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International GCSE

Centre Number

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Mathematics B

Paper 1R



Monday 9 January 2017 – Morning
Time: 1 hour 30 minutes

Paper Reference

4MB0/01R

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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Answer ALL TWENTY NINE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1

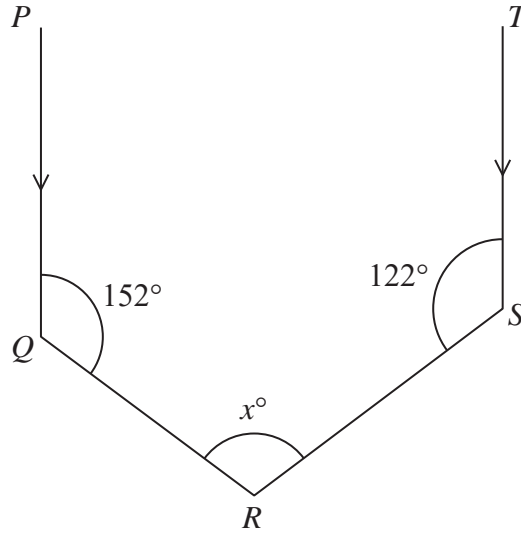


Diagram NOT
accurately drawn

In the diagram, PQ is parallel to TS , $\angle PQR = 152^\circ$, $\angle TSR = 122^\circ$ and $\angle QRS = x^\circ$

Find the value of x .

$x = \dots\dots\dots$

(Total for Question 1 is 2 marks)

- 2 Express 275 g as a fraction of 5.5 kg.
Give your answer in its simplest form.

$\dots\dots\dots$

(Total for Question 2 is 2 marks)



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3 Solve $\frac{2}{3}x - \frac{8}{15}x = \frac{16}{5}$

Show all your working clearly.

$$x = \dots\dots\dots$$

(Total for Question 3 is 2 marks)

4 Each time a music track was downloaded, the music company received £0.95

The music company gave $12\frac{1}{2}\%$ of the money received to the singer of the track.

The music track was downloaded 32 000 times in November.

Calculate how much, in £, was given to the singer by the music company for the November music track downloads.

$$\text{£ } \dots\dots\dots$$

(Total for Question 4 is 2 marks)

5 The n th term of a sequence is given by the expression $5 - 3n$

Find the difference between the 7th term and the 12th term.

$$\dots\dots\dots$$

(Total for Question 5 is 2 marks)

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6 Factorise completely $xw - yw - yz + xz$

(Total for Question 6 is 2 marks)

7 Given that $y = x^6 - \frac{6}{x^3}$

find $\frac{dy}{dx}$

(Total for Question 7 is 2 marks)

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8

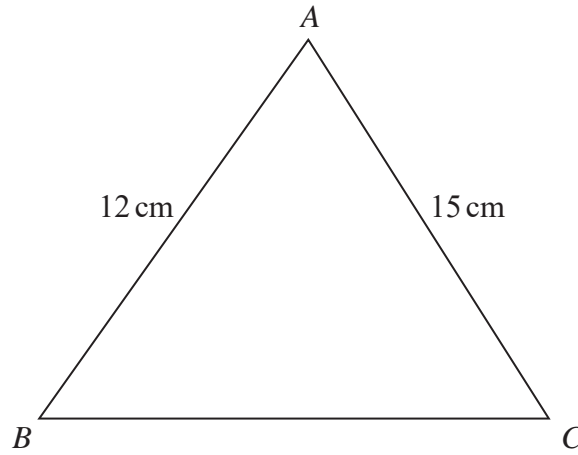


Diagram **NOT**
accurately drawn

In triangle ABC , $AB = 12$ cm and $AC = 15$ cm.
The area of triangle ABC is 35 cm²

Calculate the value of $\sin A$

$\sin A = \dots\dots\dots$

(Total for Question 8 is 2 marks)

9 Showing all your working, evaluate $\frac{3^{-2} + 5^3}{3^{-2}}$

(Total for Question 9 is 2 marks)



$$10 \quad t = \frac{2 \cos p^\circ - 1}{\sqrt{q} - r}$$

where $p = 30$, $q = 12288$ and $r = 64$

- (a) Find the exact value of t .
Give your answer as a decimal.

$$t = \dots\dots\dots (2)$$

- (b) Write your answer to part (a) to 4 significant figures.

$$\dots\dots\dots (1)$$

(Total for Question 10 is 3 marks)

- 11 $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
 $A = \{\text{odd numbers}\}$
 $B = \{\text{multiples of 3}\}$
 $C = \{\text{factors of 24}\}$

