

[illegible]

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4048/01

**30 August 2021**

**2 hours**

Write your candidate name, class and index number in the spaces at the top of this page.  
Write in dark blue or black pen.  
You may use a HB pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The use of an approved scientific calculator is expected, where appropriate.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

The number of marks is given in brackets [ ] at the end of each question or part question.  
The total marks for this paper is 80.

For Examiner's use
Marks
80

**Parent's Signature:**\_\_\_\_\_

This question paper consists of **18** printed pages.

**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]

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- 2 Write the following in descending order.

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

Answer ..... [2]

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- 3 Cherries cost  $c$  cents per gram.

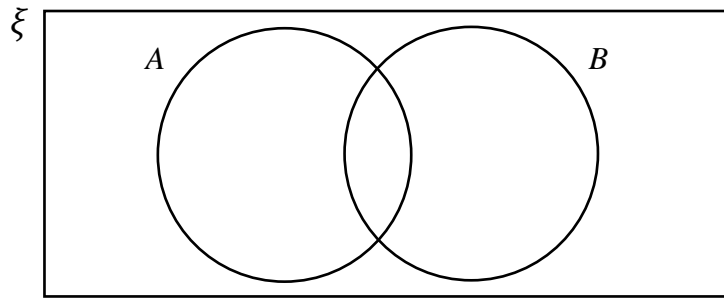
Amy buys  $p$  dollars worth of cherries.

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

Answer ..... g [2]

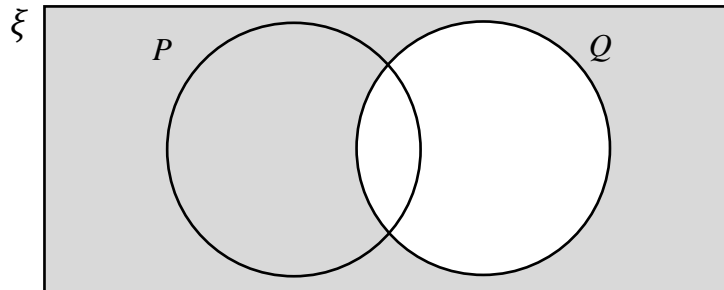
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- 4 (a) Shade  $(A \cap B)'$  in the Venn diagram below.



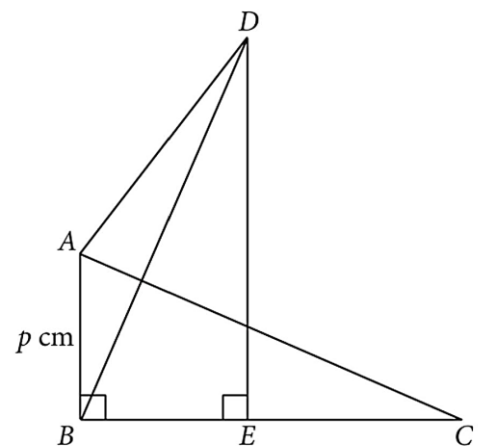
Answer ...*in the diagram*... [1]

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



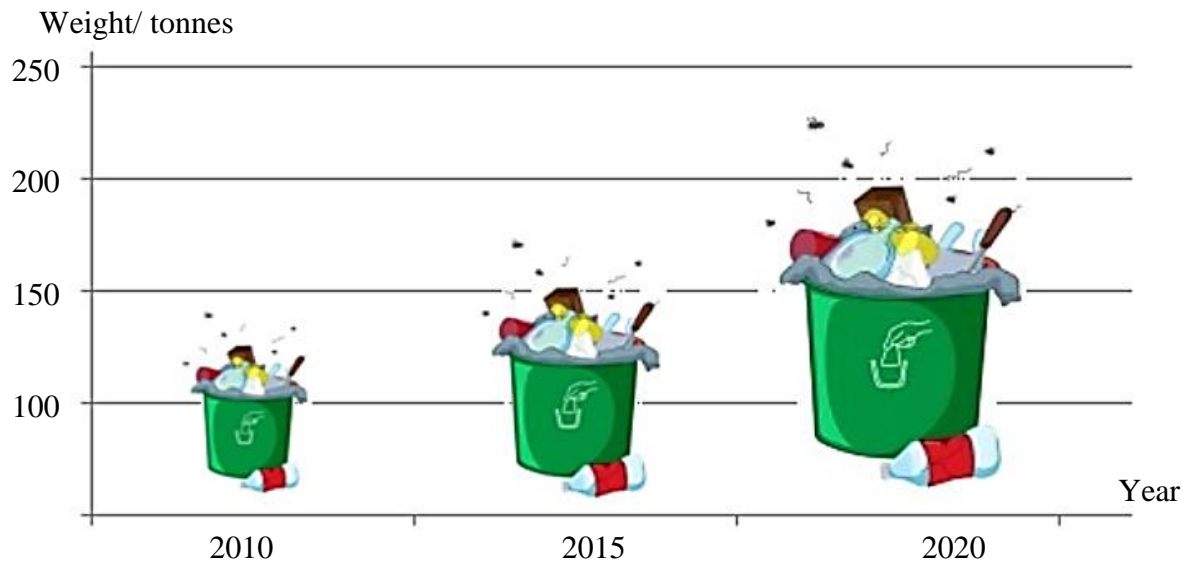
Answer ..... [1]

- 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 .....  $\text{cm}^2$  [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)  $\sqrt[4]{7}$ .

