Candidate surname | Other names

Pearson Edexcel
International GCSE

Centre Number | Candidate Number

Tuesday 7 January 2020

Morning (Time: 1 hour 30 minutes) | Paper Reference **4MB1/01R**

Mathematics B
Paper 1R

You must have: 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 $7\dfrac{1}{2}$ 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 $\dfrac{1}{x} - \dfrac{1}{3} = \dfrac{1}{2}$

$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 $\dfrac{2 \times 10^{-98}}{16 \times 10^{50}}$

Give your answer in standard form.

....

(Total for Question 6 is 2 marks)

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

find $\quad \dfrac{\mathrm{d}y}{\mathrm{d}x}$

$\dfrac{\mathrm{d}y}{\mathrm{d}x} =$ ....

(Total for Question 7 is 2 marks)

8
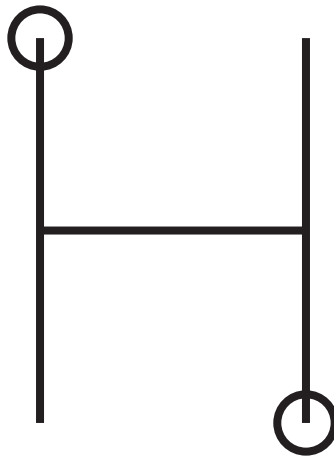
Write down

(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
$$x - 10 < 3x + 4 \leqslant 20 - 5x$$

....

(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)

Turn over ▶

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.
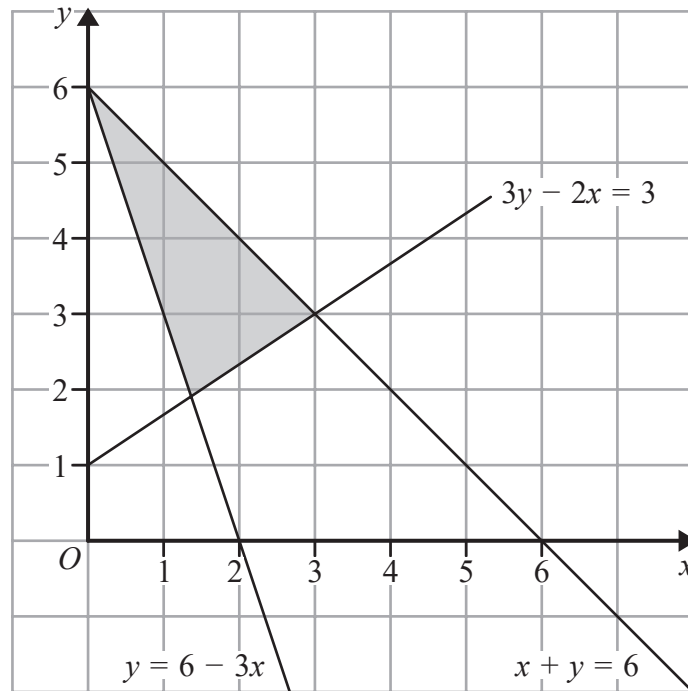The probability of a train arriving late is 0.85
The probability of a train arriving on time is 0.07

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

....

(Total for Question 12 is 3 marks)

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 $\dfrac{x}{6}(7x - 3) - \dfrac{x}{3}(5x - 9)$

....

(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)

17

Diagram **NOT** accurately drawn

30 cm

20 cm

50°
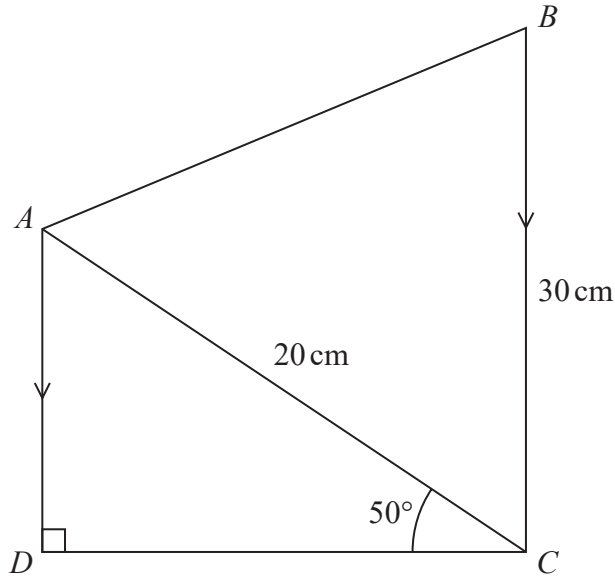
The diagram shows the trapezium *ABCD* in which *AD* and *BC* are parallel.

