



PERTH MODERN SCHOOL

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Independent Public School

Course Methods

Year 11

Student name: _____

Teacher name: _____

Date: 17/02/20

Task type: Response

Time allowed for this task: 40 mins

Number of questions: 6

Materials required: NO CALCULATOR REQUIRED
NO NOTES REQUIRED

Standard items: Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: Drawing instruments, templates and formula sheet

Marks available: 37 marks

Task weighting: 10 %

Formula sheet provided: Yes

Note: All part questions worth more than 2 marks require working to obtain full marks.

Question 1 (1.1.6)**(2, 2 = 4 marks)**Solve each of the following for x .

$$\text{i) } \begin{array}{r} 2x - 3 = 11 - 5x \\ +5x \qquad \qquad +5x \end{array}$$

$$\begin{array}{r} 7x - 3 = 11 \\ +3 \qquad +3 \end{array}$$

$$7x = 14 \quad \checkmark$$

$$x = 2 \quad \checkmark$$

$$\text{ii) } 10 - 2x = \frac{2x}{3}$$

$$30 - 6x = 2x$$

$$30 = 8x \quad \checkmark$$

$$\frac{30}{8} = x \quad \checkmark$$

$$\text{or } \frac{15}{4}$$

(\neq does not need to be simplified)

Question 2 (1.1.4, 11.5, 1.1.6)

(2, 3, 2, 3 = 10 marks)

Determine the equation of a line that passes through the point $(-4, 6)$ and:

- i) has a gradient of 3

$$y = 3x + c$$

$$6 = 3(-4) + c$$

$$6 = -12 + c$$

$$18 = c$$

$$y = 3x + 18$$

✓ finding the gradient
 ✓ finding the y-intercept

- ii) passes through the point $(2, 5)$.

$$m = \frac{5 - 6}{2 - (-4)}$$

$$m = -\frac{1}{6}$$

$$y = -\frac{1}{6}x + \frac{16}{3}$$

✓ finding gradient
 ✓ correct substitution of point
 ✓ finding y-intercept

$$y = -\frac{1}{6}x + c$$

$$5 = -\frac{2}{6} + c$$

$$5 + \frac{1}{3} = c$$

- iii) is parallel to the line $2y - 4x = -7$.

$$2y = 4x - 7$$

$$y = 2x - \frac{7}{2}$$

✓ finding gradient
 ✓ finding y-intercept

$$y = 2x + c$$

$$6 = 2(-4) + c$$

$$6 = -8 + c$$

$$14 = c$$

$$y = 2x + 14$$

- iv) is perpendicular to the line $2y - x - 8 = 0$.

$$2y = x + 8$$

$$y = \frac{x}{2} + 4$$

✓ finding the gradient of original equation
 ✓ finding the perpendicular gradient
 ✓ finding y-intercept

$$m = -2$$

$$y = -2x - 2$$

$$y = -2x + c$$

$$6 = -2(-4) + c$$

$$6 = +8 + c$$

$$-2 = c$$

Question 3 (1.1.1, 1.1.5, 1.1.6)**(3, 2, 2 = 7 marks)**The coordinates $P(2, p)$ and $Q(q + 1, 3q - 2)$ both lie on the line $y = 5x + 1$.

a) Find:

i) the values of p and q .

$$p = 5(2) + 1$$

$$p = 11$$

✓ finding the correct value for p .

$$3q - 2 = 5(q + 1) + 1$$

$$3q - 2 = 5q + 5 + 1$$

$$3q - 2 = 5q + 6$$

$$-2q - 2 = 6$$

$$-2q = 8$$

$$q = -4$$

✓ substituting Q into the equation/lineii) the midpoint of PQ .

$$P(2, 11) \quad Q(-3, -14)$$

$$\left(\frac{2 + (-3)}{2}, \frac{11 + (-14)}{2} \right)$$

$$\left(-\frac{1}{2}, -\frac{3}{2} \right)$$

✓ correctly solves for q .

✓ uses midpoint formula correctly

✓ finds correct midpoint

b) For what value of m does the line $y = mx + 2$ not intersect with the line $y = 5x + 1$? Justify your answer.

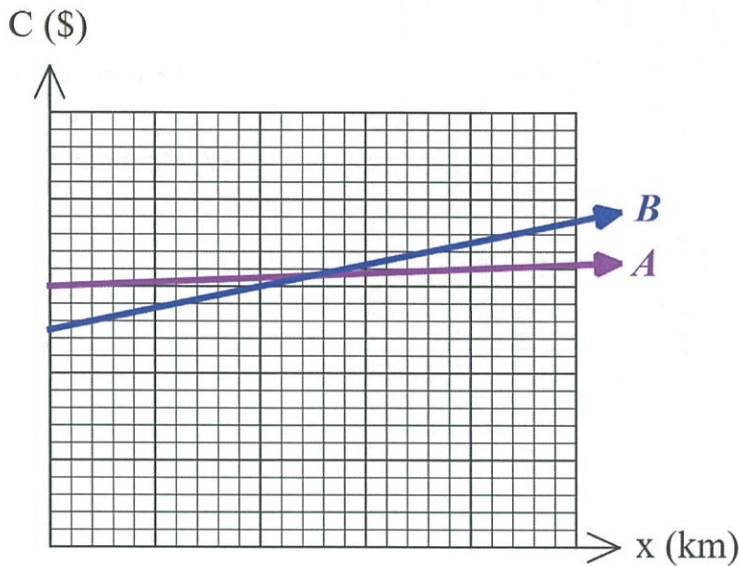
$$m = 5 \quad \checkmark$$

parallel lines do not intersect ✓ justification

Question 4 (1.1.4, 1.1.5)

(2, 1, 1, 2, 1 = 7 marks)

The graph below shows cost, C , in dollars versus distance x , in kilometres, for two different car rental companies A and B. (Assume that parts of distance are charged for proportionately.)



