

CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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MATHEMATICS

Paper 3 (Core)

0580/33**May/June 2019****2 hours**

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
 Tracing paper (optional)

Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.Answer **all** questions.

If working is needed for any question it must be shown below that question.

Electronic calculators should be used.

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 π , use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 104.

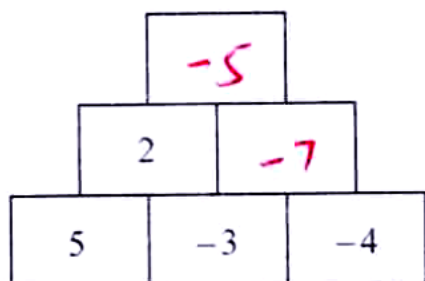
1.

- (a) Write this number in figures.

One million three hundred and two thousand five hundred and ninety-six.

1,302,596 [1]

- (b) (i) Two numbers are
- added**
- together to give the number in the box immediately above.



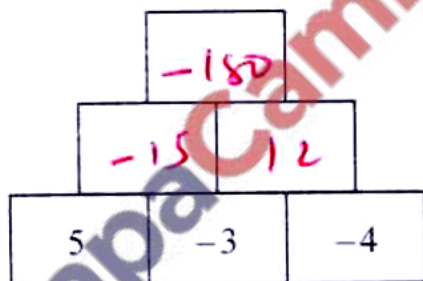
$$-3 + -4 = -7$$

$$2 + -7 = -5$$

Complete the diagram.

[2]

- (ii) Two numbers are
- multiplied**
- together to give the number in the box immediately above.



$$5 \times -3 = -15$$

$$-3 \times -4 = 12$$

$$-15 \times 12 = -180$$

Complete the diagram.

[3]

- (c) Write these in order of size, starting with the smallest.

 $\frac{5}{27}$

18.4%

 1.83×10^{-1} 5^{-1}

0.1852

0.184

0.183

0.2

1.83×10^{-1} < 18.4 < $\frac{5}{27}$ < 5^{-1} [2]

(d) Work out 142 as a percentage of 304.

$$\frac{142}{304} \times 100$$

..... 46.7 % [1]

(e) (i) Find the highest common factor (HCF) of 28 and 98.

2	28	98
7	14	49
	2	7

$$2 \times 7$$
$$14$$

..... [2]

(ii) Find the lowest common multiple (LCM) of 28 and 98.

2	28	98
2	14	49
7	7	49
7	1	7

$$2 \times 2 \times 7 \times 7$$

$$196$$

..... [2]

(f) The average distance from Earth to Mars is 2.25×10^8 km.
A space ship travels from Earth to Mars at an average speed of 5.8×10^4 km/h.

Find how long, in hours, the journey takes.