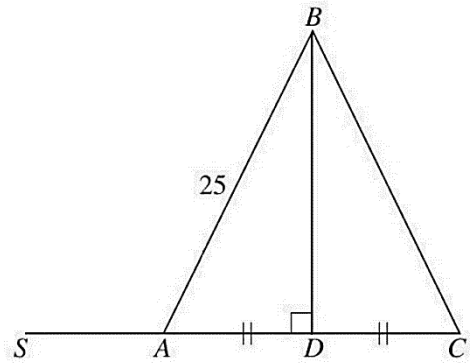
*Answer* ..... [1]

(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]

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- 10** A 45 cm tall statue is made from  $7460 \text{ cm}^3$  of gold.

An accurate scale model of the statue is made from 38 g of gold.

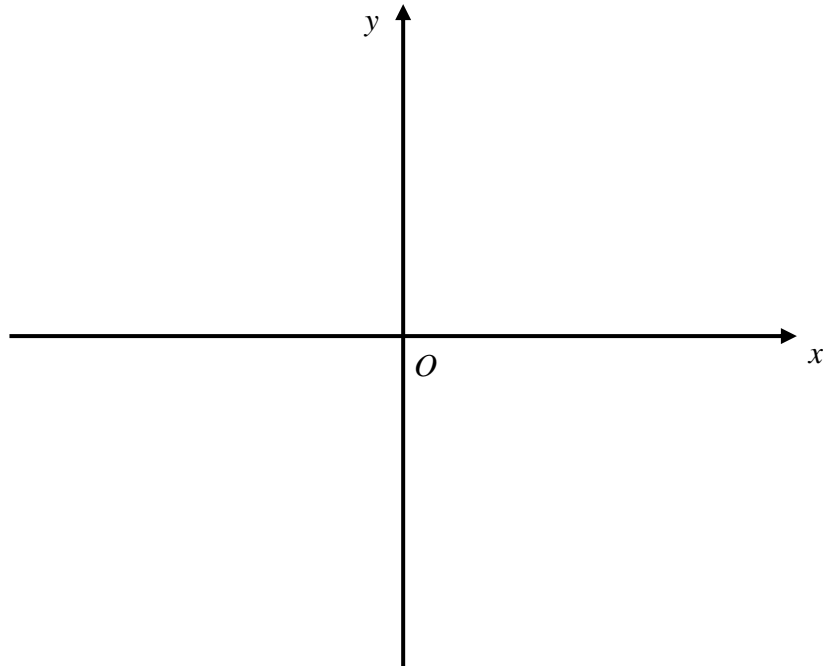
Given that the density of the gold is  $19.3 \text{ g/cm}^3$ , calculate the height, in cm, of the model.

*Answer* ..... cm [3]

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**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]*

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**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]*

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- 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  $72 \text{ m}^2$ .



- (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  $10 \text{ m}^2$ .

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.

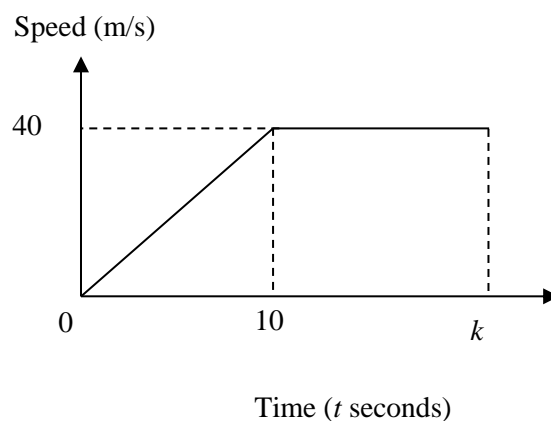
<b>Exchange rate:</b>
Singapore dollars (S\$) and US dollars (US\$) is S\$ 1 = US\$0.73
Euros (€) and US dollars is €1 = US\$1.18
<i>*For accounting purposes, all expenses are to be charged in USD to credit cards.        There will be an additional charge of 3.5% for currency conversion.</i>

*Answer* .....

