

MATHEMATICS APPLICATIONS

Test 6 2018

Piecewise and Simultaneous Linear Functions

Resource Free

Marks: 22 Time Allowed: 25 minutes

TOTAL: 47

Name: _____

ALL working must be shown for full marks.

For full marks you will need to show all your working out.

Question 1

[2, 3, 3 = 8 marks]

a) Solve the following Linear functions

i) $4y - 6 = 30$

$$4y = 30 + 6$$

$$y = \frac{36}{4} \quad \checkmark$$

$$y = 9 \quad \checkmark$$

ii) $3(x + 8) - 2 = 7$

$$3(x + 8) = 9 \quad \checkmark$$

$$x + 8 = 3 \quad \checkmark$$

$$x = -5 \quad \checkmark$$

b) Give the equation that represents the following situation and then solve to find the value of x .

"Three times a number is divided by four and then two is added. The result is one less than the original number"

$$\frac{3x}{4} + 2 = x - 1 \quad (\checkmark)$$

$$\frac{3x}{4} = x - 3$$

$$3x = 4x - 12 \quad (\checkmark)$$

$$-x = -12$$

$$\underline{x = 12} \quad (\checkmark)$$

Question 2

[3, 3 = 6 marks]

Solve the following simultaneous equations using the method stated below.

a) $2x + 3y = 6$ and $5x - 3y = -27$ by **Elimination** method.

$$\begin{array}{r} 2x + 3y = 6 \\ + 5x - 3y = -27 \\ \hline 7x = -21 \quad (\checkmark) \\ \boxed{x = -3} \quad (\checkmark) \end{array}$$

$$\begin{array}{r} 2(-3) + 3y = 6 \\ -6 + 3y = 6 \\ 3y = 12 \\ \boxed{y = 4} \quad (\checkmark) \end{array}$$

b) $x - 3y = 7$ and $y = x - 1$ by **Substitution** method.

$$\begin{array}{r} x - 3(x - 1) = 7 \\ x - 3x + 3 = 7 \quad (\checkmark) \\ -2x + 3 = 7 \\ -2x = 4 \\ \boxed{x = -2} \quad (\checkmark) \end{array}$$

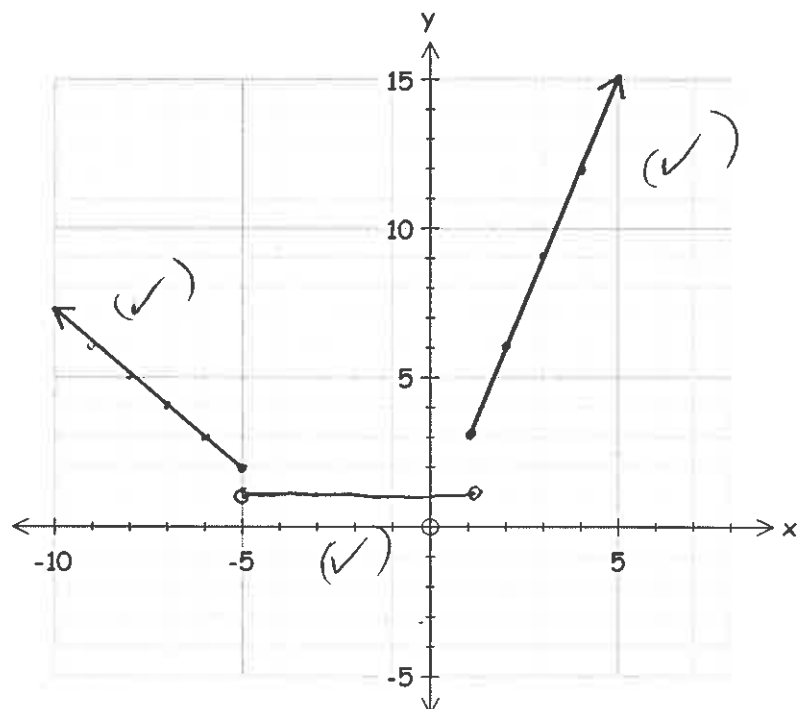
$$\begin{array}{r} y = x - 1 \\ y = -2 - 1 \\ \boxed{y = -3} \quad (\checkmark) \end{array}$$

Question 3

[3 marks]

Graph the following function on the axis below.