$$D = 2.25 \times 10^8 \text{ km}$$
$$S = 5.8 \times 10^4$$

$$3879$$

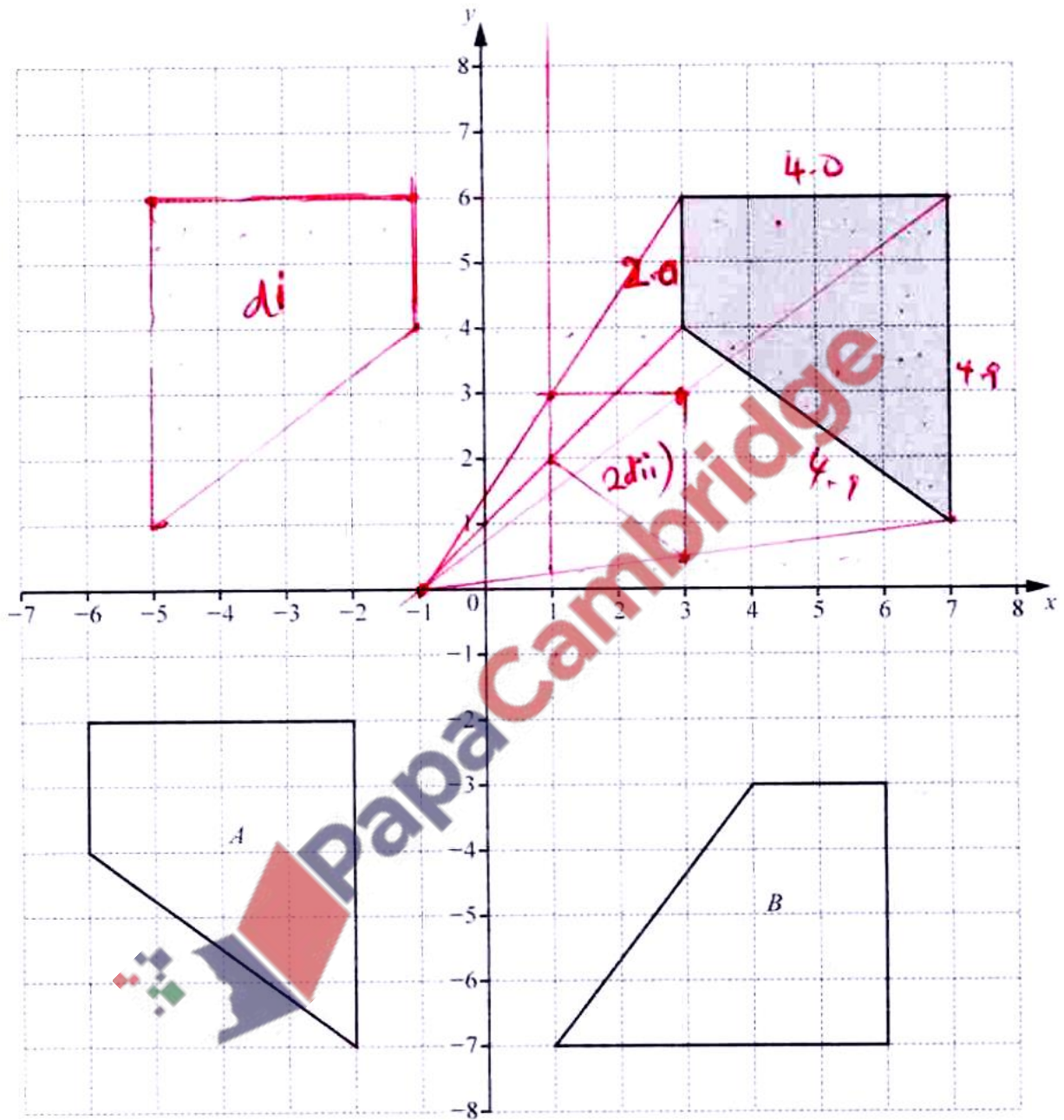
..... hours [2]

$$t = D/S = \frac{2.25 \times 10^8}{5.8 \times 10^4}$$

$$= \frac{225000000}{58000} = 3879.31 \dots$$
$$3.879 \times 10^3$$

2.

Three quadrilaterals are shown on a 1 cm^2 grid.



(a) Write down the mathematical name of the shaded quadrilateral.

..... [1]

Trapezium

(b) For the shaded quadrilateral

(i) **measure** the perimeter.

$$4.9 + 4.0 + 2.0 + 4.9$$

..... 15.8 cm [1]

(ii) work out the area.

Count the boxes

full 11

11 + 3

half $6 \times \frac{1}{2} = 3$

..... 14 cm² [1]

(c) Describe fully the **single** transformation that maps the shaded quadrilateral onto

(i) quadrilateral A,

Translation

vector $\begin{pmatrix} -9 \\ -8 \end{pmatrix}$

.....
..... [2]

(ii) quadrilateral B.

Rotation 90° clockwise

about $(9, 0)$

.....
..... [3]

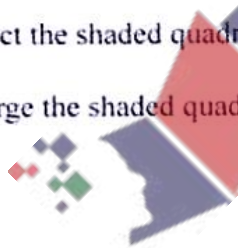
(d) On the grid,

(i) reflect the shaded quadrilateral in the line $x = 1$,

[2]

(ii) enlarge the shaded quadrilateral by scale factor $\frac{1}{2}$, centre $(-1, 0)$.

[2]



3.

The music teacher at a school forms an orchestra.

The instruments in the orchestra are 36 string, 15 woodwind and 12 brass.

- (a) Write the ratio string : woodwind : brass in its simplest form.

$$\begin{array}{ccc} \overset{S}{36} : \overset{W}{15} : \overset{B}{12} & \text{(divide each by 3)} & \\ 12 & 5 & 4 \end{array} \quad \dots\dots\dots 12 : 5 : 4 \quad [2]$$

- (b) The 36 string instruments are violins, cellos and double basses in the ratio

$$\text{violins : cellos : double basses} = 9 : 2 : 1.$$

- (i) Show that the number of violins is 27.

$$\frac{9}{(9+2+1)} \times 36 \quad \frac{9}{12} \times 36 = 3 \times 4 = 27 \quad [1]$$

- (ii) Work out the number of cellos and the number of double basses.

$$\begin{array}{l} \frac{2}{12} \times 36 \\ \frac{1}{12} \times 36 \end{array} \quad \begin{array}{l} \text{Cellos} \dots\dots\dots 6 \\ \text{Double basses} \dots\dots\dots 3 \end{array} \quad [2]$$

- (c) The 15 woodwind instruments are oboes, flutes and clarinets.

