

WILLETTON SENIOR HIGH SCHOOL



Year 11 Mathematical Applications

Test 4 – 2021

Calculator Free

Student's name:

SOLUTIONS

Please circle your teacher's name:

Dr Duan

Mr. Hamilton-Brown

Mr Stillitano

Ms. Thompson

Mr Galbraith

Mr. Riemer

Section	Time Allocated	Marks
Calculator Free	25 minutes	27

Formula sheet allowed

No calculators or notes permitted.

Answer all questions in the space provided.

Show working to receive full marks.

QUESTION 1 (8 marks)

Solve the following equations, showing working where required

b) $-2x + 8 = 4$

$$\therefore -2x = -4 \checkmark$$

$$\therefore x = 2 \checkmark$$

[2]

a) $30 = \frac{3x}{4} + 6$

$$\therefore 24 = \frac{3x}{4} \checkmark$$

$$\therefore 96 = 3x \checkmark$$

$$\therefore x = 32 \checkmark$$

[3]

c) $2x - \frac{1}{3}(x + 27) = 16$

$$\therefore 2x - \frac{1}{3}x - 9 = 16 \checkmark$$

$$\therefore \frac{5x}{3} = 25 \checkmark$$

$$\therefore x = 25 \times \frac{3}{5}$$

$$\therefore x = 15 \checkmark$$

[3]

QUESTION 2 (5 marks)

Sophie, Alice, and Ben have a total of \$220. Alice has twice as much as Sophie and Ben has \$10 less than Alice.

a) Write an equation using the given information.

Let x represent the amount Sophie has
 $2x + x + 2x - 10 = 220 \checkmark$ (MPA)

[2]

b) Solve this equation.

$$5x - 10 = 220$$

$$5x = 230 \checkmark$$

$$x = 46 \checkmark$$

[2]

c) State how much Ben has.

$$\text{Ben has: } 2 \times 46 - 10 = \$82 \checkmark$$

[1]

QUESTION 3 (8 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)

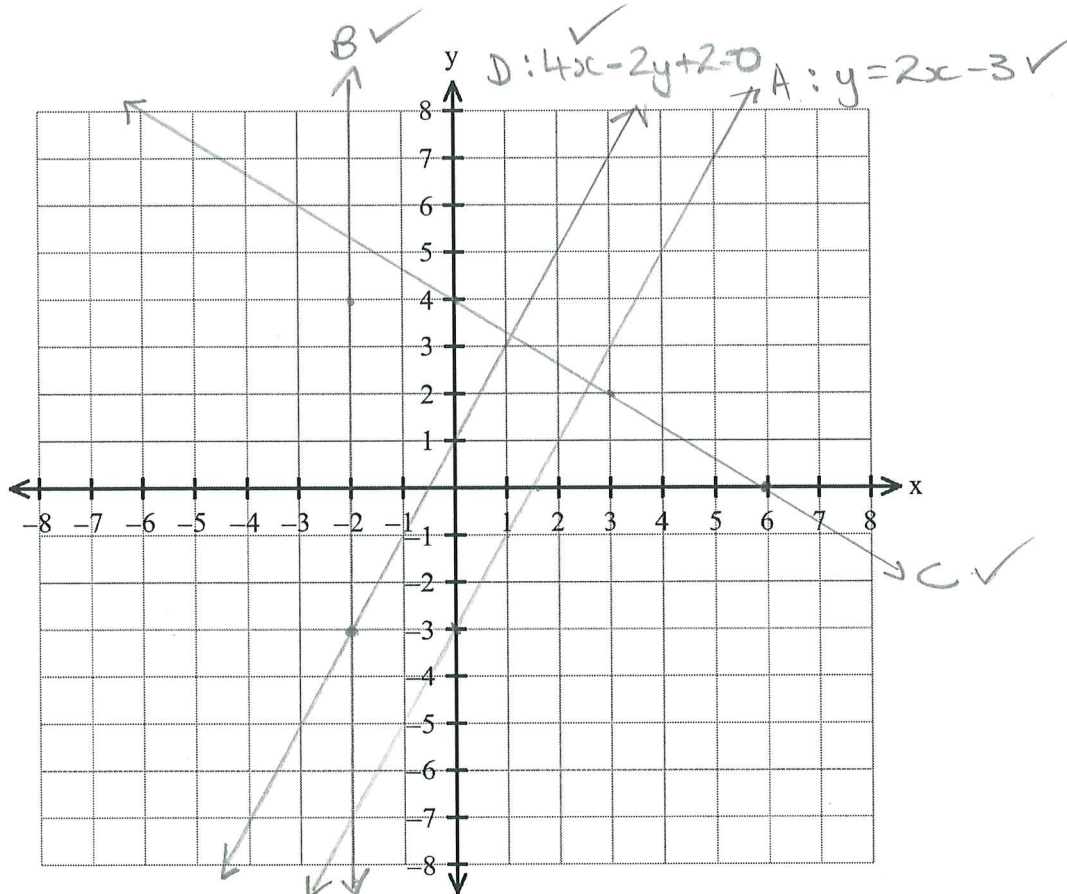
A: The equation of the line is $y = 2x - 3$

