

SOLUTIONS

Section Two: Calculator-assumed

(80 Marks)

This section has **eleven (11)** questions. Answer **all** questions. Write your answers in the space provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time for this section is 100 minutes.

Question 8

(3 marks)

- (a) Julie and her friend Vina are on holiday in Thailand. The hotel where they are staying will change their Australian currency into Thai baht (the Thai currency unit) without charging any additional fees. Julie buys 5000 baht. This costs her \$223.20. Vina wants to buy 7000 baht.

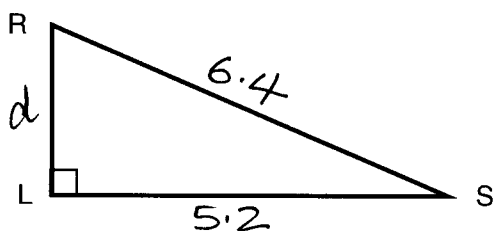
What will this cost Vina in Australian dollars?

(1 mark)

$$\frac{7000}{5000} \times 223.20 = \$312.48$$

$$\underline{\text{OR}} \quad \$312.50 \quad \checkmark$$

- (b) In a game of beach soccer, Stephanie (S) is 5.2 metres directly in front of the left hand goal post (L). She is 6.4 metres away from the right hand goal post (R), as shown in the diagram below. How far apart are the goal posts, giving your answer in metres correct to one decimal place? (2 marks)



$$\begin{aligned} d &= \sqrt{6.4^2 - 5.2^2} \quad \checkmark \\ &= 3.7309 \\ &= 3.7 \text{ m} \quad \checkmark \end{aligned}$$

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Question 9

(7 marks)

- (a) Pablo wants to buy 1 kg of instant coffee for a group of mates who are going on a camping trip. At the supermarket he finds that the preferred fair-trade coffee comes in three packs of different weights:

500 g for \$28.22, 250 g for \$11.54, and 200 g for \$9.82.

What is the cheapest way for Pablo to buy 1 kg of fair-trade instant coffee? (3 marks)

$$\begin{array}{lll}
 2 \times 28.22 & 4 \times 11.54 & 5 \times 9.82 \\
 = \$56.44 & = \underline{\underline{\$46.16}} & = \$49.10
 \end{array}$$

Cheapest is 4 packets of 250g ✓

- (b) A brand of toothpaste is sold in two sizes, 120 g tubes costing \$2.91 and 160 g tubes costing \$3.41.

- (i) Calculate the price per 100 g of each size tube and decide which is the better buy (2 marks)

$$\begin{array}{ll}
 \frac{2.91}{120} \times 100 & \frac{3.41}{160} \times 100 \\
 = \$2.425 & = \$2.131
 \end{array}$$

160g is the better buy ✓

- (ii) The manufacturers wish to introduce a 200 g tube that is to be a better buy than the 160 g tube. What is the maximum they can charge for the 200 g tube? (2 marks)

For 160g \$2.13 per 100g

$$\Rightarrow 2.13 \times 2 = 4.26 \checkmark$$

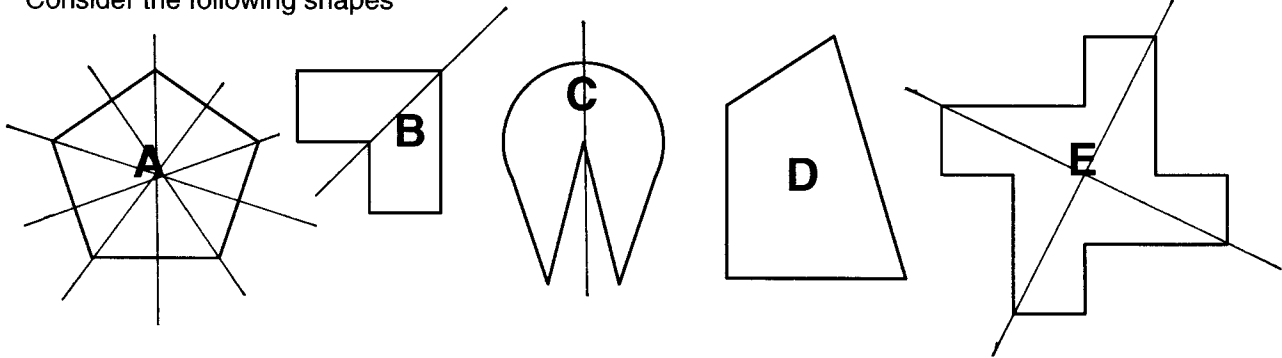
The 200g tube must be less than \$4.26 }
OR The 200g tube must be \$4.25 or less } ✓

