

Please check the examination details below before entering your candidate information

Candidate surname	Other names
<b>Pearson Edexcel</b>	Centre Number
<b>International GCSE</b>	Candidate Number
<b>Tuesday 7 January 2020</b>	
Morning (Time: 1 hour 30 minutes)	Paper Reference <b>4MB1/01R</b>
<b>Mathematics B</b> <b>Paper 1R</b>	
	
<b>You must have:</b> Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.	Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- **Calculators may be used.**

### Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ►

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**Pearson**

**Answer all TWENTY NINE questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

- 1 Express  $7\frac{1}{2}$  minutes as a fraction of 24 hours.  
Give your answer in its simplest form.

.....  
(Total for Question 1 is 2 marks)

- 2 The  $n$ th term of a sequence is given by the expression  $2n^2 - 5$   
Find the first term of the sequence and the third term of the sequence.

First term = .....

Third term = .....

(Total for Question 2 is 2 marks)

- 3 Solve  $\frac{1}{x} - \frac{1}{3} = \frac{1}{2}$

$x =$  .....

(Total for Question 3 is 2 marks)

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4 Factorise completely  $2x^2 - 6xy + 5wx - 15wy$

.....  
(Total for Question 4 is 2 marks)

5 The function  $g$  where  $g:x \mapsto 16 - x^2$  is defined for all values of  $x$ .  
Write down

(i) the maximum value of  $g(x)$ ,

(ii) the range of  $g$ .

.....  
(Total for Question 5 is 2 marks)

6 Find the value of  $\frac{2 \times 10^{-98}}{16 \times 10^{50}}$

Give your answer in standard form.

.....  
(Total for Question 6 is 2 marks)

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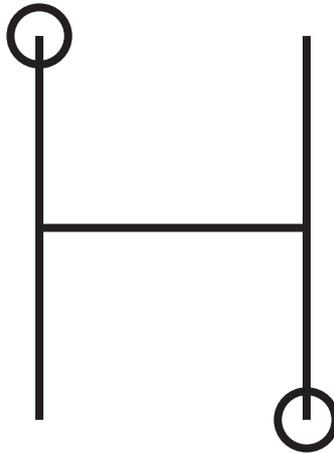
7 Given that  $y = \frac{x^4}{4} - \frac{4}{x^4}$

find  $\frac{dy}{dx}$

$$\frac{dy}{dx} = \dots\dots\dots$$

(Total for Question 7 is 2 marks)

8



Write down

(a) the number of lines of symmetry of the figure,

.....  
(1)

(b) the order of rotational symmetry of the figure.

.....  
(1)

(Total for Question 8 is 2 marks)



- 9 Find the range of values of  $x$  for which

$$x - 10 < 3x + 4 \leq 20 - 5x$$

.....  
 (Total for Question 9 is 3 marks)

- 10 A factory produces 2500 plates. There are large plates and small plates.

There are 800 large plates which have a mean weight of 600 grams.

The small plates have a mean weight of 450 grams.

Calculate the mean weight, in grams, of all 2500 plates.

..... grams

(Total for Question 10 is 3 marks)



11 Find, showing your working clearly,

- (i) the lowest common multiple (LCM) of 42, 54 and 66
- (ii) the highest common factor (HCF) of 42, 54 and 66

(i) LCM = .....

(ii) HCF = .....

**(Total for Question 11 is 3 marks)**

- 12 During a week, 500 trains will arrive at a station.  
Each train will be late, on time or early.  
The probability of a train arriving late is 0.85  
The probability of a train arriving on time is 0.07

Calculate an estimate for the number of trains that will arrive early during the week.