B: The line goes through the points $(-2, -3)$ and $(-2, 4)$

C: The line has a gradient of $-\frac{2}{3}$ and goes through $(0, 4)$

D: The equation of the line is $4x - 2y + 2 = 0$

[4]



- b) State the coordinates of the y intercept for line A $(0, -3)$ ✓ (FT)

[1]

- c) State the equation for line B $x = -2$ ✓

[1]

- d) State the equation for line C $y = -\frac{2}{3}x + 4$ ✓

[1]

- e) Determine the gradient for line D 2 ✓

[1]

QUESTION 4 (4 marks)

Algebraically solve the following pair of simultaneous linear equations.

$$2y = x + 4 \quad \text{--- (1)}$$

$$3x - 2y - 2 = 0 \quad \text{--- (2)}$$

Substitute (1) in (2)

(OR OTHER)

$$\left. \begin{aligned} 3x - (x+4) - 2 &= 0 \\ \therefore 3x - x - 4 - 2 &= 0 \end{aligned} \right\} \checkmark$$

$$\therefore 2x = 6$$

$$\therefore x = 3 \checkmark$$

Substitute $x=3$ into (1):

$$2y = 3 + 4 \checkmark$$

$$\therefore y = \frac{7}{2} \checkmark$$

Thus $x = 3$ and $y = \frac{7}{2}$

QUESTION 5 (2 marks)

The profit in dollars (P) for selling n books is modelled by the following straight line equation:

$$P = 20n - 800$$

- a) Interpret in context the meaning of the gradient in this situation.

The profit increases by \$20 for every additional book sold ✓

[1]

- b) What is the least number of books that must be sold to make a profit?

$$20n - 800 = 0$$

$$\therefore n = 40$$

41 books ✓

[1]

WILLETTON SENIOR HIGH SCHOOL



Year 11 Mathematical Applications

Test 4 – 2021

Calculator Assumed

Student's name: _____

SOLUTIONS

Please circle your teacher's name:

Dr Duan

Mr. Hamilton-Brown

Mr Stillitano

Ms. Thompson

Mr Galbraith

Mr. Riemer

Section	Time Allocated	Marks
Calculator Assumed	25 minutes	29

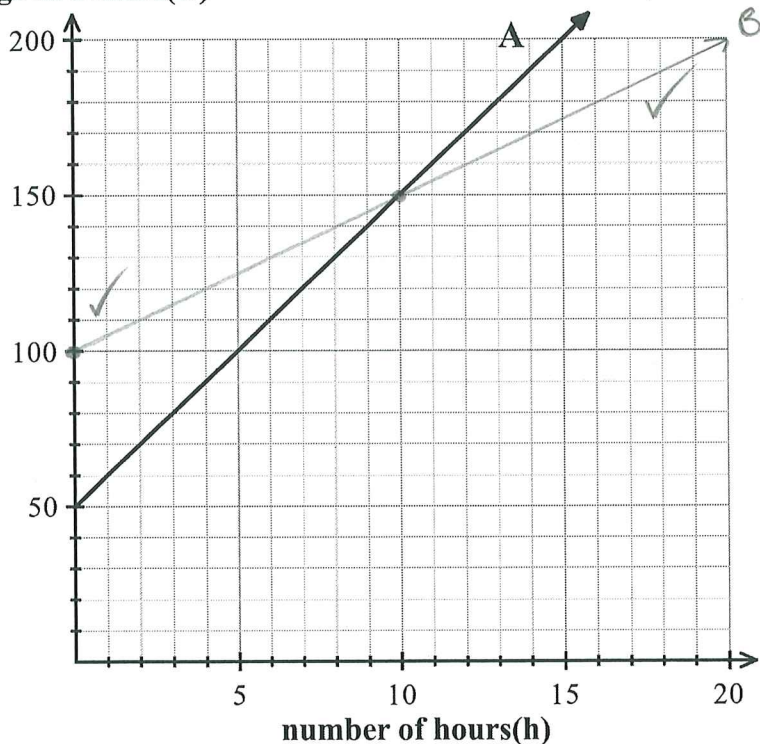
Calculators and Classpads allowed.
Formula sheet allowed
One side of A4 page of notes allowed.
Show working to receive full marks.

QUESTION 6 (7 marks)

The charges to hire a machine from two companies are as follows:

- The charges for Company A are shown on the graph below.
- Company B charges a fixed fee of \$100 plus \$5 per hour.

charge in dollars(C)



a) On the axes above, draw the graph to show the charges for Company B.

[2]

b) State the equation for the charges for company A

[2]

$$C = 10h + 50$$

c) Explain which company you would use if you wanted to hire the machine for ⁸10 hours.

[1]

Company A, as cheaper ✓

d) i. Determine the point of intersection of the two graphs.

(10, 150) (ft)

[1]

ii. Interpret in context, the significance of the point of intersection of the two graphs.

[1]

If hiring for 10 hours, the cost is \$150 for either company A or B ✓

QUESTION 7 (6 marks)

Water is poured at the same rate into two different rectangular prisms A and B. Both containers have a height of 30 cm. The depth of water in cm(D) for each container, changes over time in seconds(t).

- The equation for container A: $D = 0.5t + 12$
- The equation for container B: $D = 2t$

a) Interpret in context the meaning of the "+12" for the equation for container A.

[1]

The depth of water in container A is 12 cm before ^{more} water is poured in ✓

b) Which container will be filled first? Justify.

[3]

$$\begin{aligned} \text{A: } 0.5t + 12 &= 30 \Rightarrow t = 36 \checkmark \\ \text{B: } 2t &= 30 \Rightarrow t = 15 \checkmark \end{aligned}$$

container B will fill first as $15 < 36$ ✓

c) After how many seconds will the depth of water in the two containers be the same?

[2]

$$0.5t + 12 = 2t \checkmark$$

$$\therefore t = 8$$

After 8 seconds ✓

QUESTION 8 (3 marks)

Four tables and seven chairs together cost \$935. After a discount of 10% on the tables and 15% on the chairs, the total cost becomes \$818.75.

a) If the cost of each table is 't' dollars and the cost of each chair is 'c' dollars, write down a pair of simultaneous equations for the situation above.