..... [4]



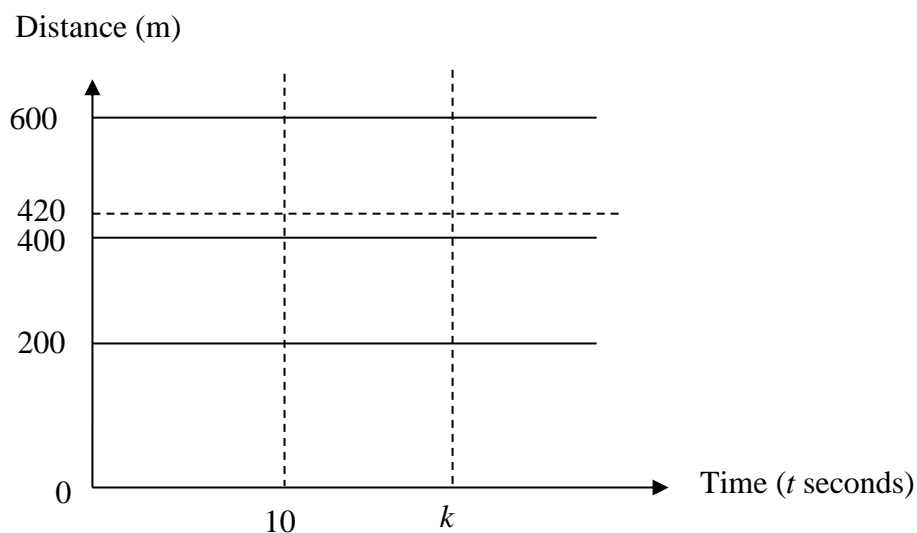
- 18** The diagram is the speed-time graph for the first  $k$  seconds of the motion of an object. The object accelerated uniformly for the first 10 seconds from rest to reach a speed of 40 m/s. It then maintained the same speed until  $k$  seconds.



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

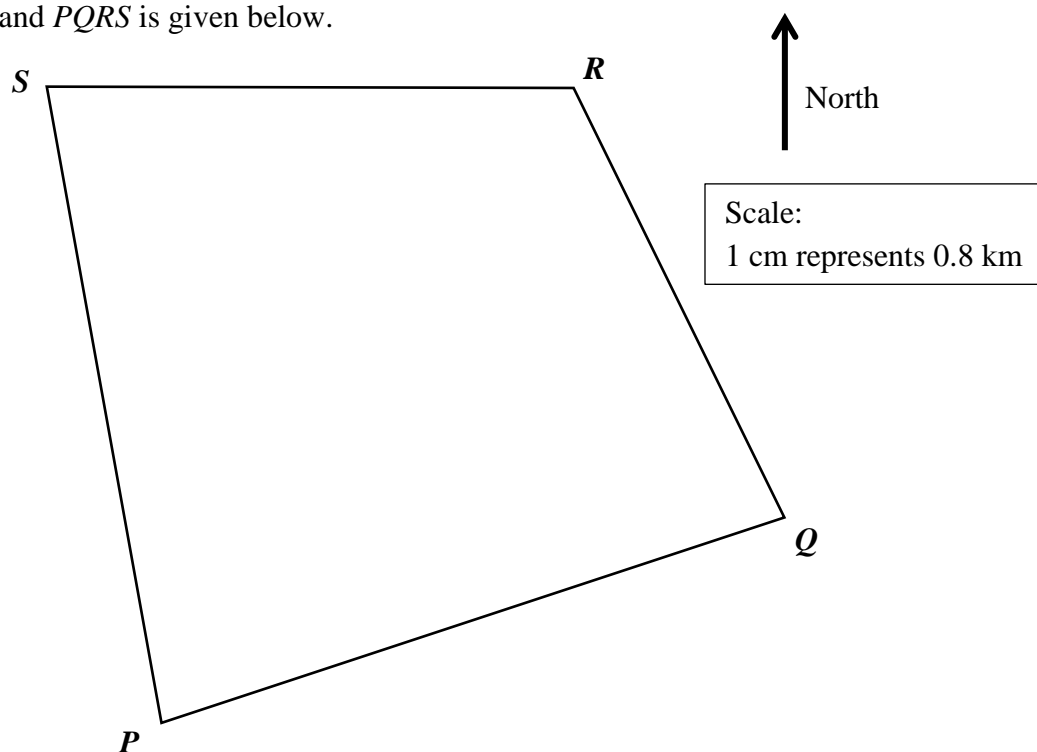
*Answer*  $k = \dots\dots\dots$  [2]

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



*Answer* .....shown 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  $120^\circ$  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  $X$ .

