

Mathematical Formulae*Compound interest*

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved Surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4 \pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

Answer **all** the questions.

- 1 Evaluate $\frac{(-0.692)^2 - \sqrt{7.318}}{-(2.873)^2}$, giving your answer to 4 significant figures.

Answer [1]

- 2 Write the following in descending order.

$$\sqrt{0.64}, \frac{\pi}{4}, 0.85^{\frac{3}{2}}, 0.801$$

Answer [2]

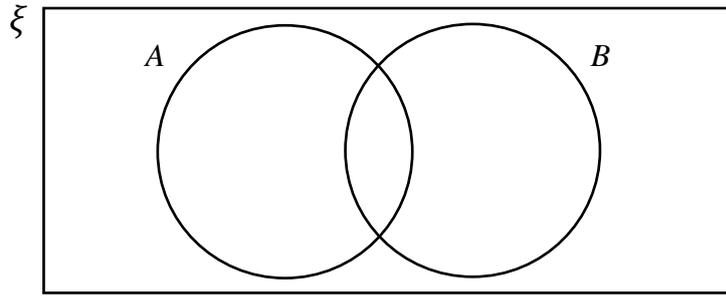
- 3 Cherries cost c cents per gram.

Amy buys p dollars worth of cherries.

Find an expression, in terms of c and p , for the mass of the cherries, in grams, that Amy buys.

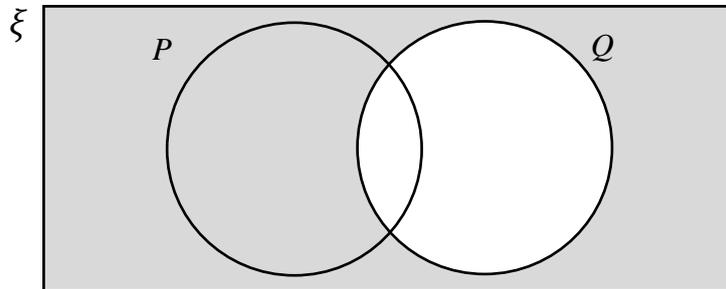
Answer g [2]

4 (a) Shade $(A \cap B)'$ in the Venn diagram below.



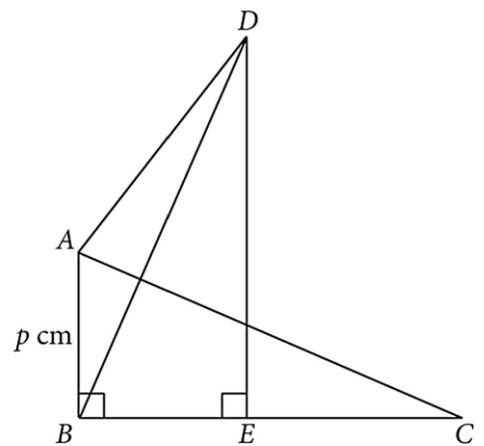
Answer ...*in the diagram*... [1]

(b) Express in set notation, the set represented by the shaded region below.