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Question 10

(6 marks)

Consider the following shapes



(a) Complete this table for the shapes

(3 marks)

Shape	A	B	C	D	E
Number of lines of symmetry	5	1	1	0	0
Order of rotational symmetry	5	0	0	0	4

-1 for each error up to 3 errors

(b) Which of these shapes tessellate?

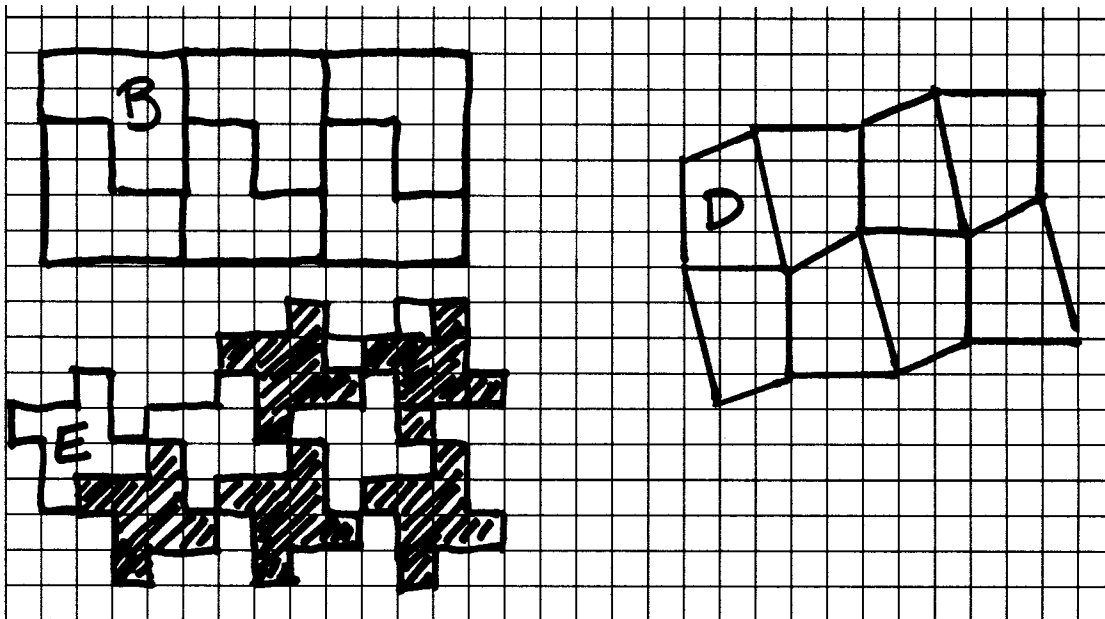
(1 mark)

B D E



(c) Select **one of the tessellating shapes** and draw a neat sketch showing the tessellation of at least two repeats to the right and another row below.

(2 mark)



One only required for full marks.



