WILLETTON SENIOR HIGH SCHOOL

Year 11 Mathematics Applications

Test 4 – 2022

Calculator Free

Student's name: Soln

Please circle your teacher's name:

Dr. Duan	**Miss. Colquhoun**	**Mr. Stillitano**
Mrs. Regi	**Mr. Galbraith**	**Mr. Riemer**

Section	Time Allocated	Marks
Calculator Free	30 minutes	44

Formula sheet allowed

No calculators or notes permitted.

Answer all questions in the space provided.

Show working to receive full marks.

QUESTION 1 (2, 3, 3 = 8 marks)

Solve the following equations, showing working where required

a) $2(1-x)=3$

$1-x=\frac{3}{2}$ ✓

$x=-\frac{1}{2}$ ✓

b) $3(1-x)=-3(4x-5)-3x$

$3-3x=-12x+15-3x$ ✓

$12x=12$ ✓

$x=1$ ✓

c) $\frac{x}{3}-\frac{1-x}{2}=2$

$2x-3(1-x)=2\times 6$ ✓

$2x-3+3x=12$ ✓

$5x=15$

$x=3$ ✓

QUESTION 2 (3 marks)

Willetton SHS and Rossmoyne SHS both had students participated in one year's National Mathematics Competition. There were all together 56 students won a prize among these two schools, but Willetton had 6 more winners. How many students won a prize in each school?

Rossmoyne: x

Willetton: $x+6$

$x+x+6=56$ ✓

$2x=50$

Rossmoyne: $x=25$ ✓

Willetton. $25+6=31$ ✓

QUESTION 3 (4 marks)

Determine the equation of the line passing through points (-2, 1) and (3, -4).

$$G = \frac{-4-1}{3-(-2)} = \frac{-5}{5} = -1 \checkmark$$

$$y = -x + c$$

$$1 = 2 + c \checkmark$$

$$c = -1 \checkmark$$

$$y = -x - 1 \checkmark$$

QUESTION 4 (2, 2, 1, 1 = 6 marks)

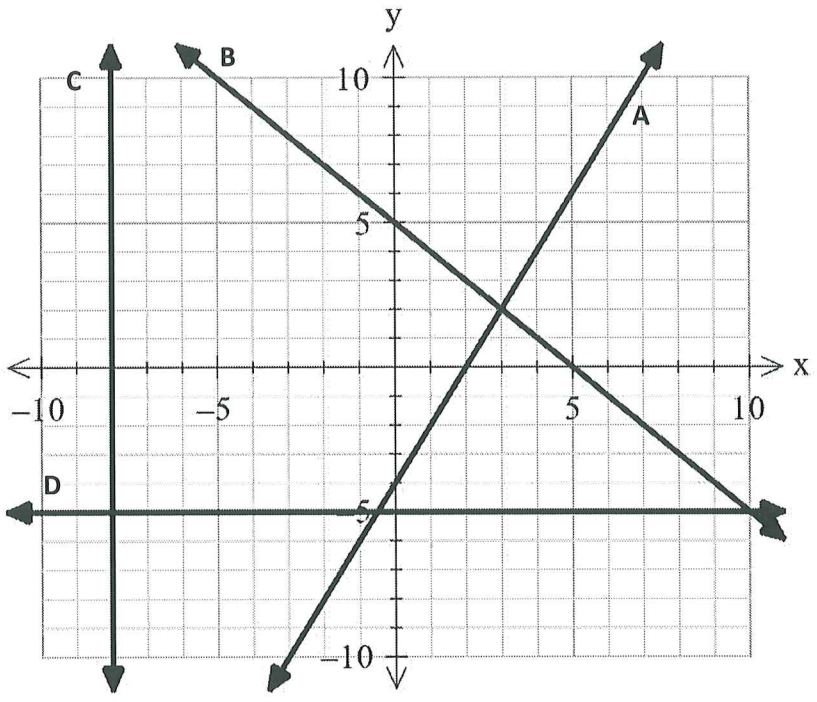
Write the equation of the lines graphed below.