20% of these instruments are oboes.

There are twice as many flutes as clarinets.

Find the number of flutes.

$$\begin{array}{l} \text{oboes } \frac{20}{100} \times 15 = 3 \\ 15 - 3 = 12 \end{array}$$

flutes as twice as many
so flutes are 8
clarinets are 4.

$$\dots\dots\dots 8 \quad [2]$$

- (d) Of the 12 brass instruments, $\frac{1}{3}$ are trumpets, 3 are trombones and the remainder are horns.

Find the number of horns.

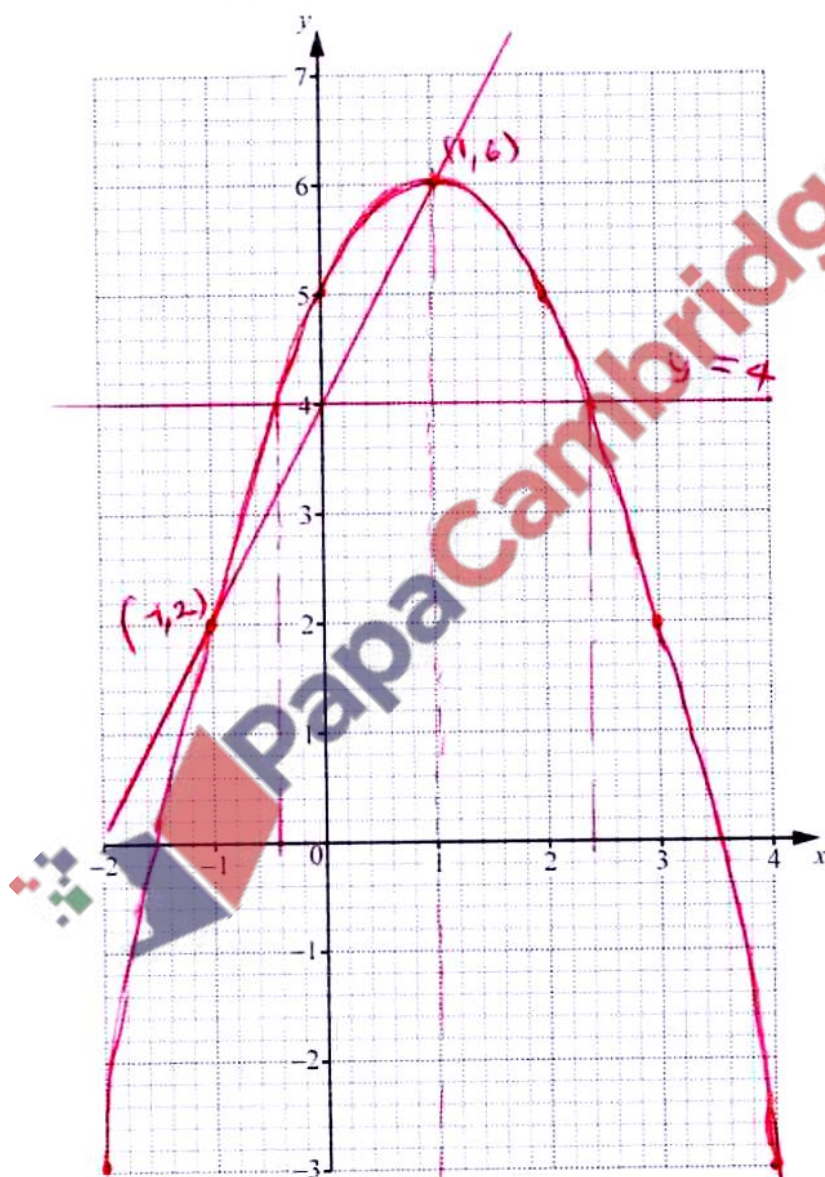
$$\begin{array}{l} \frac{1}{3} \times 12 = 4 \\ 12 - 4 = 8 \\ 8 - 3 = 5 \end{array} \quad \dots\dots\dots 5 \quad [2]$$

4.