$AC = 20$ cm $\qquad BC = 30$ cm $\qquad \angle ACD = 50°$ $\qquad \angle ADC = 90°$

Calculate the area, in cm² to 3 significant figures, of the trapezium *ABCD*.

.... cm²

(Total for Question 17 is 3 marks)

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

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

....

(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)

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

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

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

(2)

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

(b) Find $\mathbf{BA}$

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

(2)

(Total for Question 20 is 4 marks)

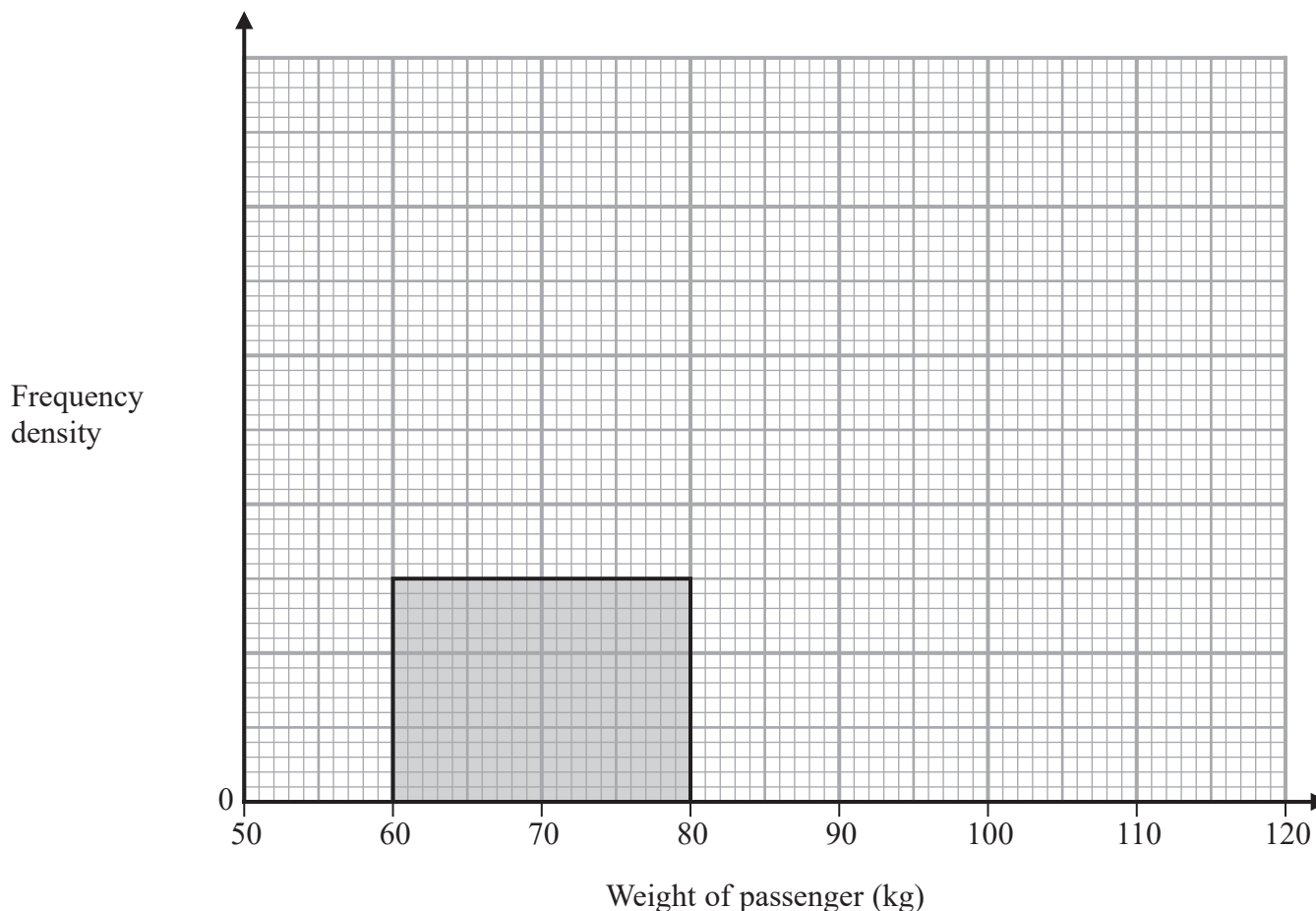**21** The weights of 710 passengers boarding buses at a bus station were recorded.