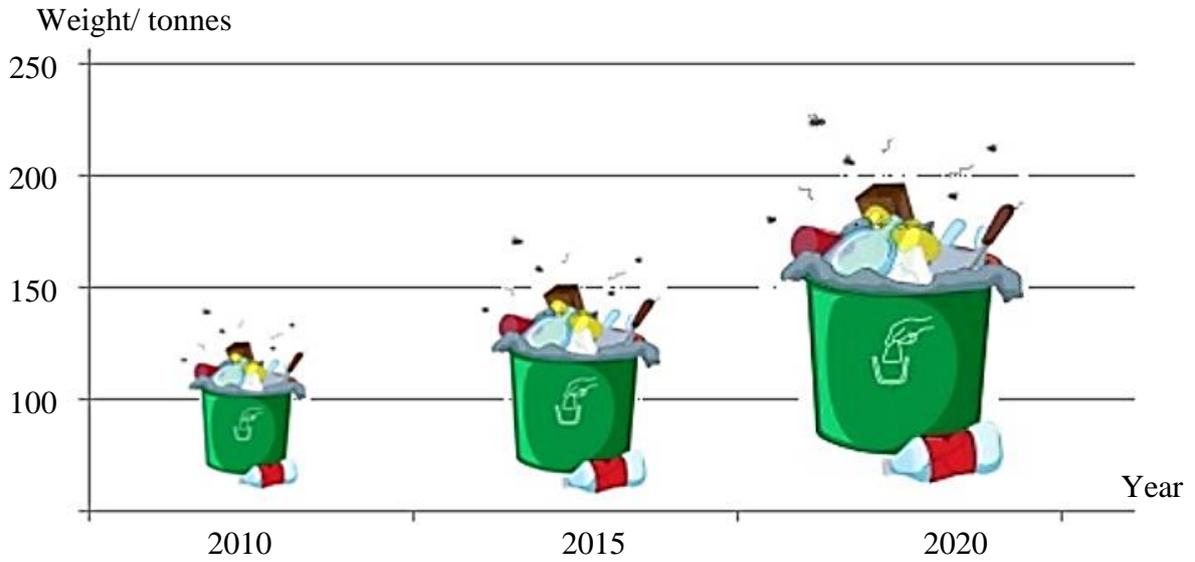
Answer [1]

5 Triangle ABC is congruent to triangle BED .
 The point E divides BC into two equal parts and
 $AB = p$ cm. Find an expression, in terms of p , for the
 area of the quadrilateral $ADEB$.



Answer cm^2 [3]

6 The graph below shows the amount of trash generated by a city over the past 10 years.



(a) Explain how the graph above may be misleading.

Answer

..... [1]

(b) Suggest an appropriate statistical diagram to better represent the graph above.

Answer [1]

7 (a) Factorise $5x^2 + 3x - 8$.

Answer [2]

(b) Hence factorise $5(4y-1)^2 + 12y - 11$ completely.

Answer [3]

8 (a) Expressing your answer as a power of 7, find

(i) $7^{17} \div 7^{-4}$,

Answer [1]

(ii) $\frac{1}{343}$,

Answer [1]

(iii) $\sqrt[4]{7}$.

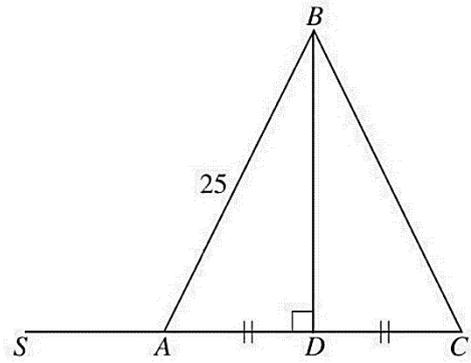
Answer [1]

(b) Given that $11^5 \times 11^n = 1$, write down the value of n .

Answer $n =$ [1]

- 9 In the diagram, $\angle ADB = 90^\circ$, $AB = 25$ cm and D is the midpoint of AC .

Given that $\cos \angle BAS = -\frac{7}{15}$, find the length of BD , without evaluating any angles.