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Question 11

(10 marks)

(a) Determine the values of u , v , and w so that the data set:

(i) 0, 1, 3, 7, 10, u has a mean of 4 (1 mark)

$6 \times 4 = 24 \quad u = 3 \quad \checkmark$

(ii) 0, 1, 3, 7, 10, v has a median of 3.5 (1 mark)

$v = 4 \quad \checkmark$

(iii) 0, 1, 3, 7, 10, w has a range of 20 (1 mark)

$w = 20 \quad \checkmark$

(b) The coach of the school swimming team records the number of laps each team member swims at training sessions. The data for training last Thursday is shown in the table.

Number of laps	11	14	15	16	17	Total
Frequency	1	4	7	6	3	21
Relative frequency	.05	.19	.33	.29	.14	1.00

\checkmark

(i) Complete the frequency table. (1 mark)

(ii) How many members of the swim team trained last Thursday? (1 mark)

21 \checkmark

(iii) What fraction of the team swam the median number of laps on Thursday? (2 marks)

median = 15 laps \checkmark $\frac{7}{21} = \frac{1}{3} \checkmark$

(iv) What percentage of the team swam the maximum number of laps? (1 mark)

14% \checkmark

(v) Without drawing the graph, describe the spread of the data using appropriate statistics and terms. (2 marks)

The data tends to be clustered about the median. The range is quite low $17-11=6$. The single value of 11 may be an outlier. The range would be 3 if the value 11 is discarded. \checkmark

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Question 12

(5 marks)

The number of children per family was recorded for all residents of Windyup who were made homeless after heavy floods. The results are displayed in the table below.

Number of children in family	frequency
0	15
1	10
2	22
3	25
4	10
5	6
6	0
7	1

Use the data in the table for the following calculations.

- (a) How many children in Windyup were made homeless? (1 mark)

206 ✓

- (b) What was the modal number of children per family? (1 mark)

3 ✓

- (c) What was the mean number of children per family? (1 mark)

2.3 ✓

- (d) What was the median number of children per family? (1 mark)

2 ✓

- (e) The relief authorities would like to keep families together. They plan temporary housing for each family. Which measure would be the most appropriate to use for them to use for their planning?
Explain your reasoning. (1 marks)

The mode because then the greatest number of families will have housing that suits them.

OR
The median because then at least half of the families will have the right housing. ✓

OR
Any other sensible explanation.

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Question 13

(10 marks)

An insurance company statistician studied the causes of car accidents over a period of one year. One of the variables she recorded was the age of the driver involved in serious accidents.

The information was recorded as follows:

Age in years	$18 \leq a < 23$	$23 \leq h < 28$	$28 \leq h < 33$	$33 \leq h < 38$	$38 \leq h < 43$
Number of drivers	10	8	3	3	1

Age in years	$43 \leq h < 48$	$48 \leq h < 53$	$53 \leq h < 58$	$58 \leq h < 63$	$63 \leq h < 68$
Number of drivers	3	1	4	5	7

- (a) Use the class midpoints to calculate the mean age of drivers (correct to two decimal places). (2 marks)

$$\bar{x} = 40.39 \quad \checkmark \checkmark$$

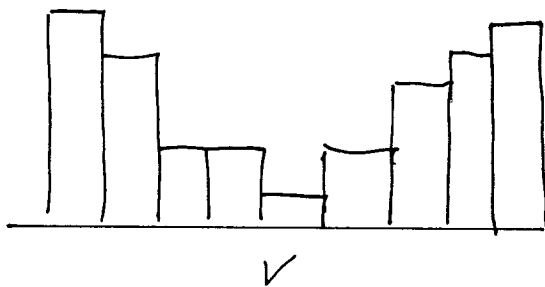
- (b) Find the median class interval (the interval which contains the median). (1 mark)

$$33 - 38 \quad \checkmark$$

- (c) State the modal class interval. (1 mark)

$$18 - 23 \quad \checkmark$$

- (d) Draw a **sketch** of the frequency histogram (not to scale) and briefly describe the spread of the data. (3 marks)



The data is very spread out. \checkmark
 Bimodal at extreme values. \checkmark
 Frequencies are lowest near the median and the mean. \checkmark
 Full marks for any two sensible comments.