.....  
**(Total for Question 12 is 3 marks)**

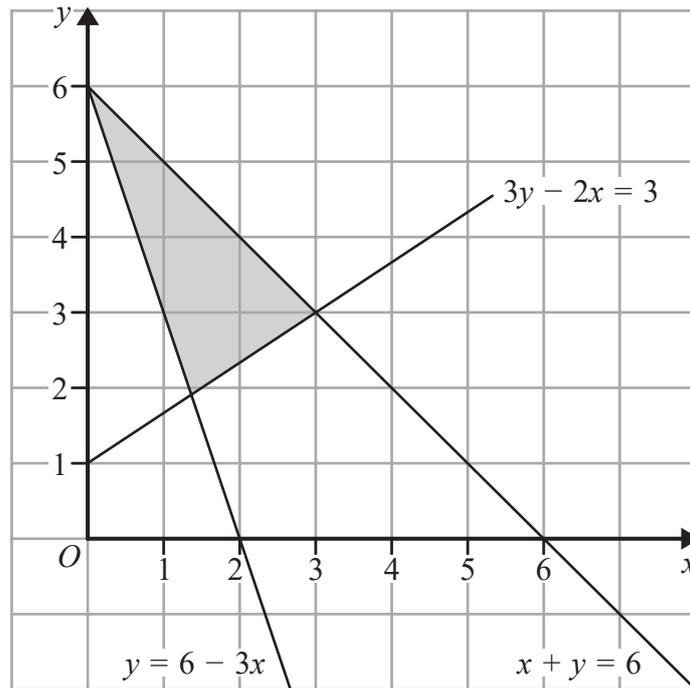
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13



Write down the three inequalities that define the shaded region in the diagram.

.....

.....

.....

(Total for Question 13 is 3 marks)

14

$$P = \{ a, b, c, d \}$$

Write down all of the subsets of  $P$  that have 2 elements.

.....

(Total for Question 14 is 3 marks)



15 Simplify fully  $\frac{x}{6}(7x - 3) - \frac{x}{3}(5x - 9)$

.....  
(Total for Question 15 is 3 marks)

16  $ABCD$  is a rectangle with perimeter 28 m.

The length of  $AB$  is 8 m.

Calculate the length, in m, of the diagonal  $AC$  of the rectangle.

..... m  
(Total for Question 16 is 3 marks)

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17

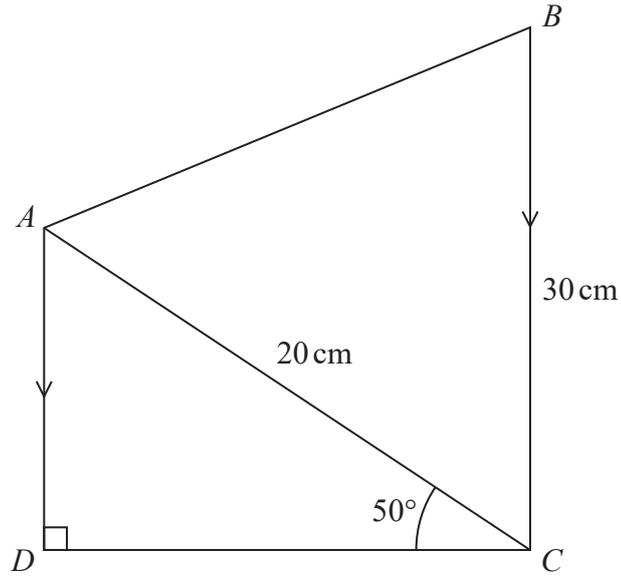


Diagram **NOT**  
accurately drawn

The diagram shows the trapezium  $ABCD$  in which  $AD$  and  $BC$  are parallel.

$$AC = 20\text{ cm} \quad BC = 30\text{ cm} \quad \angle ACD = 50^\circ \quad \angle ADC = 90^\circ$$

Calculate the area, in  $\text{cm}^2$  to 3 significant figures, of the trapezium  $ABCD$ .

.....  $\text{cm}^2$

(Total for Question 17 is 3 marks)



18 Express  $\frac{\sqrt{35} + 3\sqrt{5} - 2\sqrt{7} - 6}{\sqrt{5} - 2}$

in the form  $m + \sqrt{n}$ , where  $m$  and  $n$  are integers.  
Show your working clearly.