The incomplete table and histogram give information about these passengers.

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

(a) Complete the table.

(1)

(b) Complete the histogram.
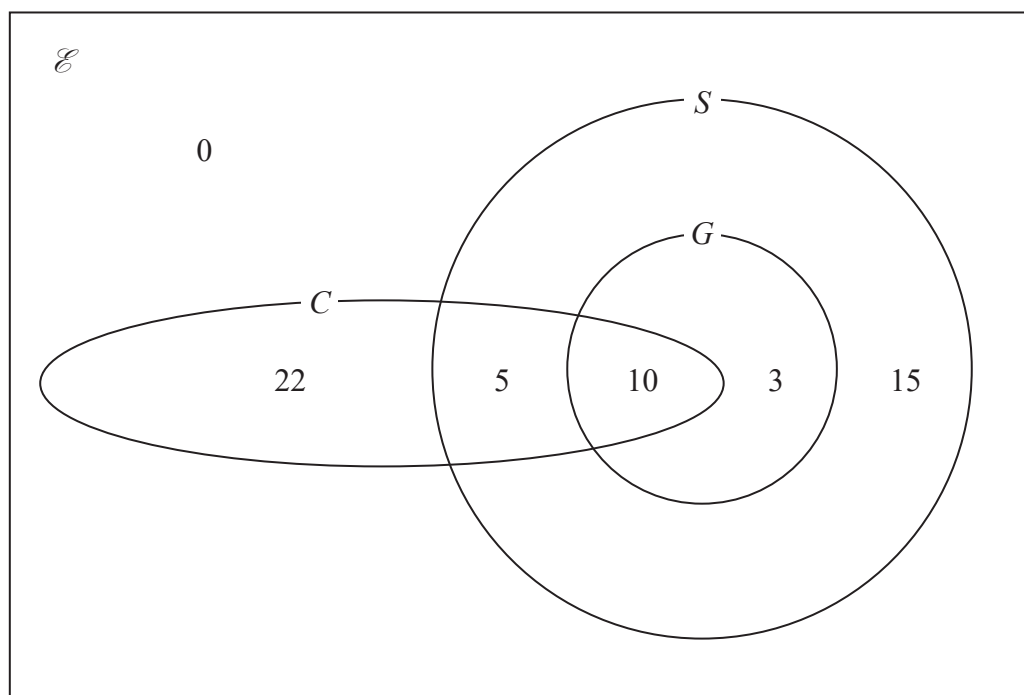

Weight of passenger (kg)

(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 $\mathscr{E}$.

(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)

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)

Turn over ▶

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 km²

(a) Calculate the area, in cm², of the field on the map.

.... cm²

(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)

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

express x in terms of y and w.
Give your answer as a single fraction.

$x = $ ....