(a) Complete the table of values for $y = 5 + 2x - x^2$.

x	-2	-1	0	1	2	3	4
y	-3	2	5	6	5	2	-3

[2]

(b) On the grid, draw the graph of $y = 5 + 2x - x^2$ for $-2 \leq x \leq 4$.

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

$$y = 5 - 4 - 4$$

$$= -3$$

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

$$= 5$$

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

$$= 2$$

[4]

(c) (i) On the grid, draw the line of symmetry.

[1]

(ii) Write down the equation of the line of symmetry.

$$x = 1$$

[1]

(d) Use your graph to find the solutions of the equation $5 + 2x - x^2 = 4$.

Draw a line $y=4$.

$$x = 0.4 \text{ or } x = 2.4 \quad [2]$$

(e) (i) On the grid, draw a line from $(-1, 2)$ to $(1, 6)$. [1]

(ii) Find the equation of this line in the form $y = mx + c$.

$$\begin{array}{l} (1, 6) \\ (-1, 2) \end{array} \quad \frac{\Delta y}{\Delta x} = \frac{6-2}{1-(-1)} = \frac{4}{2} = 2$$

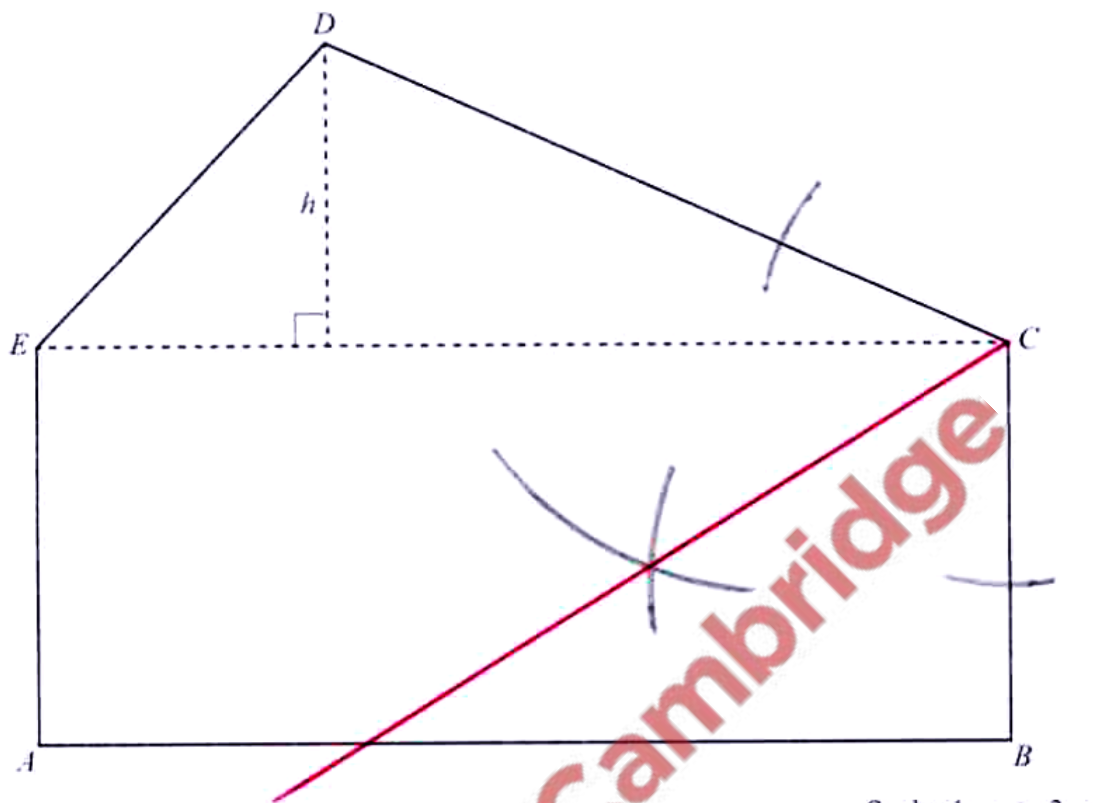
$c = 4$ (y-intercept)

$$y = 2x + 4 \quad [3]$$



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The scale drawing shows a play area, $ABCDE$.
The scale is 1 centimetre represents 3 metres.



- (a) Find the actual distance h in metres.