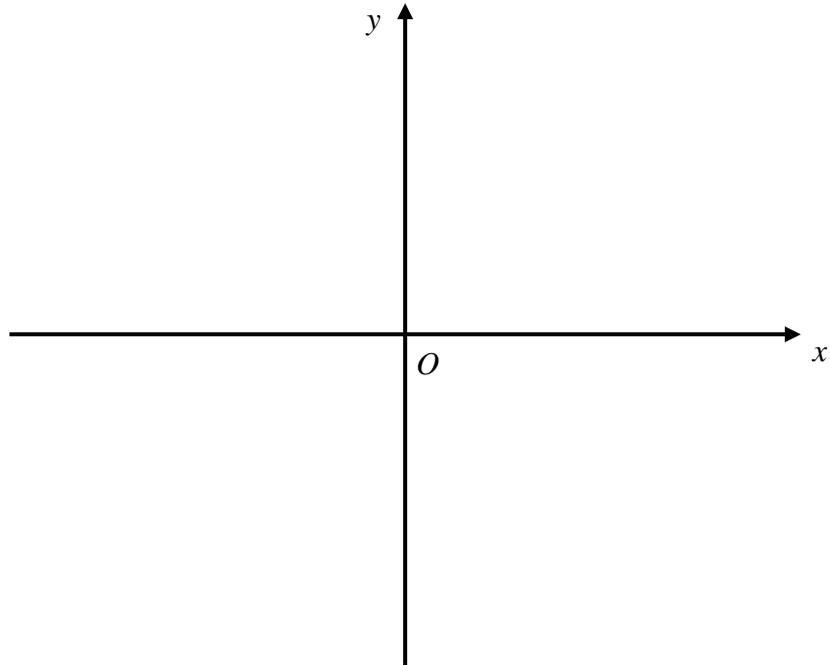
Answer cm [3]

- 10 A 45 cm tall statue is made from 7460 cm^3 of gold.
 An accurate scale model of the statue is made from 38 g of gold.
 Given that the density of the gold is 19.3 g/cm^3 , calculate the height, in cm, of the model.

Answer..... cm [3]

11 Sketch the graph of $y = x(x-8)$ on the axes below.

Indicate clearly the coordinates of the points where the graph crosses the axes and the minimum point on the curve.



Answer ...in the diagram... [3]

12 Ming Hui can wash 70 plates in 2 hours.

Akila can wash 100 plates in 3 hours.

If Ming Hui and Akila work together, how long will it take for them to wash 200 plates?

Leave your answer in hours and minutes.

Answer h min [3]

- 13** The diagram shows the plan of the ceiling of a kitchen.
 It is drawn to the scale of 1 cm to n metres.
 The actual area of the ceiling is 72 m^2 .



- (i) Using the plan, find the value of n .

Answer $n = \dots\dots\dots$ [2]

- (ii) Donald wants to paint the ceiling.
 The paint he has chosen is available in three different sizes.

S:	400 ml \$9.90	M:	1 litre \$21	L:	5 litres \$85
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1 litre of paint can cover 10m^2 .

Explain how many cans of each size he should buy in order to keep his cost of paint to a minimum.

Answer

.....

..... [3]

14 The table show the time taken, in minutes, to clear 100 passengers embarking on a cruise at the Singapore Cruise Centre on a particular day.

Time taken (min)	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 50$
Number of passengers	16	25	28	17	14

(a) Calculate the
 (i) mean,

Answer mins [1]

(ii) standard deviation.

Answer mins [1]

The following table shows the mean and standard deviation of the time taken to clear passengers at the Marina Bay Cruise Centre.

Mean = 21.9 min	Standard deviation = 13.5 min
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(b) A tour operator has a choice of starting his group’s journey from either the Singapore Cruise Centre or the Marina Bay Cruise Centre. Which cruise centre should he choose? Explain your answer.

Answer

 [2]

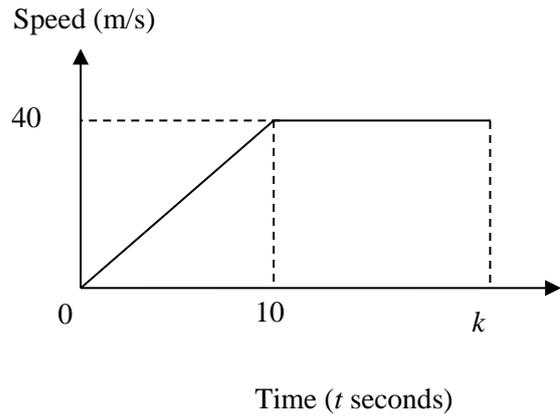
- 15 Riswan is planning a business trip to Paris and Los Angeles. He books 3 nights at a Paris hotel which charges €140 per night and 5 nights at a Los Angeles hotel that charges US\$245 per night. Riswan uses his credit card to pay for the bookings. He is offered a reimbursement of S\$ 2500 for his trip. Justify with relevant working if that amount can cover the cost of the hotel booking.