List the elements of the set

- (a) A'

$$A' = \{\dots\dots\dots\} (1)$$

- (b) $B \cup C$

$$B \cup C = \{\dots\dots\dots\} (1)$$

- (c) $A' \cap (B \cup C)$

$$A' \cap (B \cup C) = \{\dots\dots\dots\} (1)$$

(Total for Question 11 is 3 marks)

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12 Find the matrix product

(a) $(3 \quad -2) \begin{pmatrix} 1 \\ -4 \end{pmatrix}$

.....
(1)

(b) $\begin{pmatrix} 1 \\ -4 \end{pmatrix} (3 \quad -2)$

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

13 Simplify fully $\frac{6x^3 - 12x^2y}{4xy - 8y^2}$

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(Total for Question 13 is 3 marks)

14 Here are the mathematics test results of 12 students.

9 8 6 8 5 4 8 10 6 9 4 5

(a) Find the median mark.

.....
(2)

(b) Write down the modal mark.

.....
(1)

(Total for Question 14 is 3 marks)

15 Make y the subject of $4x - 5(y + 3) = wy$

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

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16 (a) Write down **any** number a for which $\sqrt{a} > a$

$$a = \dots\dots\dots (1)$$

(b) x is a positive number and $10\sqrt{x} = x\sqrt{40}$

Showing all your working, find the value of x .

$$x = \dots\dots\dots (2)$$

(Total for Question 16 is 3 marks)

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17 Solve $3x - 2y = 11$

$$5x - 3y = 18$$

$$x = \dots\dots\dots \quad y = \dots\dots\dots$$

(Total for Question 17 is 4 marks)

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18 $a:b = 5:8$ and $b:c = 6:25$

Find, in its simplest form, $a:b:c$

$$a:b:c = \dots\dots\dots$$

(Total for Question 18 is 3 marks)

19



Diagram NOT accurately drawn

$ABCD$ is a rectangle.

X is the point on AD and Y is the point on AB such that $XY = 5$ cm, $YC = 12$ cm, $\angle BYC = 45^\circ$ and $\angle AYX = 20^\circ$

Find the length, in cm to 3 significant figures, of

(a) BC ,

$$BC = \dots\dots\dots \text{ cm} \quad (2)$$

(b) AB .

$$AB = \dots\dots\dots \text{ cm} \quad (2)$$

(Total for Question 19 is 4 marks)

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20 A biased six-sided die is numbered 1, 2, 3, 4, 5 and 6.

The table shows the probability of each possible score when the die is rolled once.

| | | | | | | |
|--------------------|-----|-----|-----|------|-----|-----|
| Score | 1 | 2 | 3 | 4 | 5 | 6 |
| Probability | 0.2 | 0.1 | x | 0.15 | 0.3 | 0.1 |

(a) Find the value of x .

$$x = \dots\dots\dots$$

(1)

The die is to be rolled twice.

(b) Find the probability that the sum of the scores for the two rolls is 10.

$$\dots\dots\dots$$

(3)

(Total for Question 20 is 4 marks)

21 (a) Express 729 as a power of 3

$$\dots\dots\dots$$

(1)

(b) Hence solve $3^{2x+5} = 729^{5-x}$

Show your working clearly.

$$x = \dots\dots\dots$$

(3)

(Total for Question 21 is 4 marks)

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- 22 Each day, Sania recorded the maximum wind speed, in km/h, in her town for a period of 60 days. On no day was the maximum wind speed greater than 60 km/h.

The incomplete table and histogram give information about the maximum wind speeds.