$h = 3.8 \text{ cm}$ $3.8 \times 3 \leftarrow$

Scale: 1 cm to 3 m

$h = \dots\dots\dots 11.4 \dots\dots\dots \text{m}$ [2]



- (b) Find the actual area of triangle CDE .

$$CE = 11.8 \text{ m} \times 3 = 35.4$$
$$\text{Area of a Triangle} = \frac{1}{2} \times b \times h$$
$$\Rightarrow \frac{1}{2} \times 35.4 \times 11.4$$

..... 201.78 m^2 [3]

- (c) A straight path crosses the play area from C to AB .
It is equidistant from CB and CD .

Using a straight edge and compasses only, construct the path.
Show all your construction arcs.

[2]

- (d) There is a circular pool in the play area.
The pool has a diameter of 8 m.

Calculate

- (i) the circumference of the pool. $\pi \times D$

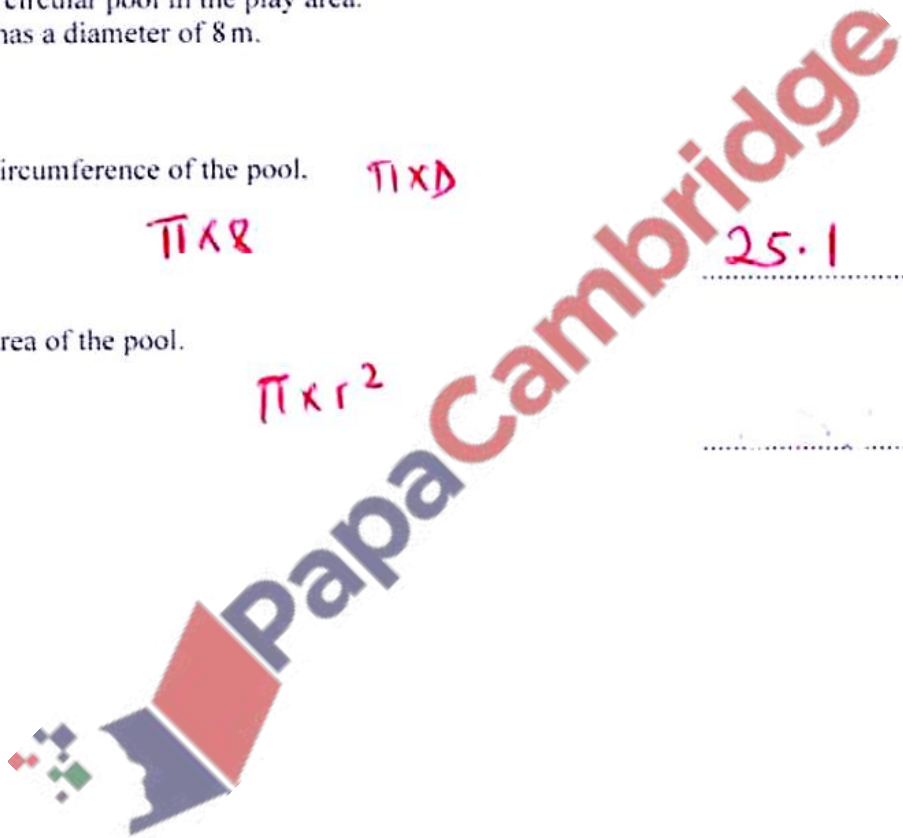
$$\pi \times 8$$

..... 25.1 m [2]

- (ii) the area of the pool.

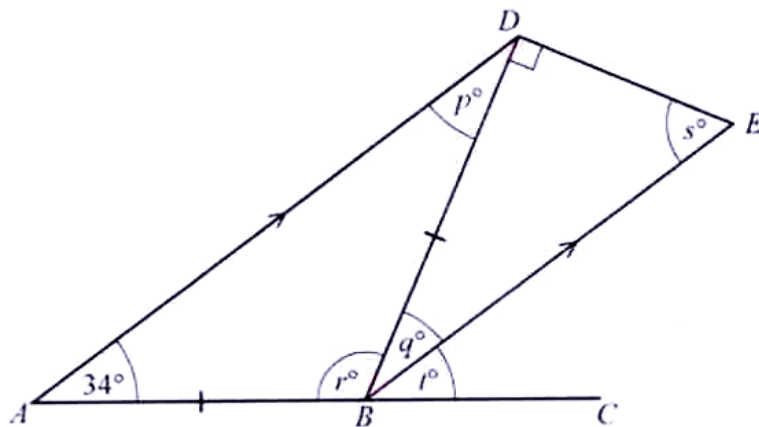
$$\pi \times r^2$$

..... 28.3 m^2 [2]



5.