[2]

$$4t + 7c = 935 \dots \textcircled{1} \checkmark$$

$$3.6t + 5.95c = 818.75 \dots \textcircled{2} \checkmark \leftarrow \text{or other}$$

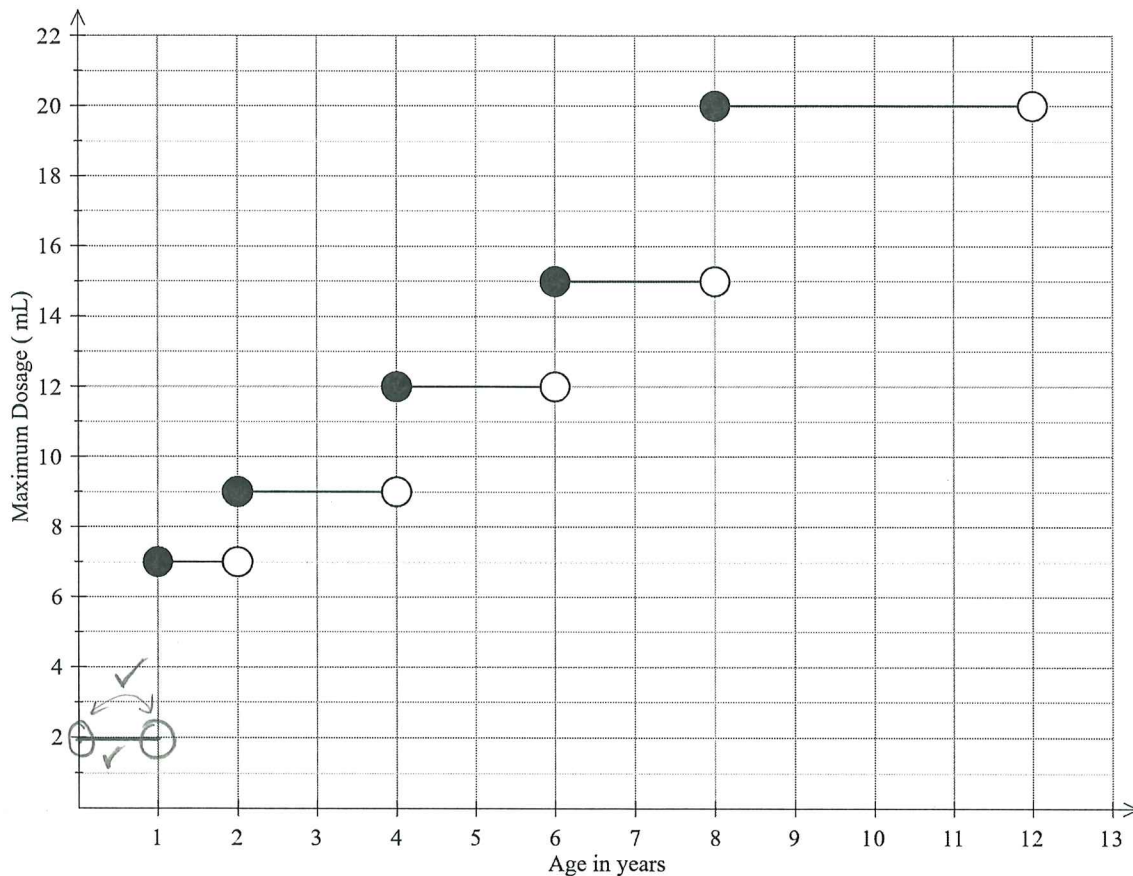
b) Find the cost of each table

[1]

Each table costs \$120 ✓

QUESTION 9 (5 marks)

The recommended maximum dosage(D) for a child's syrup according to age(A), is represented by the step graph below.



a) What is the maximum dosage for a child aged

i. 18 months?

7 mL ✓

[1]

ii. 8 years?

20 mL ✓

[1]

b) One spoon holds 5 mL, and another spoon holds 2 mL. How could you use these spoons to give the maximum dose to a 3-year-old?

1 × 5 mL + 2 × 2 mL ✓

[1]

c) Complete the graph if a child under one year of age, but not newborns, is allowed to take a maximum of two millilitres.