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(Total for Question 18 is 3 marks)



- 19** Given that 1 mile = 1.609 kilometres and 1 gallon = 4.546 litres,  
change 35 miles per gallon into litres per 100 kilometres.  
Give your answer correct to 3 significant figures.

..... litres per 100 kilometres

**(Total for Question 19 is 4 marks)**

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$$20 \quad \mathbf{A} = \begin{pmatrix} -2 & 3 \\ 5 & -7 \end{pmatrix}$$

(a) Find  $\mathbf{A}^2$

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

(2)

$$\mathbf{B} = \begin{pmatrix} -1 & 2 \\ -3 & 5 \\ 4 & -3 \end{pmatrix}$$

(b) Find  $\mathbf{BA}$

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

(2)

(Total for Question 20 is 4 marks)

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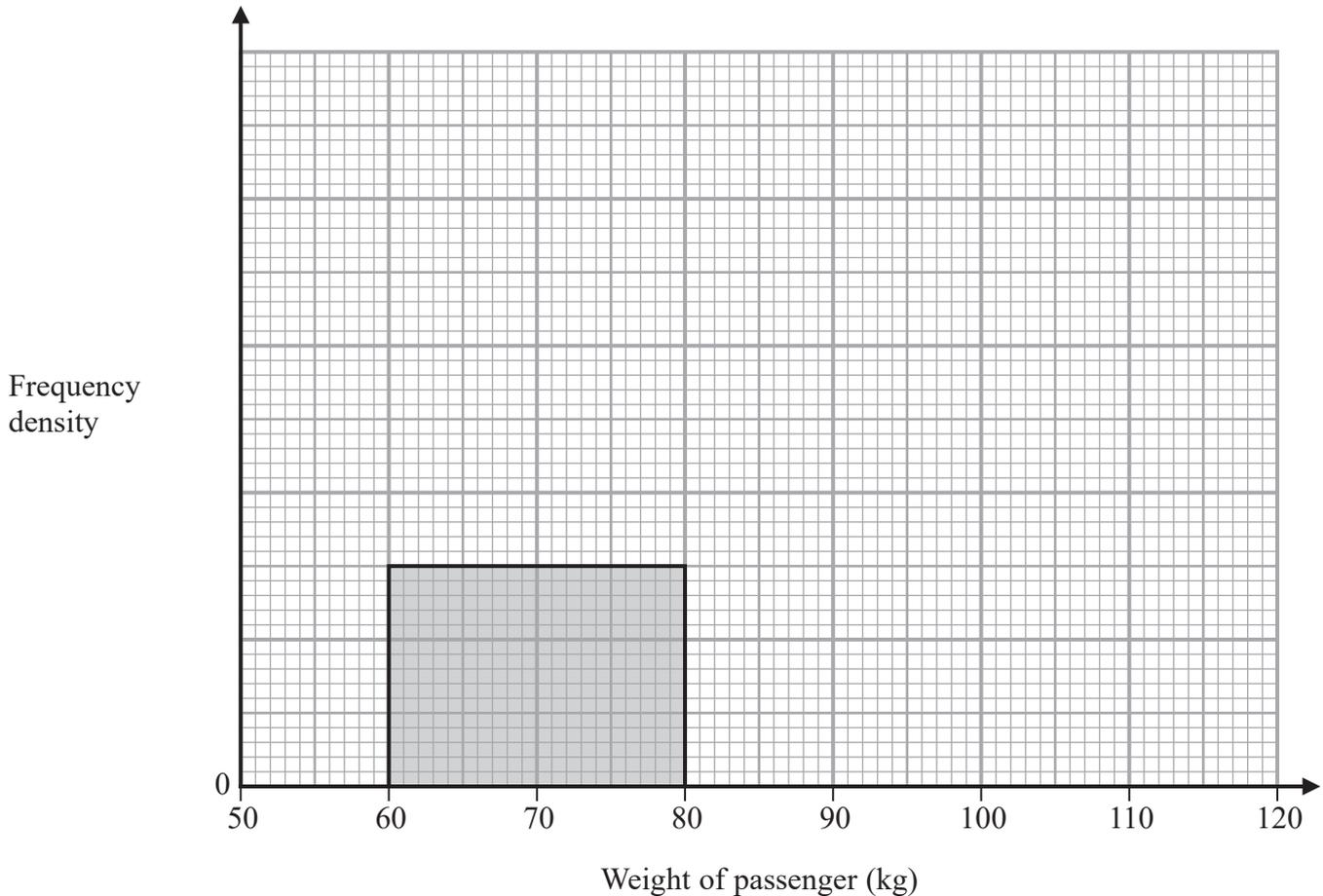
- 21 The weights of 710 passengers boarding buses at a bus station were recorded. The incomplete table and histogram give information about these passengers.