(a)

NOT TO
SCALE

In the diagram, ABC is a straight line.
 AD is parallel to BE , angle $BAD = 34^\circ$ and $AB = BD$.

(i) Complete the statements.

(a) $p = 34$ because ABD is isosceles; base angles equal. [2](b) $q = 34$ because alternate to p . [2](ii) Work out the value of r and the value of s .

$$r = 180 - 34 - 34$$

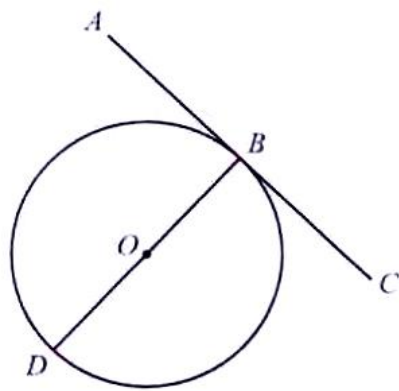
$$r = 112^\circ$$

$$s = 180 - 90 - 34$$

$$s = 56^\circ$$
 [2]

(iii) Find the value of t and give a reason for your answer. $t = 34$ because corresponding angles to BAD . [2]

(b)



NOT TO
SCALE

In the diagram, B and D are points on the circumference of a circle, centre O .
 AC is a straight line touching the circle at B only and BD is a straight line through O .

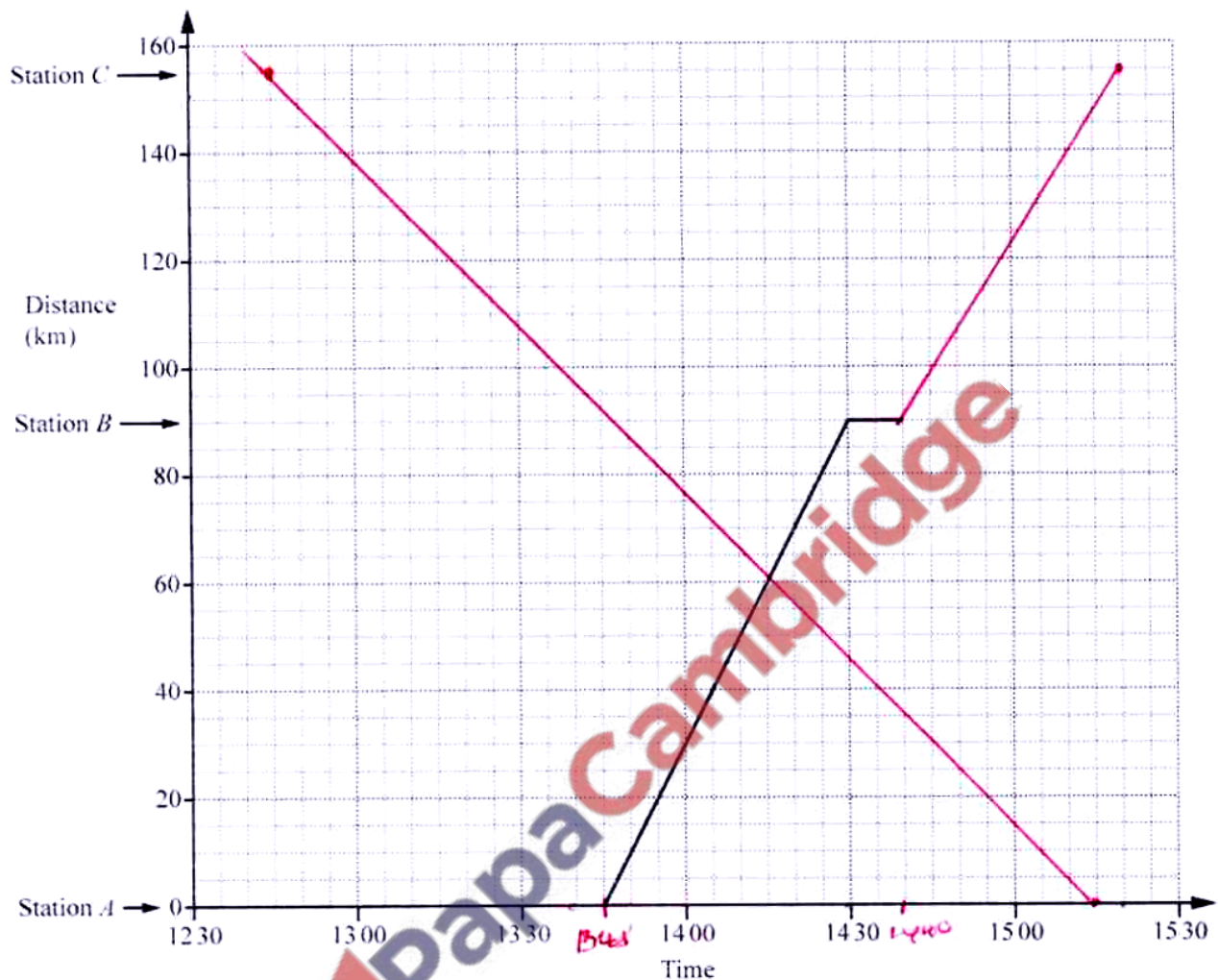
Complete the statement.