A) $y = 2x - 4$ ✓ ✓

B) $y = -x + 5$ ✓ ✓

C) $x = -8$ ✓

D) $y = -5$ ✓



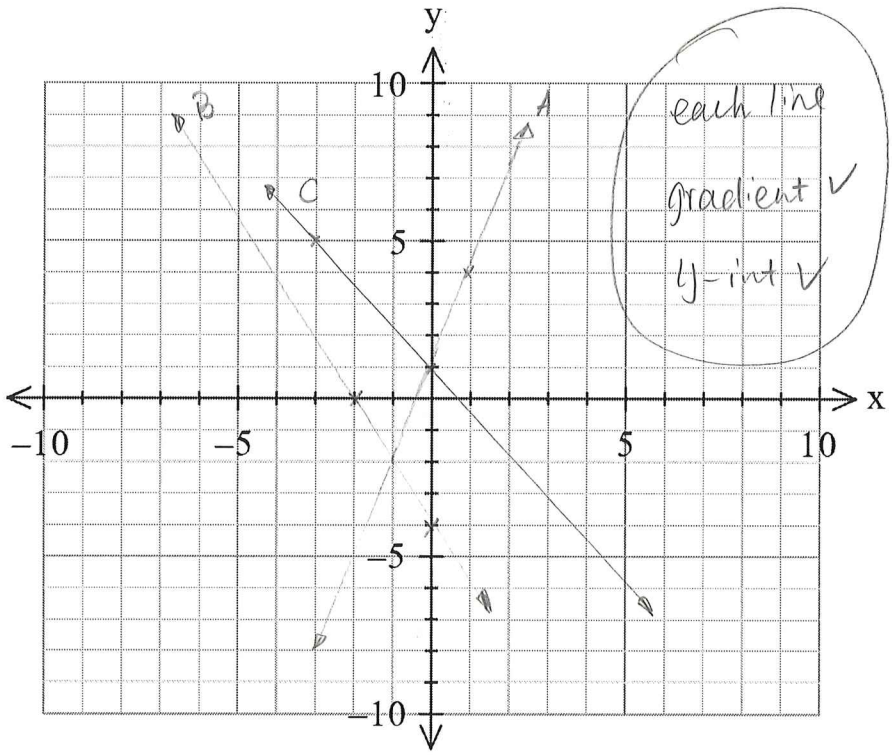
QUESTION 5 (6, 1 = 7 marks)

a) On the axes below, draw each of the following straight-line graphs with the given information. (Label each straight line drawn with the given letter)

A: $y = 3x + 1$

B: $2x + y + 4 = 0$

C: The line has a gradient of $-\frac{4}{3}$ and goes through (-3, 5)

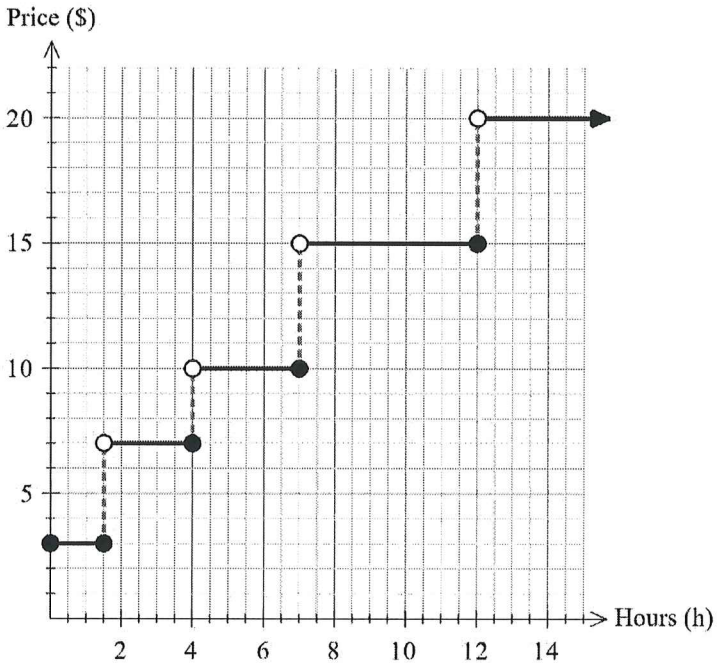


b) Find the solution that satisfies both A and B

(-1, -2) ✓

QUESTION 6 (1, 1, 2 = 4 marks)

The graph shows the parking costs (in dollars) over different lengths of time:



a) How much would 3 hours of parking cost?

$7 ✓

b) What is the longest time that you can park for $15?