Weight of passenger ( $w$ kg)	Number of passengers
$50 \leq w < 60$	80
$60 \leq w < 80$	120
$80 \leq w < 95$	270
$95 \leq w < 115$	

- (a) Complete the table.

(1)

- (b) Complete the histogram.



(3)

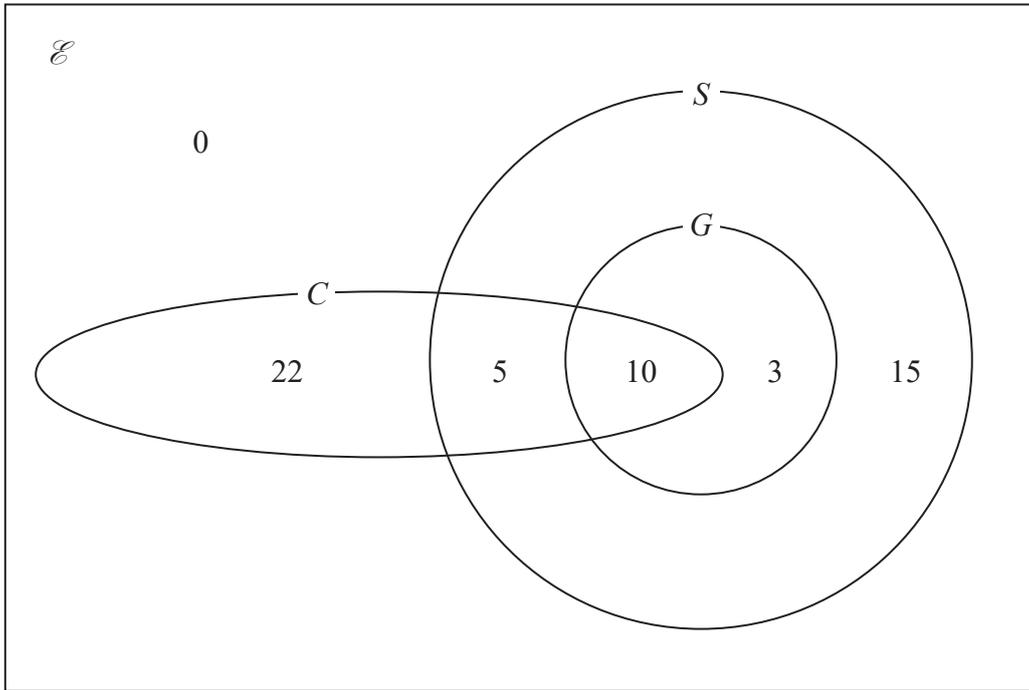
(Total for Question 21 is 4 marks)



- 22 In a survey of 55 farmers who keep animals, the numbers of farmers who keep cattle ( $C$ ), goats ( $G$ ) and sheep ( $S$ ) were recorded.

The Venn diagram shows information about the results of the survey.

The numbers shown in the Venn diagram are the **number** of farmers in the given subset of  $\mathcal{E}$ .



- (a) (i) Find  $n(C \cap G \cap S)$

.....