Exchange rate:
Singapore dollars (S\$) and US dollars (US\$) is S\$ 1 = US\$0.73
Euros (€) and US dollars is €1 = US\$1.18
<i>*For accounting purposes, all expenses are to be charged in USD to credit cards. There will be an additional charge of 3.5% for currency conversion.</i>

Answer

..... [4]

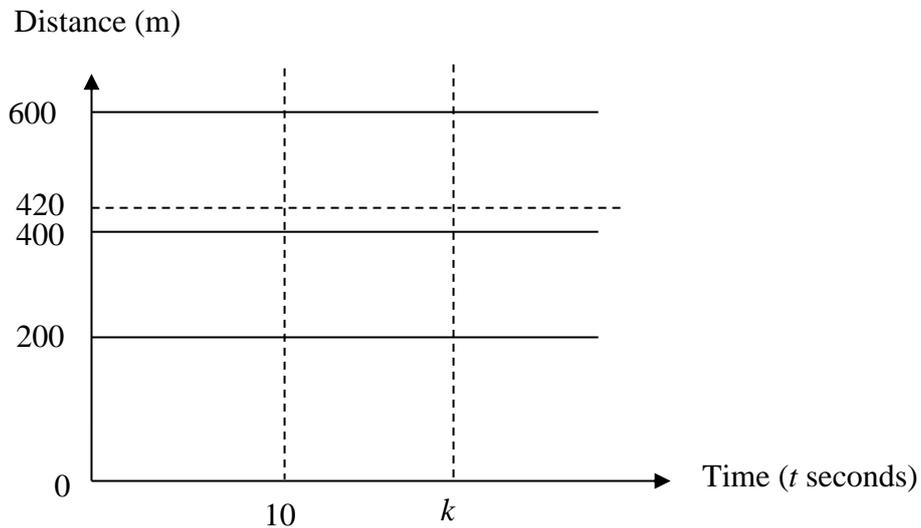
- 18** The diagram is the speed-time graph for the first k seconds of the motion of an object. The object accelerated uniformly for the first 10 seconds from rest to reach a speed of 40 m/s. It then maintained the same speed until k seconds.



- (a) Given that the distance travelled in the first k seconds is 420 m, find the value of k .

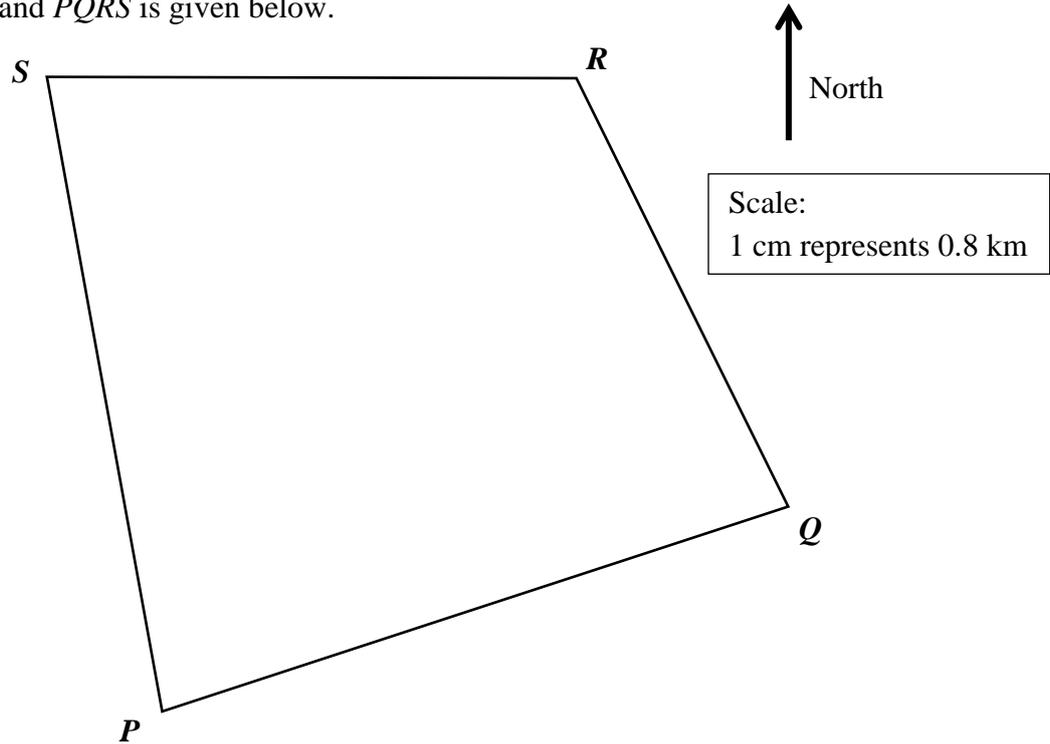
Answer $k = \dots\dots\dots$ [2]