12 hrs ✓

c) The carpark offers a weekly pass for $70. If Mr. Stillitano parks his car for 8 hours each day, five days a week, how much would he save each week with the weekly pass?

15 × 5 = $75 ✓

75 - 70 = $5 ✓

QUESTION 7 (4 marks)

Solve the following pair of simultaneous linear equations algebraically.

$\begin{cases} 2x - 3y = 5 & ① \\ x - 2y = 2 & ② \end{cases}$

② × 2 $2x - 4y = 4$ ③ ✓

① − ③

$2x - 3y - (2x - 4y) = 5 - 4$

$2x - 3y - 2x + 4y = 1$

$y = 1$ ✓

Sub $y = 1$ into ②

$x - 2(1) = 2$ ✓

$x = 4$ ✓

$\begin{cases} x = 4 \\ y = 1 \end{cases}$

OR

$x = 2 + 2y$ ③ ✓

Sub ③ into ①

$2(2 + 2y) - 3y = 5$

$4 + 4y - 3y = 5$

$y = 1$ ✓

Sub $y = 1$ into ③

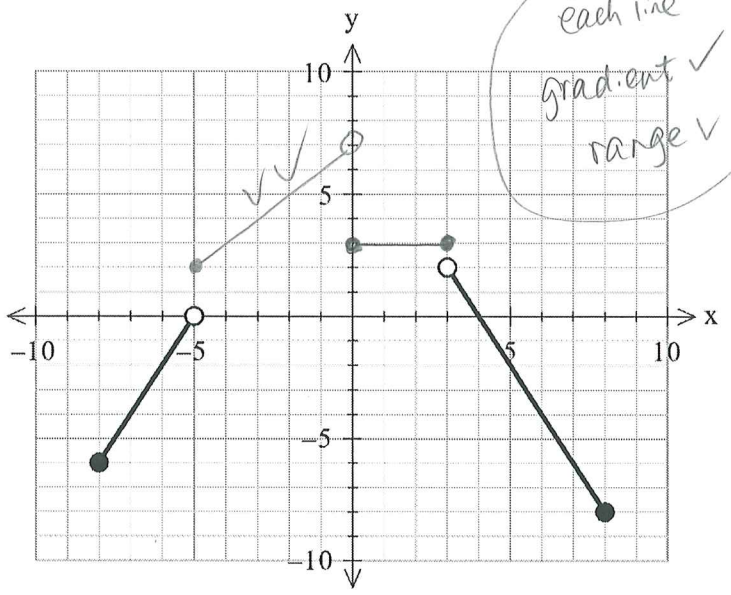
$x = 2 + 2(1)$ ✓

$x = 4$ ✓

$\begin{cases} x = 4 \\ y = 1 \end{cases}$

QUESTION 8 (8 marks)

Complete the following statements for the piecewise defined function shown below and **complete the graph.**



each line
gradient ✓
range ✓

$$y = \begin{cases} 2x + 10 & , \quad -8 \leq x \leq -5 \\ x + 7 & , \quad -5 \leq x < 0 \\ 3 & , \quad 0 \leq x \leq 3 \\ -2x + 8 & , \quad 3 < x \leq 8 \end{cases}$$

END OF CALCULATOR FREE

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Calculator Assumed

Student's name: _____

Please circle your teacher's name:

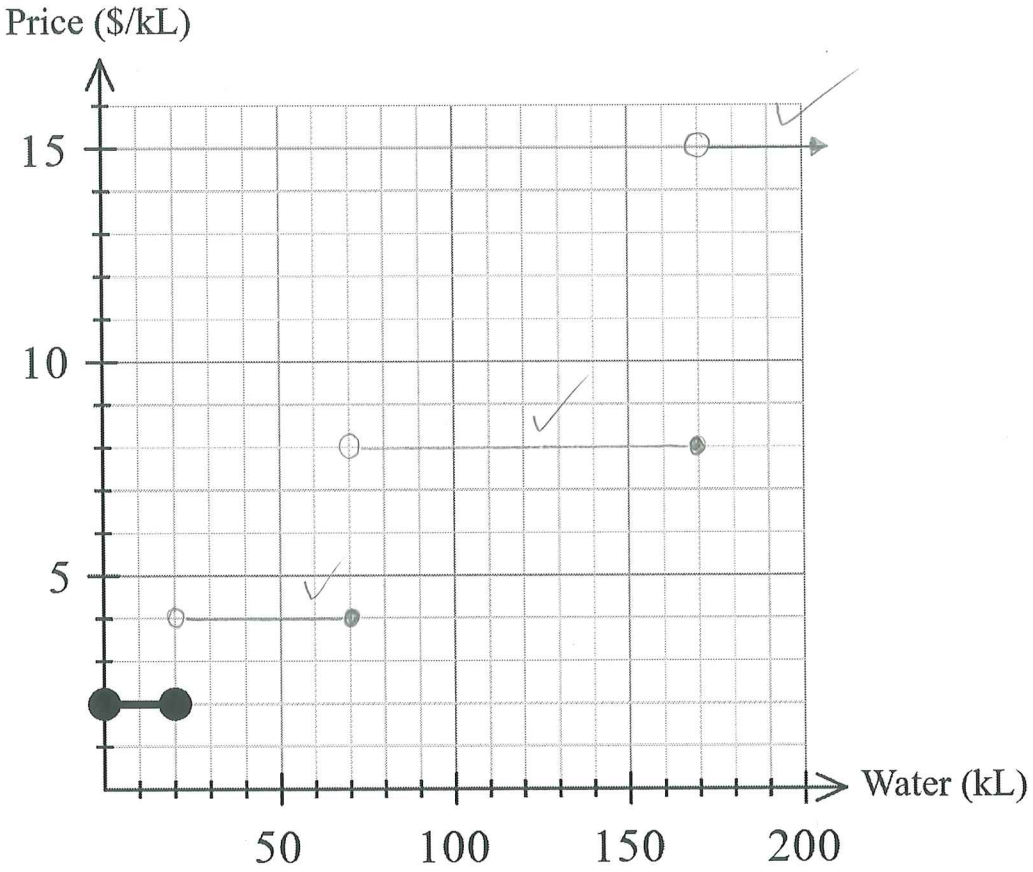
Dr Duan	**Miss. Colquhoun**	**Mr Stillitano**
Mrs. Regi	**Mr Galbraith**	**Mr. Riemer**

Section	Time Allocated	Marks
Calculator Assumed	20 minutes	20

Calculators and Classpads allowed.
Formula sheet allowed
One side of A4 page of notes allowed.
Show working to receive full marks.

QUESTION 9 (3, 2, 3 = 8 marks)

The Water Corporation charges \$2 / kL for the first 20 kL of water used, \$4 for the next 50 kL, and \$8 for the following 100 kL. For any volume of water over 170kL, it costs \$15 / kL.



a) On the axes above, complete the step graph to show the charges for water usage.

b) **i)** In the last water bill, Mr. Riemer used 90 kL water, how much did he have to pay for his total water bill?

$2 \times 20 + 4 \times 50 + 8 \times 20$ ✓

$= 40 + 200 + 160$

$= \$400$ ✓

ii) After this last water bill, his water budget for the next month is \$500. What is the most water (round to whole kL) that he can use in this month?