The costs for each company are outlined in the table below.

a) Which cost equation corresponds to Company A and Company B?

$C = 250 + 0.25x$	$C = 300 + 0.05x$
B	A
✓	✓

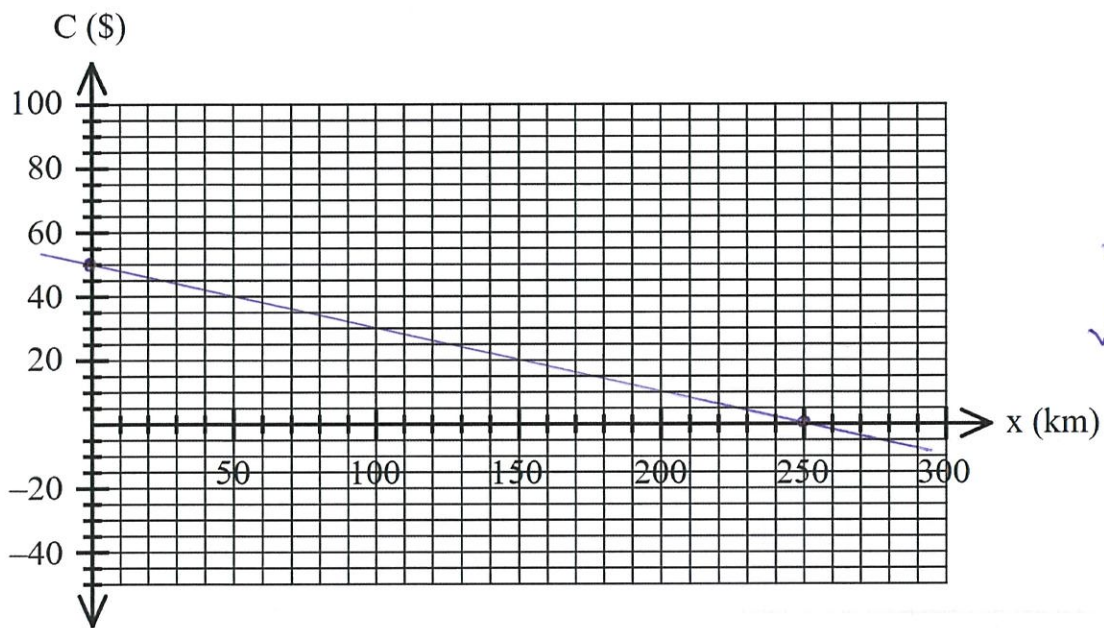
b) Explain what the gradient in the equation $C = 250 + 0.25x$ represents.

explanation ✓ For every km ~~of~~ travel~~led~~ the cost increases by \$0.25.

c) Construct a linear rule for $y = C_A - C_B$, the difference in cost between Company A and Company B.

$$y = 50 - 0.2x \quad \checkmark$$

d) Sketch the equation from part c) on the graph below clearly showing all intercepts.



✓ correct y-intercept
 ✓ correct x-intercept

e) Using the graph in part d) determine the number of km when the costs of Company A is cheaper than those of Company B.

More than 250 km ✓

Question 5 (1.1.6)**(5 marks)**Solve for x , expressing your answer in its simplest form in terms of a and/or b .

$$\frac{x+a}{b} = \frac{b-x}{a} \quad [a, b \neq 0]$$

$$a(x+a) = b(b-x)$$

$$ax + a^2 = b^2 - bx$$

$$ax + bx = b^2 - a^2$$

$$x(a+b) = b^2 - a^2$$

✓ factorising ^{for} x

$$x = \frac{b^2 - a^2}{a+b}$$

✓ expressing x in terms of a & b

$$x = \frac{(b+a)(b-a)}{b+a}$$

✓ factorising $b^2 - a^2$

$$x = b-a, \quad a+b \neq 0$$

✓ simplified answer

✓ ^{must} state the solution is only true if $a+b \neq 0$.

Question 6 (1.1.6)**(2, 1, 1 = 4 marks)**

A car travelling at 60 km/h takes t hours to go from A to B . If the speed of the car is reduced by 10 km/h , the time to go from A to B is increased by half an hour.

- a) Construct a linear equation for t using the information given.

$$60t = 50(t + 0.5) \quad \begin{array}{l} \checkmark \text{ LHS} \\ \checkmark \text{ RHS} \end{array}$$

- b) Solve your equation in part a) and hence calculate the value of t .

$$\begin{aligned} 60t &= 50t + 25 \\ 10t &= 25 \\ t &= 2.5 \text{ hrs} \quad \checkmark \quad (\text{allow for } t) \end{aligned}$$

- c) Find the distance between A and B .

$$\begin{aligned} d &= s \times t \\ d &= 60 \times 2.5 \\ &= 150 \text{ km} \quad \checkmark \quad (\text{allow for } t) \end{aligned}$$

END OF TEST