Angle $ABD = 90$ because radius / diameter meets a
tangent at 90° [2]



6.

The travel graph shows part of a train journey between station *A* and station *C*.



- (a) (i) Calculate, in km/h, the speed of the train between station *A* and station *B*.

$$\frac{\text{Distance}}{\text{time}} = \frac{90}{(45 \div 60)}$$

$$\frac{1430}{1345} = 45 \text{ min}$$

..... 120 km/h [2]

- (ii) The train leaves station *B* at 1440.

For how many minutes did the train stop at station *B*?

..... 10 min min [1]

- (iii) The train travels at a constant speed between station *B* and station *C*, arriving at 1520.

Complete the travel graph for the journey between station *B* and station *C*.

[1]

- (iv) On which part of the journey was the train travelling faster?

Between station *A* and station *B* [1]

the slope is steeper

(b) Another train leaves station C at 1245.
It travels to station A at a constant speed of 62 km/h without stopping at station B.

(i) Work out how long, in hours and minutes, this journey takes.

Distance is 155 km
Speed = 62 km/h.

$$155/62 = 2.5$$

..... 2 h 30 min [2]

(ii) Write down the time this train arrives at station A.

$$\begin{array}{r} 1245 \\ + 230 \\ \hline 1515 \end{array}$$

..... 1515 h. [1]

(iii) On the grid, show the journey of this train. [1]

(iv) Find the distance from station A when the two trains pass each other.

..... approximately 61 km [1]



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7.

- (a) Kyung records the number of people in each of 24 cars on Wednesday. His results are shown below.

1, 3, 6, 1, 2, 2, 4, 5
 3, 4, 1, 5, 3, 2, 4, 1
 1, 1, 2, 4, 4, 1, 2, 1

- (i) Complete the frequency table. You may use the tally column to help you.

Number in a car	Tally	Frequency	cf
1		8	8
2		5	13
3		3	16
4		5	21
5		2	23
6		1	24

[2]

- (ii) Write down the mode.

..... 1 [1]

(iii) Work out the range.

$$6 - 1$$

..... 5 [1]

(iv) Work out the median.

$$\frac{1}{2} \times 24 = 12$$

..... 2 [1]

(v) Calculate the mean.

$$\frac{(1 \times 8) + (2 \times 5) + (3 \times 3) + (4 \times 5) + (5 \times 2) + (6 \times 1)}{24}$$

..... 2.625 [3]

(vi) One of these cars is chosen at random.

Find the probability that the number of people in this car is 4.

..... $\frac{5}{24}$ [1]