(Total for Question 25 is 5 marks)

P 6 0 4 9 8 A 0 1 7 2 4

26
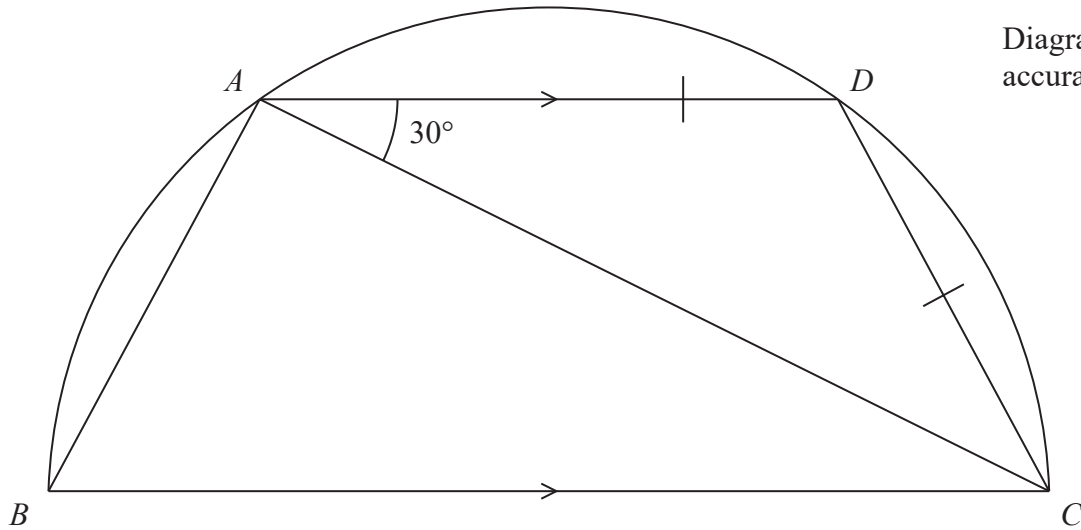
The diagram shows part of a circle through the points *A*, *B*, *C* and *D*.

$$AD \text{ is parallel to } BC, AD = DC \text{ and } \angle CAD = 30°$$

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.

Speed
(m/s)

Time (seconds)
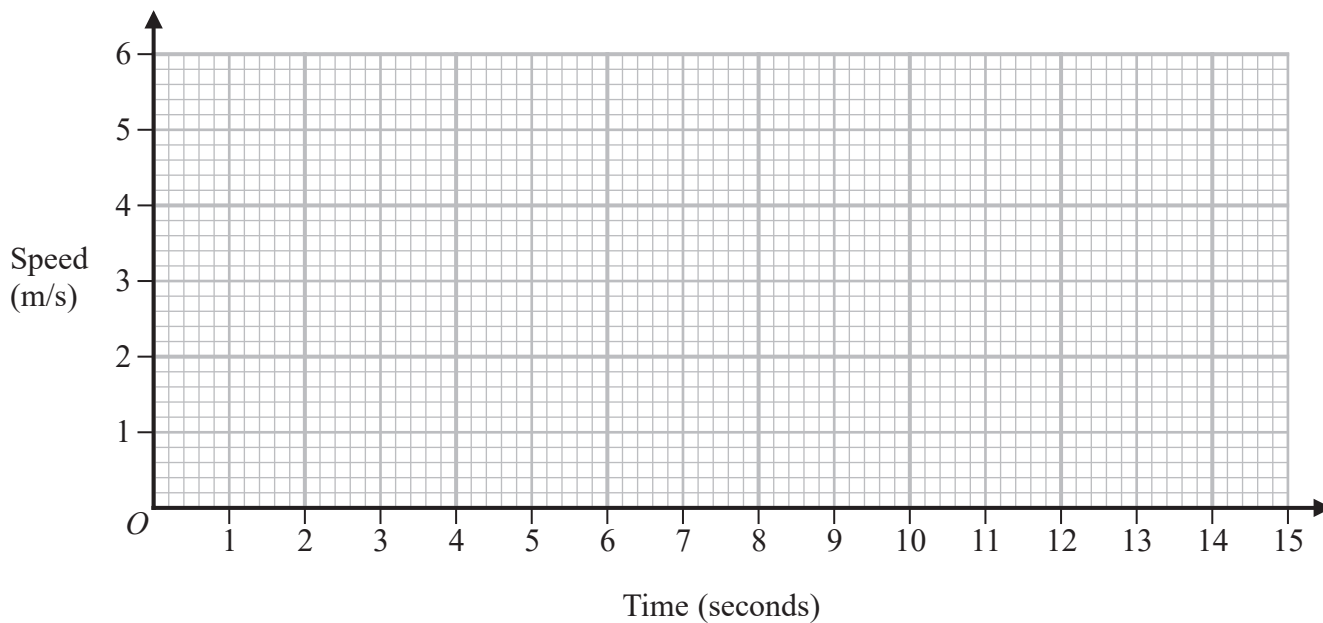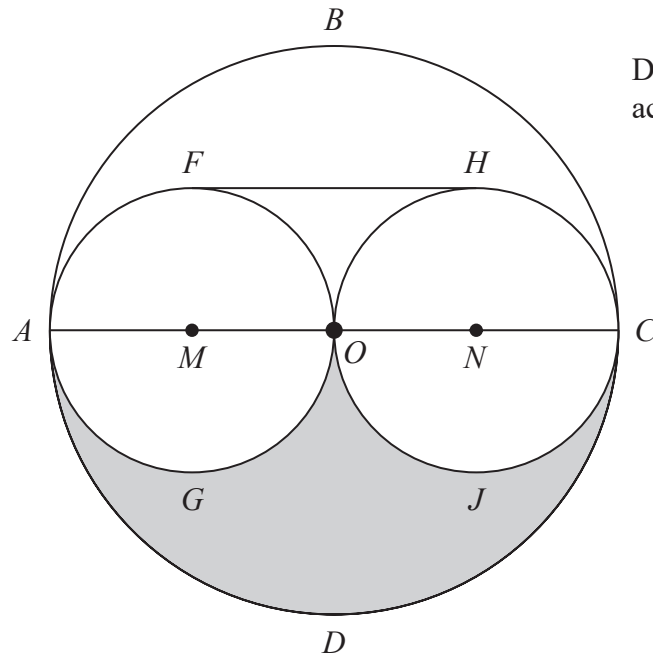
(Total for Question 27 is 5 marks)