- (e) What conclusions could the statistician make from studying the data? (3 marks)

The mean and the median ages do not reflect the distribution of the ages. \checkmark
 Inexperienced and older drivers tend to have more serious accidents. \checkmark

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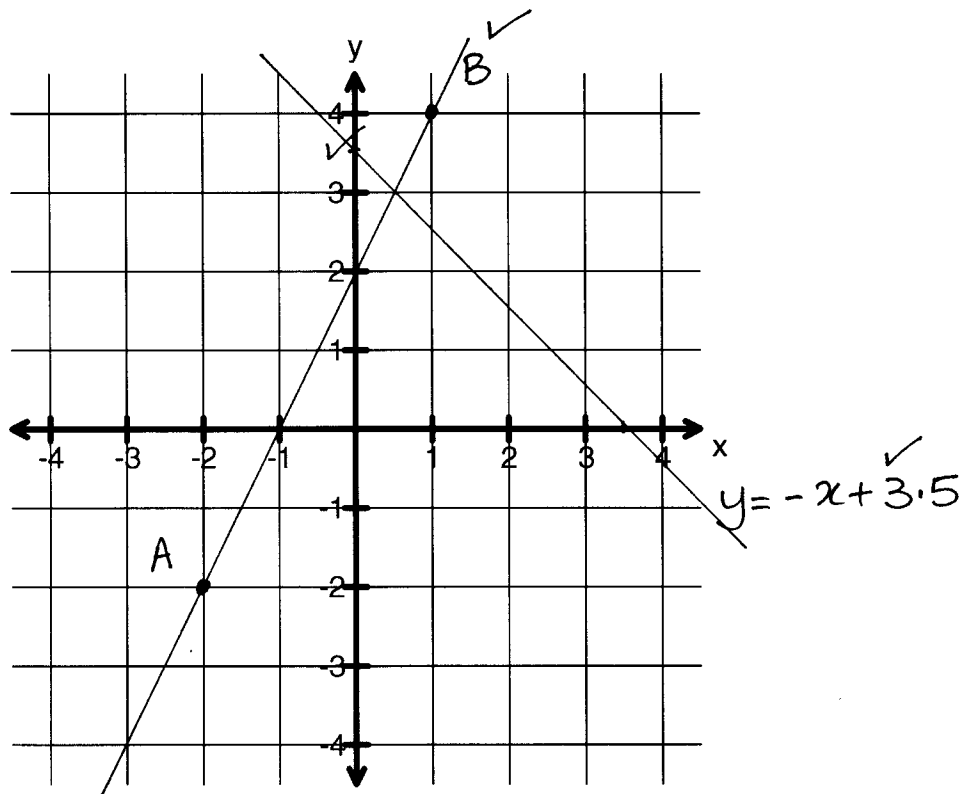
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The mode is a better indicator but does not show the accident rate in old people. \checkmark

Question 14

(8 marks)

- (a) (i) Plot the points A(-2, -2) and B(1, 4) on the axes below. Label these. (1 mark)



- (ii) On the graph above, draw in the line that passes through points A and B. (1 mark)
- (iii) What is the gradient of the line through points A and B? 2 ✓ (1 mark)
- (iv) Write the equation of the line through points A and B in the form $y = mx + c$ (1 mark)

$$y = 2x + 2 \quad \checkmark$$

- (b) On the same axes, draw and label the line $y = -x + 3.5$ (2 marks)

- (c) Show algebraically that the point (0.5, 3) lies on the line through the points A and B. (2 marks)

$$\begin{aligned} x = 0.5 \quad y &= 2x + 2 \\ y &= 2(0.5) + 2 \\ &= 3 \end{aligned} \quad \checkmark$$

pt (0.5, 3)
does lie on the line
through A and B

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Question 15

(8 marks)

Fiona is training for an endurance race. She decides to follow a training program over several weeks. Fiona decides to increase the total distance she runs each day by a constant number of metres. The distances for the first four days of this training program are shown in the table.