- (ii) Describe the members of the subset  $C \cap G \cap S$

.....  
(2)

- (b) (i) Find  $n(C' \cap G' \cap S)$

.....

- (ii) Describe the members of the subset  $C' \cap G' \cap S$

.....  
(2)

(Total for Question 22 is 4 marks)

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23 A particle is dropped from rest and falls a distance of  $s$  metres in time  $t$  seconds.

In the first 4 seconds after it has been dropped, the particle falls a distance of 96 metres.

At time 5 seconds after it has been dropped, the particle is at the point  $A$ .

At time 6 seconds after it has been dropped, the particle is at the point  $B$ .

Given that  $s$  is directly proportional to the cube of  $t$ ,

calculate, in metres, the distance  $AB$ .

..... m

(Total for Question 23 is 4 marks)



P 6 0 4 9 8 A 0 1 5 2 4

- 24 The scale of a map is 1 : 40 000  
The actual area of a field is  $2.4 \text{ km}^2$

(a) Calculate the area, in  $\text{cm}^2$ , of the field on the map.

.....  $\text{cm}^2$   
(3)

Given that  $n$  is an integer, the scale of another map is 1 :  $n$   
The length of a road shown on this map is 8 cm.  
The actual length of this road is 2 km.

(b) Find the value of  $n$ .

$n =$  .....  
(2)

(Total for Question 24 is 5 marks)

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25 Given that  $w = \sqrt{\frac{x - y - 3w^2}{5x + y - 1}}$

express  $x$  in terms of  $y$  and  $w$ .

Give your answer as a single fraction.

$x = \dots\dots\dots$

(Total for Question 25 is 5 marks)

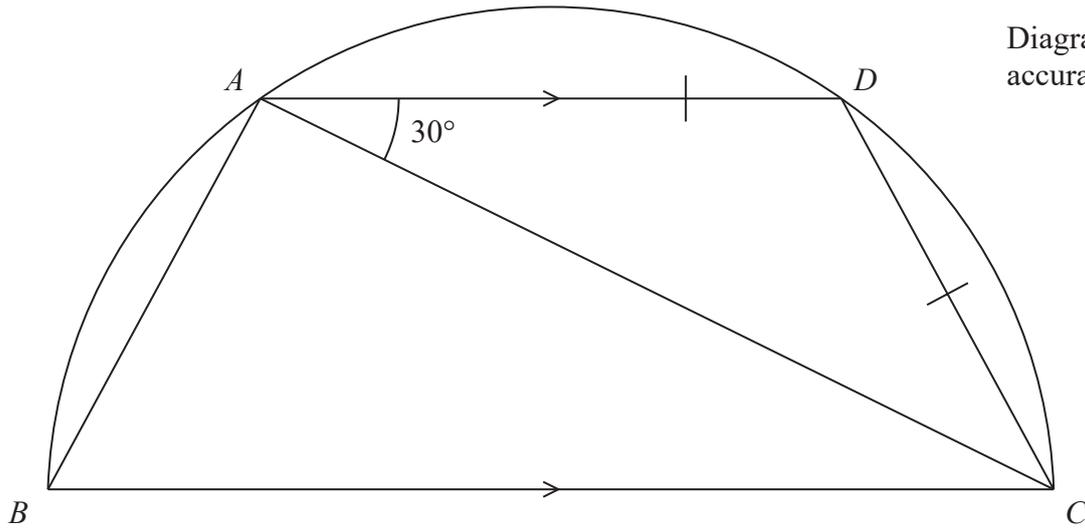
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26

Diagram **NOT**  
accurately drawn

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The diagram shows part of a circle through the points  $A$ ,  $B$ ,  $C$  and  $D$ .

$AD$  is parallel to  $BC$ ,  $AD = DC$  and  $\angle CAD = 30^\circ$

Giving your reasons, prove that  $BC$  is a diameter of the circle.