- (b) On the axes given below, sketch the distance-time graph for the first k seconds of the motion of the object.



Answershown on diagram..... [2]

19 A plot of land $PQRS$ is given below.



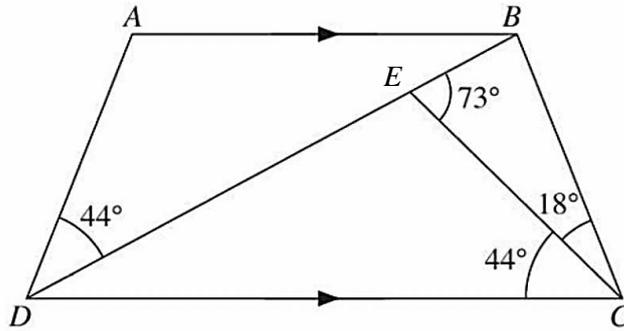
- (i) A business tycoon would like to fix a position for his building in that plot of land. The building is on a bearing of 120° from S and is equidistant from R and Q . By construction, using protractor, compasses and ruler, find and label the position of the building with a X .

Answershown on diagram..... [2]

- (ii) When the tycoon stands at P and looks at the top of the building, his angle of elevation is 1.8° . By measuring the length of PX , find the actual height of the building, in metres.

Answer m [3]

20 In the diagram given below, $ABCD$ is a trapezium and DEB is a straight line. $\angle ADB = \angle ECD = 44^\circ$, $\angle BEC = 73^\circ$ and $\angle ECB = 18^\circ$.



(a) Calculate, stating reasons clearly

(i) $\angle ABD$,

Answer $^\circ$ [2]

(ii) reflex $\angle DAB$.