Day	1	2	3	4	5	6
Distance (km)	3.2	3.5	3.8	4.1	4.4	4.7

- (a) What distance will Fiona run on Day 6? (1 mark)

4.7 km ✓

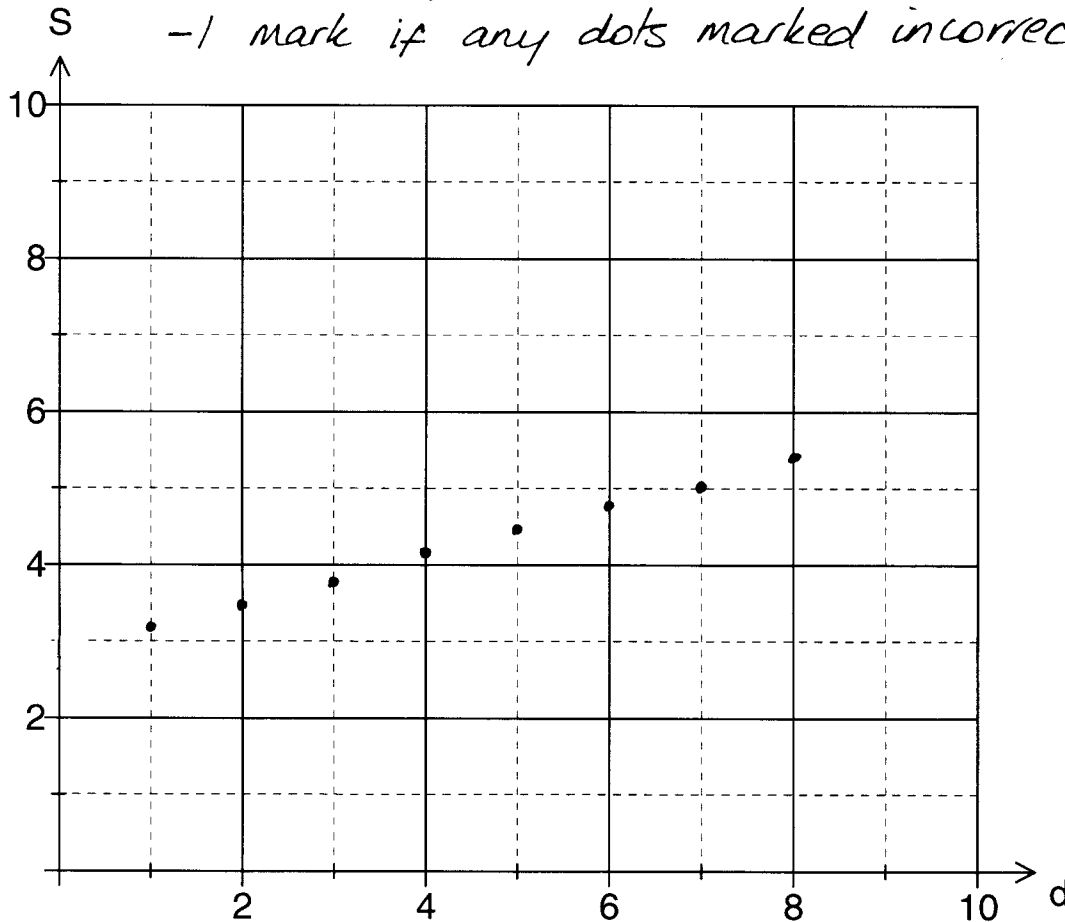
- (b) On which day will Fiona first run more than 6 kilometres? (1 mark)

7 8 9 10 11
5.0 5.3 5.6 5.9 6.2 Day 11 ✓

- (c) Draw a graph of the distances run by Fiona from day 1 to day 8 on the axes below. (2 marks)

- 1 mark if a line is drawn through the points.