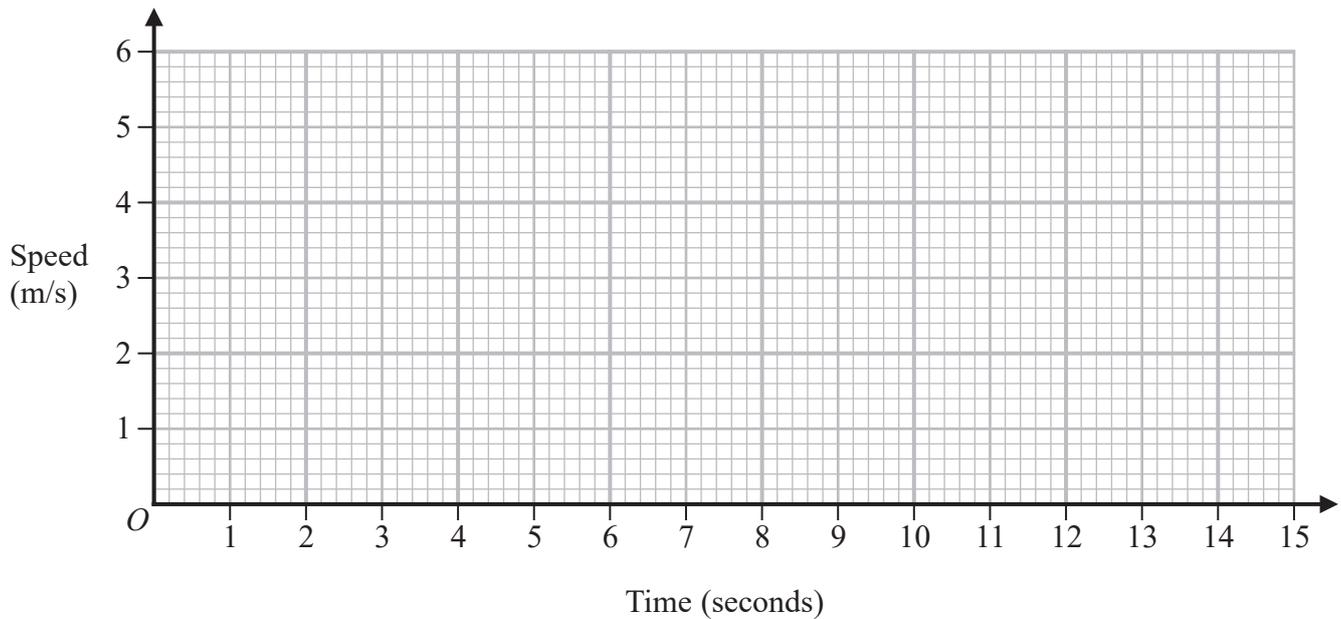
(Total for Question 26 is 5 marks)



- 27 At time  $t = 0$  seconds, a cyclist passed the point  $P$  on a straight horizontal road. The cyclist was moving with a constant speed of 5 m/s. The cyclist travelled a distance of 35 m at this speed to the point  $Q$  on the road.

On reaching  $Q$ , the cyclist decelerated at a constant rate, coming to rest at the point  $R$  on the road such that  $PQR$  is a straight line and  $QR = 10$  m.

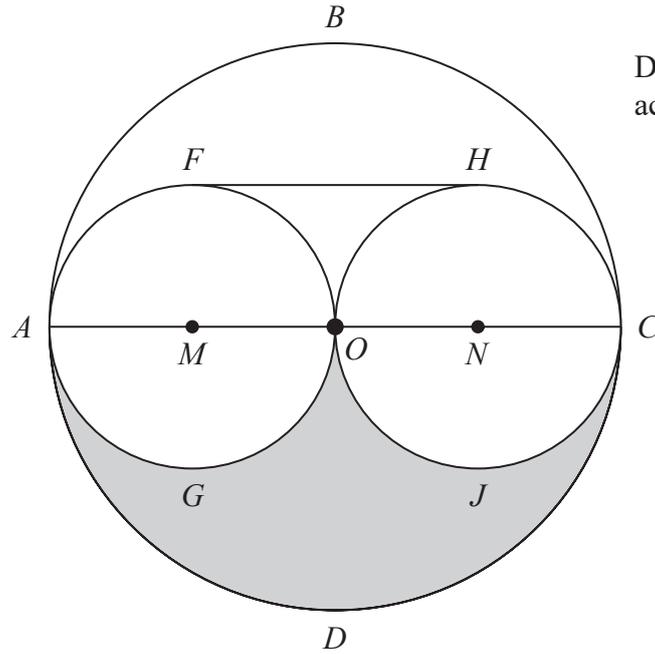
Represent, on the grid, the information for the journey of the cyclist from  $P$  to  $R$  as a speed-time graph.