[2]

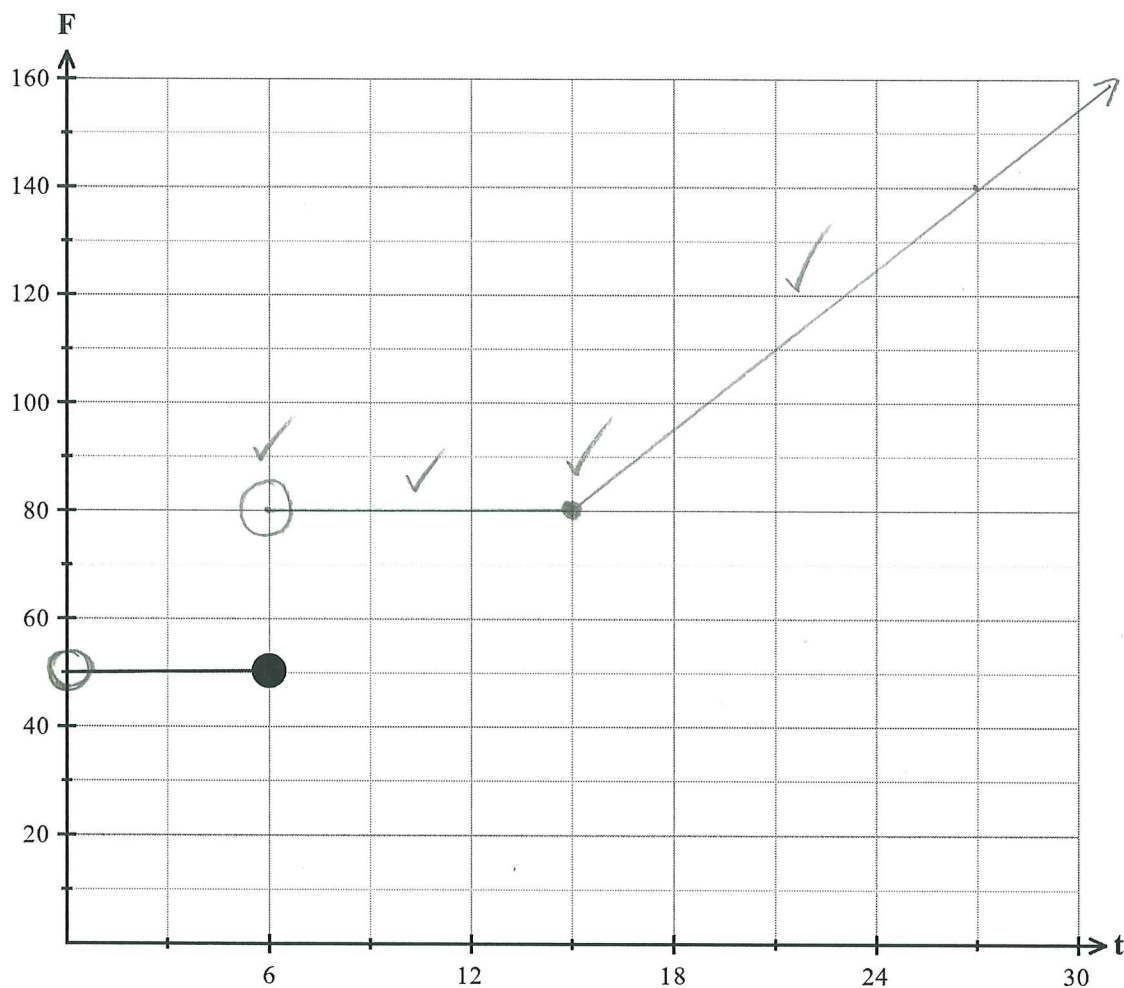
QUESTION 10 (8 marks)

A doctor's fee in dollars(F) is based on the length of the consultation in minutes(t), as shown below:

- Up to 6 minutes costs \$50.
- Over 6 minutes to 15 minutes costs \$80.
- Over 15 minutes costs \$80 plus \$5 for every minute over 15 minutes.

a) On the axes below, complete the piece-wise linear graph for the above situation.

[4]



b) How much will a 10-minute consultation cost?

$\$80$ ✓

[1]

c) If the fee paid was \$110, how long was the consultation?

21 min ✓

[1]

d) Write an equation for the interval $t > 15$.

$$F = 5t + 5$$

[2]