- 1 mark if any dots marked incorrectly



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- (d) The distance S run by Fiona on day d may be written in the form

$$S = md + c$$

Determine the value of:

(i) $m = 0.3$ ✓ (1 mark)

(ii) $c = 2.9$ ✓ (1 mark)

- (e) Use the values you determined in part (d) above.

- (i) Determine the value of d that corresponds to the value $S = 9.0$ (1 mark)

$$S = 0.3d + 2.9$$
$$S = 9 \quad 9 = 0.3d + 2.9$$
$$d = 20.3 \quad \checkmark$$

- (ii) Explain why your solution to part (e) (i) is not reasonable in the situation of Fiona's training schedule. (1 mark)

It is not possible to run on day 20.3
Days must be whole numbers.

Fiona ran less than 9 km on day 20
and more than 9 km on day 21. ✓

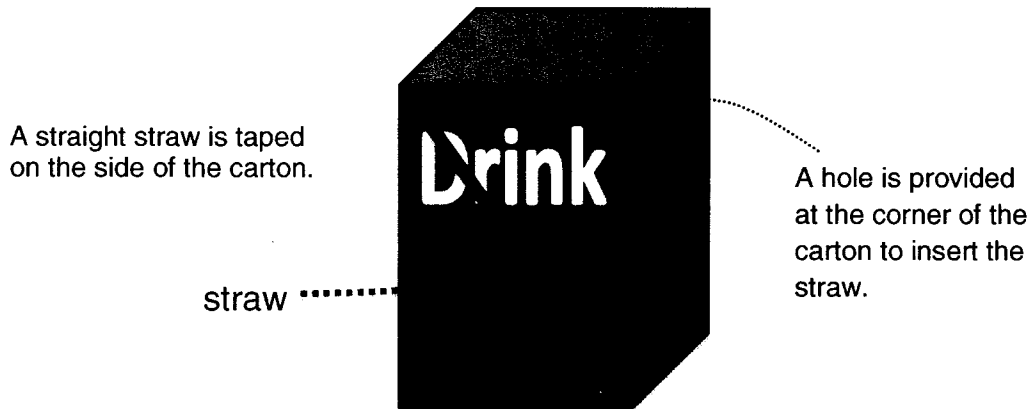
1 mark for explanation that days
must be integers.

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Question 16

(5 marks)

An individual drink carton is designed in the shape of a rectangular prism with dimensions: height = 13 cm, width = 6 cm and depth 6 cm.



- (a) What is the length, to the nearest centimetre, of the longest straight straw that does not project beyond the edges of the carton? (1 mark)

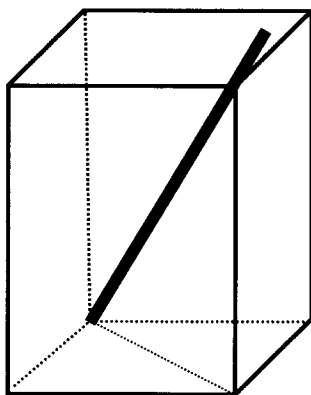
$$l^2 = 13^2 + 6^2 \quad l = 14.3178... \quad l = 14 \text{ cm } \checkmark$$

- (b) If the dimensions of the carton are all doubled, how will that affect the length of the straw? (1 mark)

the straw can be doubled, OR $l = 28 \text{ cm } \checkmark$

- (c) A new type of straw is developed that can be folded before being taped to the carton. The straw can now be longer without projecting beyond the edges of the carton. The designers want the straw to be long enough that it cannot fall through the hole into the carton.

What is the minimum length required for the straw so that it will have at least 1 cm sticking out the drink carton when in use? (3 marks)



$$l^2 = 14.3178^2 + 6^2 \checkmark$$

$$= 241$$

$$l = 15.52$$

add 1 cm \rightarrow 16.52

The straw must be at least 16.5 cm \checkmark
OR at least 17 cm.