(Total for Question 27 is 5 marks)



28

Diagram **NOT**  
accurately drawn

The diagram shows circle  $ABCD$  with centre  $O$ , diameter  $AMONC$  and radius  $r$ .

The diagram also shows circle  $AFOG$ , with centre  $M$ , and circle  $OH CJ$ , with centre  $N$ .

- (a) Find and simplify an expression, in terms of  $r$  and  $\pi$ , for the perimeter of the shaded region in the diagram.

.....  
(3)

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The line  $FH$  is the tangent to the circle  $AFOG$  at the point  $F$ .  
 The line  $FH$  is also the tangent to the circle  $OHCJ$  at the point  $H$ .

The point  $P$  on circle  $ABCD$  is such that  $OFP$  is a straight line.  
 The point  $Q$  on circle  $ABCD$  is such that  $OHQ$  is a straight line.

The region  $FPBQH$  inside circle  $ABCD$  is bounded by the straight line  $FP$ , the arc  $PBQ$  of circle  $ABCD$  and the two straight lines  $QH$  and  $HF$ .

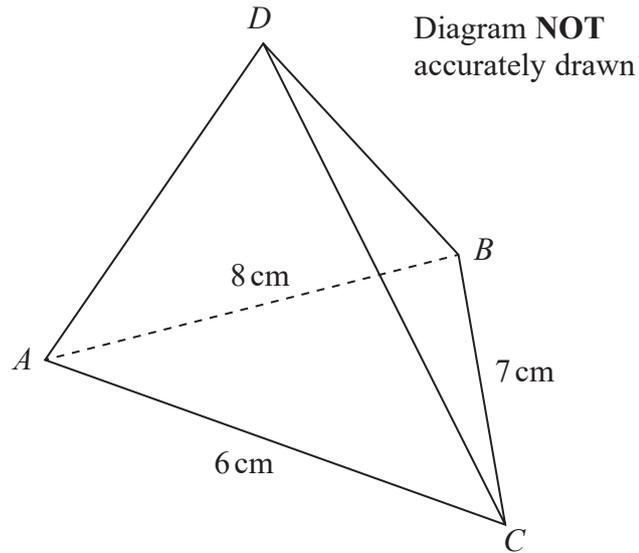
(b) Find and simplify an expression, in terms of  $r$  and  $\pi$ , for the area of  $FPBQH$ .

.....  
 (4)

(Total for Question 28 is 7 marks)



29



The diagram shows a pyramid  $ABCD$  with a horizontal triangular base  $ABC$ . The face  $ADB$  of the pyramid is perpendicular to the base  $ABC$ . In  $\triangle ABC$ ,  $AB = 8$  cm,  $BC = 7$  cm and  $CA = 6$  cm.

- (a) Calculate the size, in degrees to 3 significant figures, of  $\angle ACB$ .

$$\angle ACB = \dots\dots\dots^\circ$$

(3)

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In  $\triangle ADB$ ,  $AD = DB$  and  $\angle ADB = 50^\circ$

(b) Calculate the volume, in  $\text{cm}^3$  to 3 significant figures, of the pyramid  $ABCD$ .

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.....  $\text{cm}^3$

(4)

(Total for Question 29 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS



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