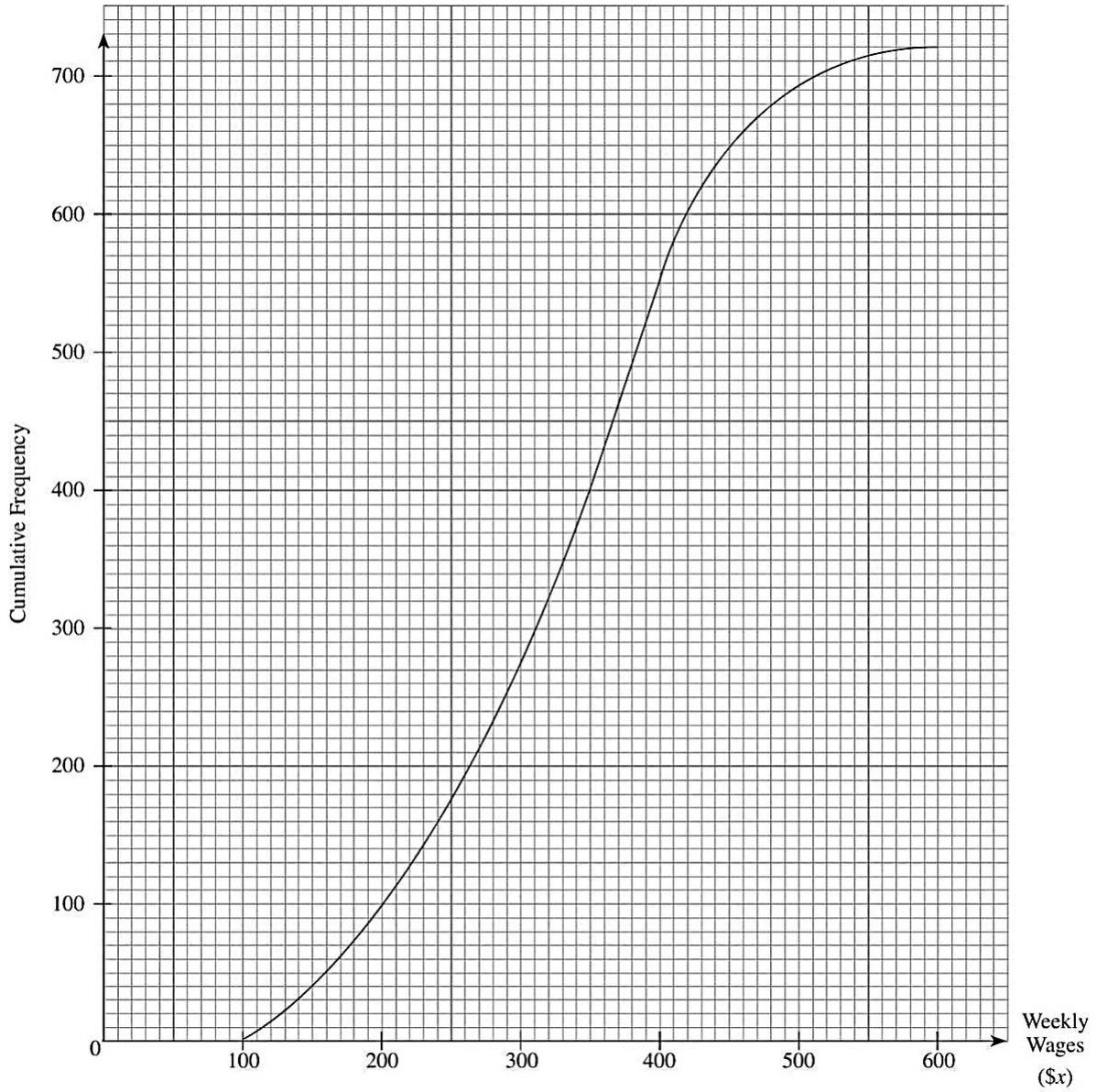
Answer $^\circ$ [2]

(b) Explain why a semicircle, with DC as a diameter, does not pass through B .

Answer

..... [1]

21 The cumulative frequency curve below gives the weekly wages of 720 factory workers in factory A.



Use the graph to find

- (a) the number of workers earning \$240 or less a week,

Answer [1]

(b) the median weekly wage,

Answer \$ [1]

(c) the interquartile range,

Answer \$ [2]

(d) the percentage of workers earning more than \$420 a week.

Answer% [2]

22 The average number of plain waffle, peanut waffle and chocolate waffle sold per day at 2 outlets on weekdays is given by matrix **P** and the average number of waffles sold on weekends is given by matrix **Q**.

$$P = \begin{pmatrix} 71 & 53 & 89 \\ 80 & 24 & 92 \end{pmatrix} \qquad Q = \begin{pmatrix} 22 & 35 & 52 \\ 22 & 42 & 45 \end{pmatrix}$$

(a) Evaluate the matrix **T** = **5P** + **2Q**.

Answer T = [2]

(b) The price of a plain waffle is \$1.60, peanut waffle is \$2.20 and a chocolate waffle is \$2.00. Represent the prices by a 3×1 column matrix **S**.

Answer S = [1]

(c) Evaluate the matrix **R** = **TS**.

Answer R = [2]

(d) Explain what the elements of **R** represent.

Answer

.....[1]