$500 - 400 = \$100$ ✓

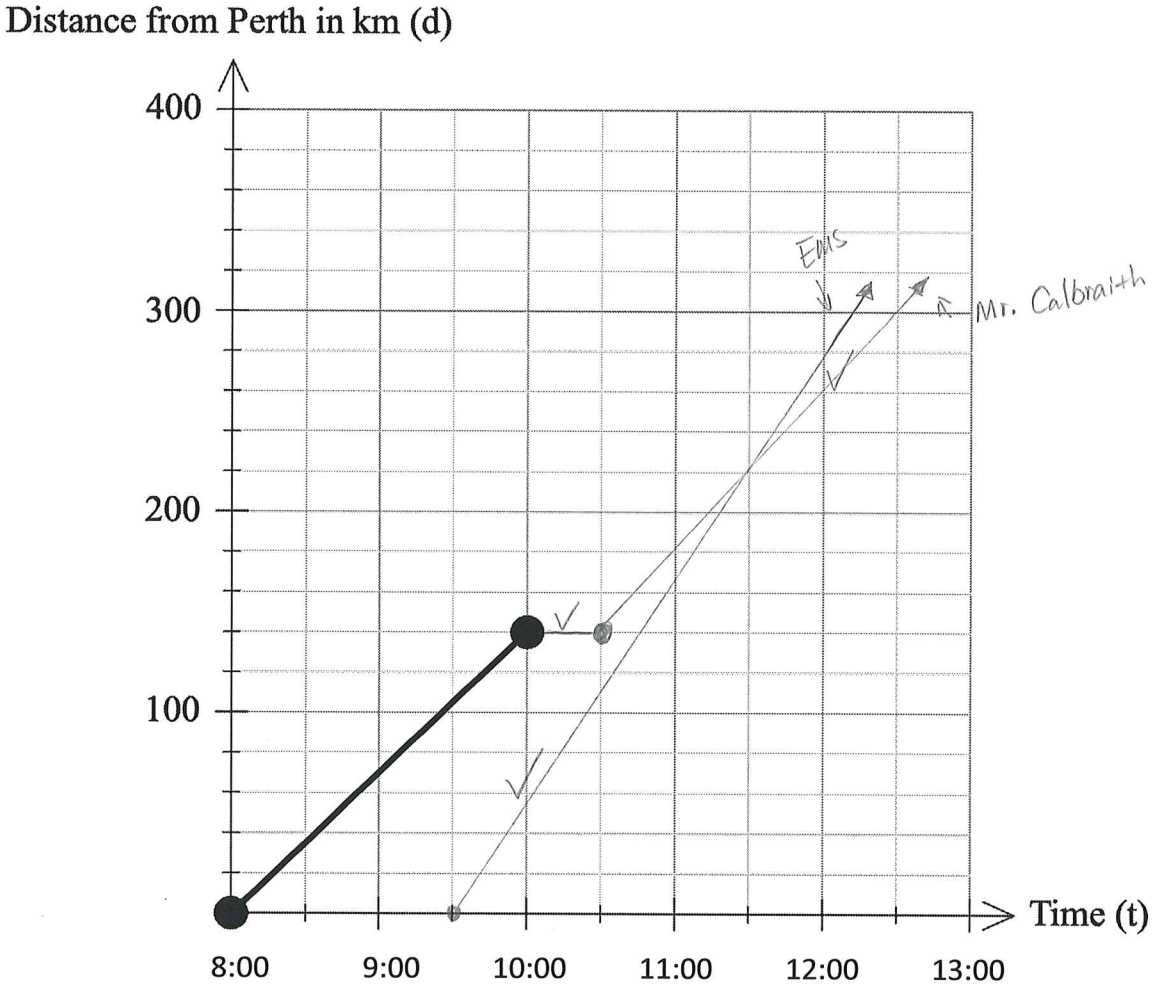
$\frac{100}{8} = 12.5$ kL

$90 + 12.5 = 102.5$ kL ✓

∴ max 102 kL ✓

QUESTION 10 (2, 1, 2, 3 = 8 marks)

Mr. Galbraith drove his caravan to Albany for a holiday. He left at 8:00am in the morning, with an average speed of 70 km/hr. After two hours, he pulled over and rested for 30 mins, and then he started again but with an average speed of 80 km/hr. At 9:30am, an EMS (Express Email Service) car left Perth, and also headed to Albany via the same route as Mr. Galbraith, with an average speed of 110km/hr.



a) On the axes above, complete the 'Time and Distance' graph for Mr. Galbraith.

b) On the axes above, draw the Time and Distance graph for the EMS car.

c) Determine **graphically** at what time and how far from Perth the EMS car will overtake Mr. Galbraith's car?

at 11:30 am ✓

220 km from Perth ✓

d) State the equation for the EMS car.

$d = 110t + c$ ✓

Sub (1.5, 0)

$0 = 110 \times \frac{3}{2} + c$

$c = -165$ ✓

$\therefore d = 110t - 165$

QUESTION 11 (4 marks)

Old MacDonald had a farm, he put chickens and rabbits in the same cage. He counted 35 heads, and 94 feet, how many chickens and rabbits respectively were there in the cage?

Chicken : x

Rabbits : y

$$\begin{cases} x+y=35 \checkmark \\ 2x+4y=94 \checkmark \end{cases}$$

CAS solve

$x = 23$ ✓

$y = 12$ ✓

∴ There were 23 chickens, 12 Rabbits