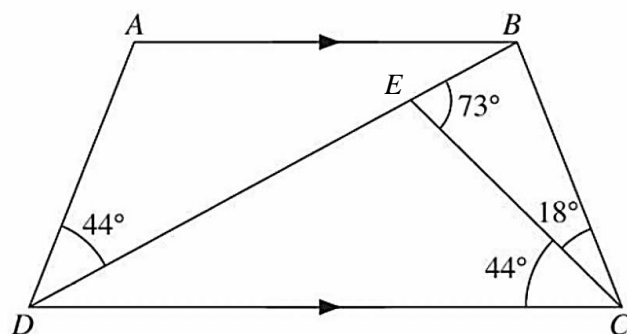
*Answer .....shown on diagram.....* [2]

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

*Answer ..... m* [3]

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- 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  $\angle DAB$ .

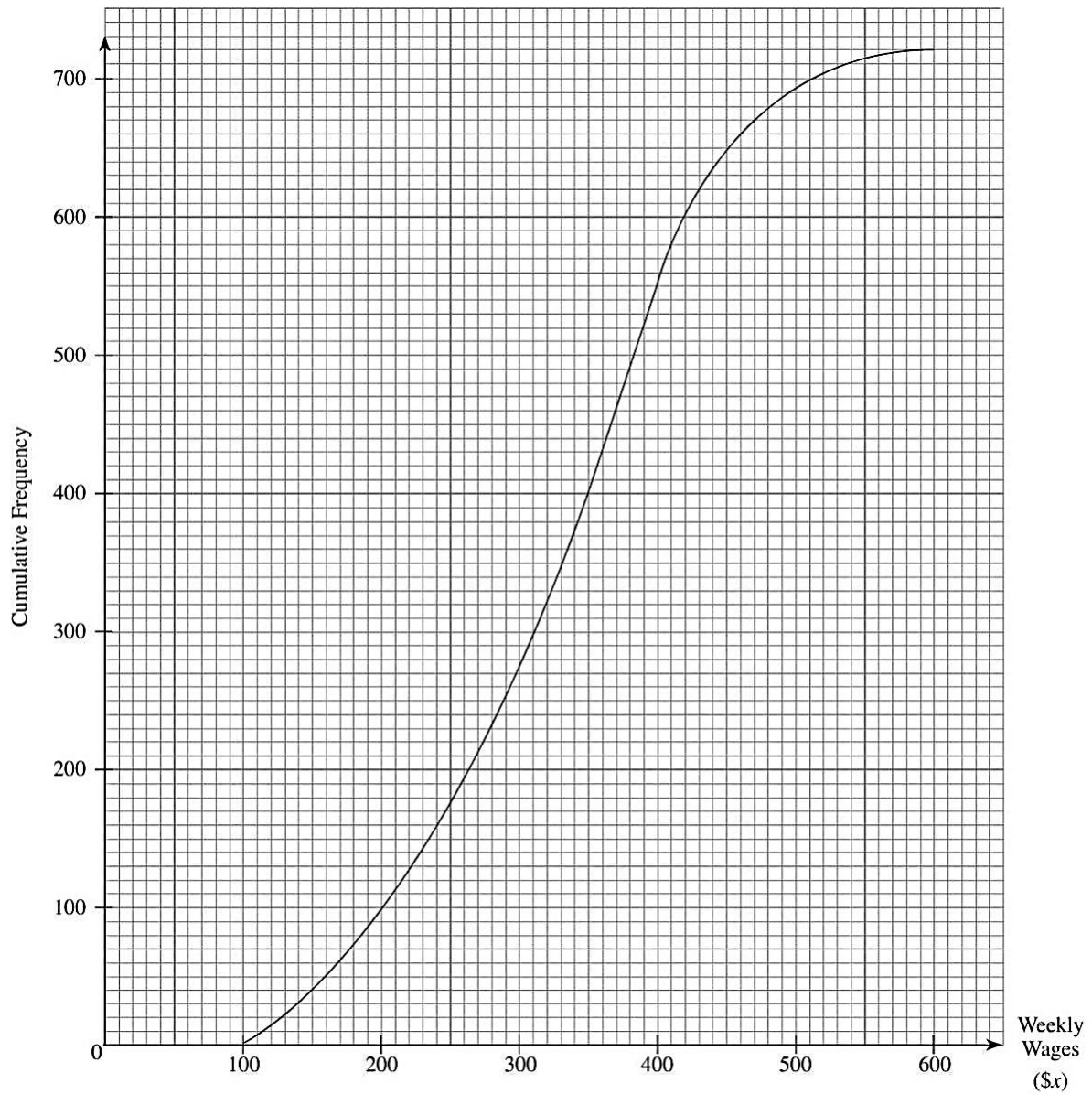
Answer ..... $^\circ$  [2]

- (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]

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- 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**.

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

- (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]