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Question 17

(9 marks)

At a well-known wizard academy, students make pocket money by devising potions that are sold to other students.

A best-selling *Elastica* potion enables break-dancers to increase their flexibility on the dance floor. The recipe for *Elastica* requires 2 parts by weight of hogwash, 3 parts by weight of elixium, and 7 parts by weight of sugar.

- (a) How much elixium is needed for 60 grams of *Elastica* potion? (2 marks)

$$\begin{array}{l} 2:3:7 \\ H \ E \ S \end{array} \quad 2+3+7=12 \quad \text{For 60g need 5 lots} \\ \text{total } 3 \times 5 = 15 \text{ g} \checkmark$$

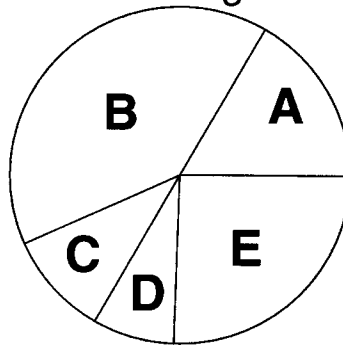
- (b) What percentage of *Elastica* is made of sugar? Give your answer correct to one decimal place. (2 marks)

$$\frac{7}{12} \times 100 = 58.3\% \checkmark$$

The circle graph below illustrates the ingredients and proportions needed for *Agoria* potion.

The ingredients cost \$84 to make 1 litre of this potion.

Ingredients for *Agoria* Potion



- (c) Which two ingredients make up exactly half of *Agoria* potion? (1 mark)

$$B + C \checkmark$$

- (d) Ingredient A represents one-sixth of the circle graph. How much will it cost for ingredient A to make 500 mL of *Agoria* potion? (2 marks)

$$\begin{array}{l} 500 \text{ mL is half } \$84 \checkmark \\ \frac{1}{6} \times 84 \div 2 = \$7 \checkmark \end{array}$$

- (e) Ingredient B costs \$6.75 to make 200 mL of *Agoria* potion. What is the approximate percentage, correct to the nearest whole number, of ingredient B in *Agoria* potion? (2 marks)

$$\frac{6.75}{84 \div 5} \times 100 \approx 40\% \checkmark$$

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Question 18

(9 marks)

- (a) Inigo saw that a hair-straightening appliance was advertised for a discount of 30%. If the usual price of the appliance is \$46.99, what is the discounted price? (1 marks)

$$46.99 \times 0.7 = \$32.89$$

OR \$32.90 ✓

- (b) At a second-hand caravan sale yard, a van that was purchased for \$12 000 is then advertised for sale with a mark up of 40% added.

- (i) At what price is the van advertised? (1 mark)

$$12000 \times 140\% = \$16800 \checkmark$$

- (ii) Clinton, a salesman, earned a 3% commission on the sale price of the van. If his commission was \$480, for how much was the van sold? (1 marks)

$$\frac{480}{0.03} = \$16000 \checkmark$$

- (iii) Not only did the buyer of the van talk down the asking price, he also traded in his old vehicle for \$1 500. What profit did the caravan sale yard actually make on the sale of this van? (2 marks)

$$16000 - (12000 + 1500 + 480) = \$2020 \checkmark$$

- (c) A stockbroker bought a penthouse for \$1 940 000. After the global financial crisis he was forced to sell the penthouse for \$1 720 000. The agent selling the penthouse received a commission of 1.5% of the selling price.

- (i) How much did the stockbroker receive after the commission was paid? (2 marks)

$$1720000 \times 0.985 = \$1694200 \checkmark$$

- (ii) What was the stockbroker's loss on the sale of the penthouse expressed as a percentage of the price he paid to buy it, correct to one decimal place? (2 marks)

$$\frac{1694200}{1940000} \times 100 = 87.3\%$$

Loss is $100 - 87.3 = 12.7\% \checkmark$

End of questions