by linear functions.

10	9	8	7	6	5	4	3	2	1	0

Printing Company A

Number of posters	Cost ($)
100	65
250	80
500	105
1250	180

Printing Company B



Determine, according to the number of posters printed, which of the two advertising companies is the most advantageous.

Show all your work.

Answer: _____

_____

12 The process of emptying a swimming pool starts at 8:00 am. At 10:00 am the pool contained 80 000 litres of water and at noon it contained 64 000 litres of water.

10	9	8	7	6	5	4	3	2	1	0

If the pool is being emptied at a constant rate, at what time will the pool be completely empty?

Show all your work.

Answer: The pool will be completely empty at _____.

Chapter 4 - Relations & functions

Practice Test - Solution

Part 1:

1	A	3	B	5	C
2	C	4	D	6	A

Part 2:

7 $y_1 = 0.3x + 50$ $\quad$ $y_2 = 0.1x + 130$

$0.3x + 50 = 0.1x + 130$

$0.2x = 80$

$x = 400$

$y_1 = 170$ $\quad$ $y_2 = 170$

The rental cost will be same for 400 Km, cost will be $170

8 $R.O.C. = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}} = \frac{15000}{4} = 3750$

Between 2010 & 2014, average yearly rate of chand was $ 3750

9 $a = R.O.C = \frac{\text{rise}}{\text{run}} = \frac{150}{8} = 18.75$

$b = 0$

∴ The rule of the function is $f(x) = 18.75x$

10 Rational function → Rule ⇒ $y = \frac{c}{x}$

$c = x, y = (5)(12) = 60$ OR $(10)(6) = 60$

∴ $f(x) = \frac{60}{x}$

$f(15) = \frac{60}{15} = 4$

∴ The price of the ticket is $4

Part 3:

11

For Company A:

$a = \frac{80-65}{250-100} = \frac{15}{150} = 0.1$

$b = y_1 - ax_1$

$= 65 - (0.1)(100)$

$= 55$

$\therefore y_A = 0.1x + 55$

For Company B

$a = \frac{110-90}{500-250} = \frac{20}{250} = 0.08$

$b = y_1 - ax_1$

$= 90 - (0.08)(250)$

$= 70$

$\therefore y_B = 0.08x + 70$

Solve for same price:

$y_A = y_B$

$0.1x + 55 = 0.08x + 70$

$0.02x = 15$

$x = 750$

$y_A = 0.1(750) + 55 = 130$

Vi: $y_B = 0.08(750) + 70 = 130$

$\therefore$ for less than 750 posters – Company A is cheaper
for exactly 750 posters – Both companies cost the same
for more than 750 posters – Company B is cheaper

12

8:00 AM is equivalent to time $t = 0$

	t	Q
(10 AM)	2	80000
(noon)	4	64000

$a = R.O.C = \frac{\Delta y}{\Delta x} = \frac{-16000}{2} = -8000$

$b = y_1 - ax_1 = 80000 - (-8000)(2) = 96000$

$\therefore y = Q(t) = 96000 - 8000t$

$0 = 96000 - 8000t$

$8000t = 96000$

$t = 12$

$\therefore$ after 12 hours from 8:00 AM.

$\therefore$ The pool will be completely empty at 8:00 PM.