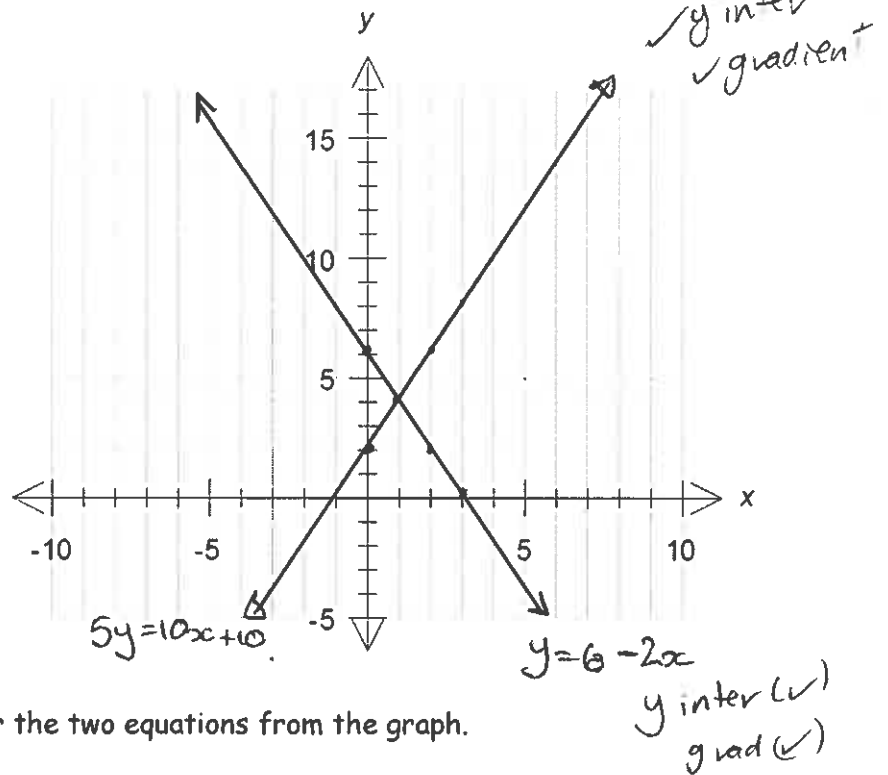
$$\begin{array}{ll} y = -x - 3 & x \leq -5 \\ y = 1 & -5 < x < 1 \\ y = 3x & 1 \leq x \end{array}$$



Question 4

[4, 1 = 5 marks]

- a) Sketch the graph for the following equations $y = 6 - 2x$ and $5y = 10x + 10$.



- b) Find the point of intersection for the two equations from the graph.

(1, 4) (✓)



MATHEMATICS APPLICATIONS
Test 6 2018
Linear Functions
Section B-Resource Assumed
Marks: 25 Time Allowed: 25 minutes

ALL working must be shown for full marks.

Question 1

[2, 2 = 4 marks]

Find the point of intersection between the following equations

a) $y = 2x + 10$ and $y = 3.5x + 0.5$

$$x = 6\frac{1}{3}$$
$$y = 22\frac{2}{3}$$

b) $5(2x - y) + 4y = 3(3x + 1)$ and $5(2x - 1) = 5x - 2y + 38$

$$x = 7, y = 4$$

Question 2

[2, 2 = 4 marks]

To promote the school Fete two poster companies have considered.

Polly's posters charge \$175 to design the poster and \$3 for each poster she makes.

Pete's posters charge \$250 to design the poster and \$2 for each poster he makes.

- a) Write down an equation to find the cost of producing (n) posters for each company.

Use C for the cost and n for the number of posters.

$$(Polly) C = 3n + 175$$

$$(Pete) C = 2n + 250$$

- b) What company should the school use if they need 40 posters. Why?

$$(Polly) C = 3 \times 40 + 175 = \$295$$

$$(Pete) C = 2 \times 40 + 250 = \$330$$

Polly is cheaper by \$35

Question 3

[2, 1, 1, 1, 2 = 7 marks]

The piecewise graph below shows the annual premium (cost) of life insurance for men of different ages.

a) What is the annual premium for a man aged:

i) 24 years? \$200 (✓)

ii) 52 years? \$500 (✓)

b) Why is the cost different?

Older / Not as healthy. (✓)

c) For what age group is the cost \$275

$45 \leq x < 50$ (✓)

d) What is the age of the youngest man who can pay a premium of \$160. (✓)

35 ~~20~~ years.

e) For what age ranges does the price reduce as you get older? Why?