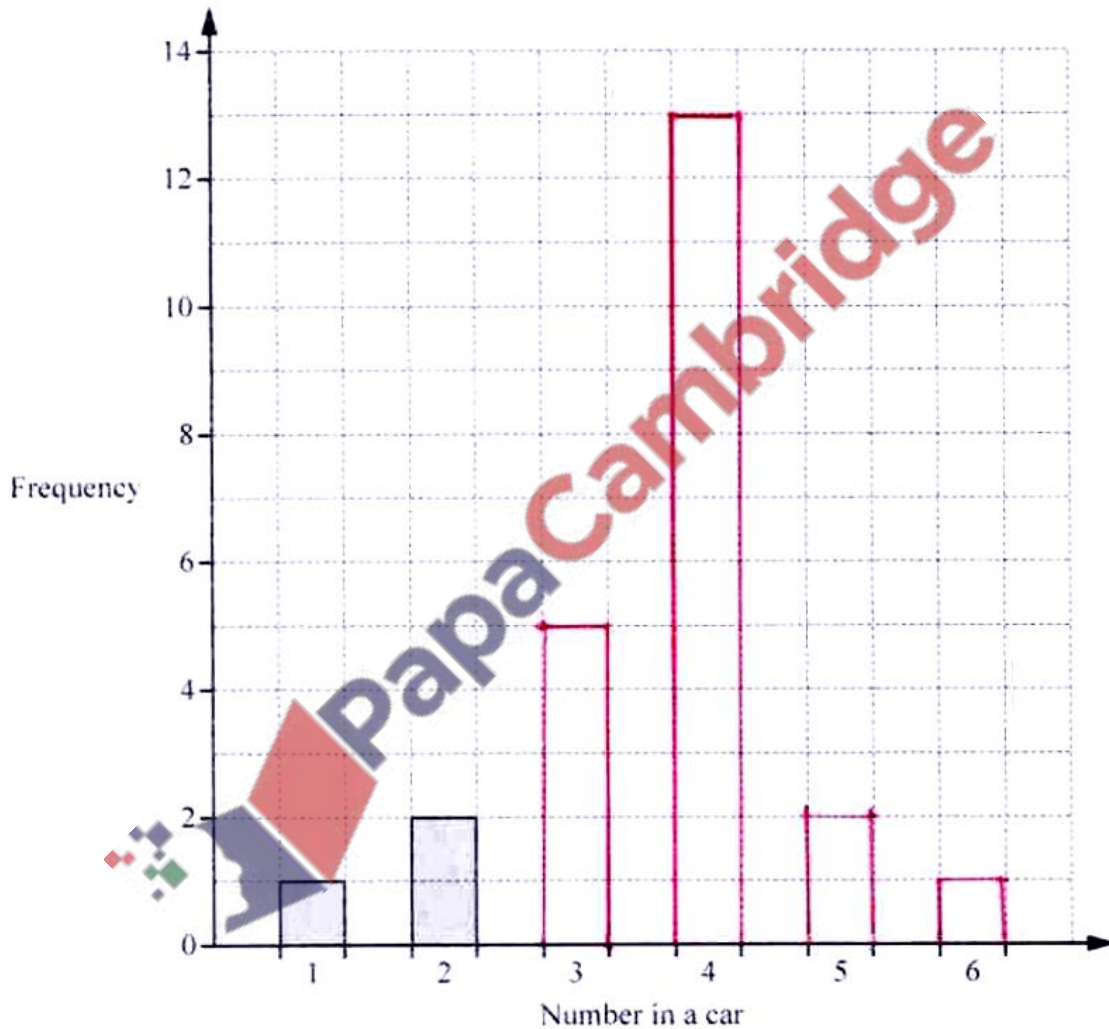


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- (b) Kyung also records the number of people in each of 24 cars on Saturday. The table shows the results.

Number in a car	1	2	3	4	5	6
Frequency	1	2	5	13	2	1

On the grid, complete the bar chart to show these results.



[2]

- (c) Write down one comparison between the frequency tables in **part (a)(i)** and **part (b)**.

Mode in part (a)(i) is 1, while mode in part (b) is 4

[1]

8.

Mr Razif travels by bus from Singapore to Kuala Lumpur with his wife and his four children.

(a)

Ticket Price	
Adult	\$32.40
Child	\$24.40
Family (2 adults and 3 children)	\$115.00

Work out how much Mr Razif saves if he buys a family ticket and one child ticket rather than six individual tickets.

$$\text{family } (115 + 24.40) = 139.40$$

$$\text{Individual tickets } (32.40 \times 2) + (24.40 \times 4) \\ = 162.40$$

$$162.40 - 139.40$$

\$ 23 [4]

(b) The bus leaves Singapore at 1240 and arrives in Kuala Lumpur at 1735.

Work out, in hours and minutes, the time this journey takes.



$$\begin{array}{r} 16 \ 95 \\ + 7 \ 35 \\ \hline 12 \ 40 \\ \hline 4 \ 55 \end{array}$$

..... 4 h 55 min [1]

(c) Mr Razif changes some dollars into Malaysian ringgits.

He receives 318 ringgits when the exchange rate is \$1 = 4.24 ringgits.

Work out how many dollars he changes.

$$\begin{array}{l} \$1 = 4.24 \text{ ringgits} \\ ? = 318 \end{array}$$

$$\begin{array}{r} 1 \times 318 \\ \hline 4.24 \end{array}$$

\$ 75 [2]