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 *OHCJ*, with centre *N*.

(a) Find and simplify an expression, in terms of *r* and π, for the perimeter of the shaded region in the diagram.

....

(3)

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

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.
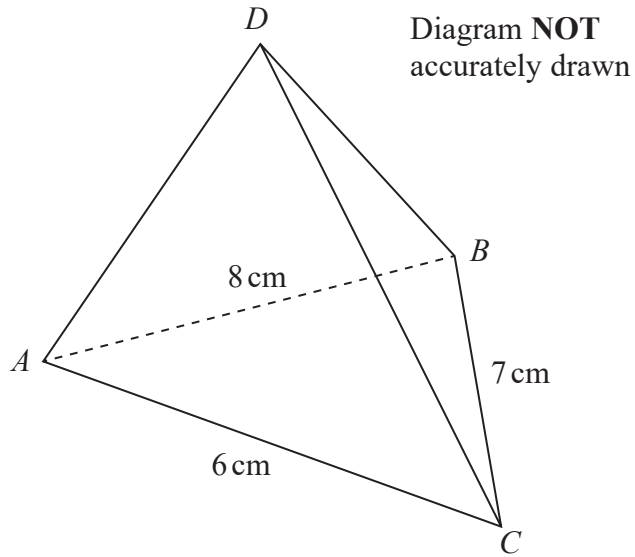The point *Q* on circle *ABCD* is such that *OHQ* is a straight line.

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 π, for the area of *FPBQH*.

....
(4)

(Total for Question 28 is 7 marks)

D

Diagram **NOT**
accurately drawn

B

8 cm

A

7 cm

6 cm

C

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 △*ABC*, *AB* = 8 cm, *BC* = 7 cm and *CA* = 6 cm.

(a) Calculate the size, in degrees to 3 significant figures, of ∠*ACB*.

∠*ACB* = ... °

(3)

In △*ADB*, *AD* = *DB* and ∠*ADB* = 50°

(b) Calculate the volume, in cm^3 to 3 significant figures, of the pyramid *ABCD*.

.... cm^3

(4)

(Total for Question 29 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS

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