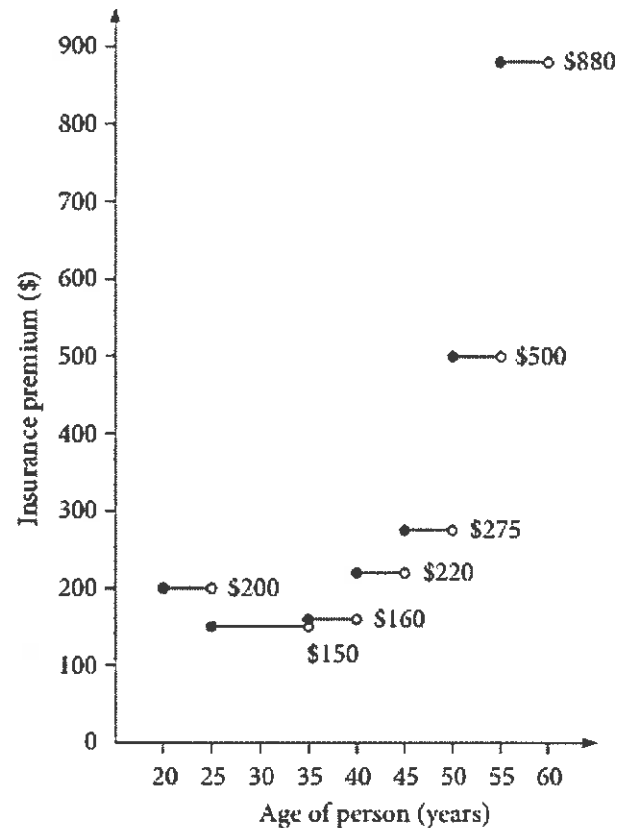
Between $20 \leq x < 25$

and $25 \leq x \leq 35$ (✓)

Because p. males between

20-25 take more risks (✓)

Life insurance premiums for males



Question 4

[2, 2, 1, 2, 1, 2 = 10 marks]

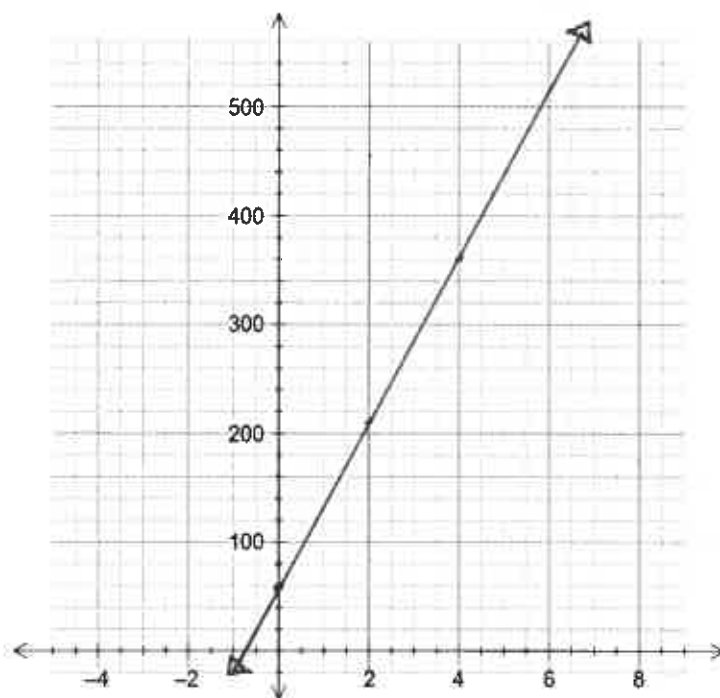
Amber is a plumber. She charges \$60 for arriving at a job, and \$75 per hour that she works.

a) Use the information above to complete this table

Time worked, t (hours)	0	1	2	3	10
Cost, C (\$)	60	135	210	285	810

1 off
each error

b) Graph the data in the table on the axis below.



✓_m
✓_c

c) What is the significance of the intercept on the y axis?

The cost of the call out fee (✓)

d) Determine the equation of the line for the relationship between t and C .
(must be in terms of t and c)

$$y = 75x + 60$$

(✓) (✓)

e) What is the significance of the Gradient?

The charge per hour. (✓)

f) Use your graph to answer the following questions

i) How much would Amber charge for working 6 hours?

\$510 (✓)

ii) How long has Amber worked if she charges \$360?

4 hours (✓)