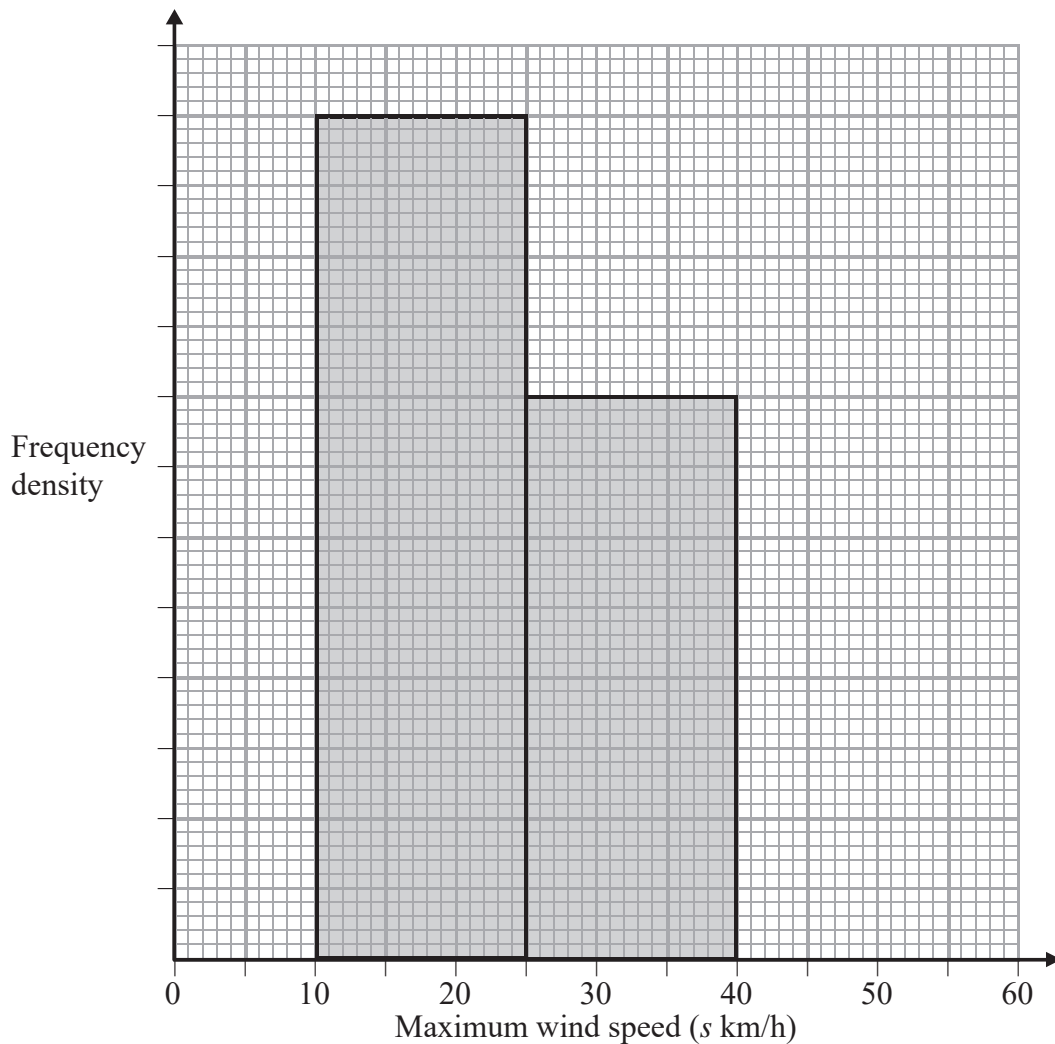
Using this information

- (a) complete the table,

| Maximum wind speed (s km/h) | Number of days |
|-----------------------------------|----------------|
| $0 < s \leq 10$ | 8 |
| $10 < s \leq 25$ | 24 |
| $25 < s \leq 40$ | |
| $40 < s \leq 60$ | |

(2)

- (b) complete the histogram.



(2)

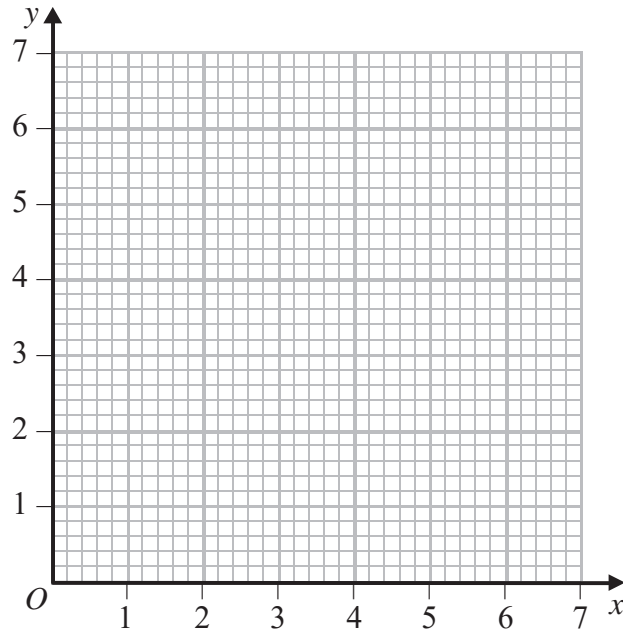
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23



(a) On the grid, draw and label the lines with equation

- (i) $y = 5$
- (ii) $x + y = 6$
- (iii) $2y = x + 1$

(3)

(b) On the grid, shade and label the region **R** defined by

$$x \geq 0 \quad \text{and} \quad y \leq 5 \quad \text{and} \quad x + y \leq 6 \quad \text{and} \quad 2y \geq x + 1$$

(1)

(Total for Question 23 is 4 marks)

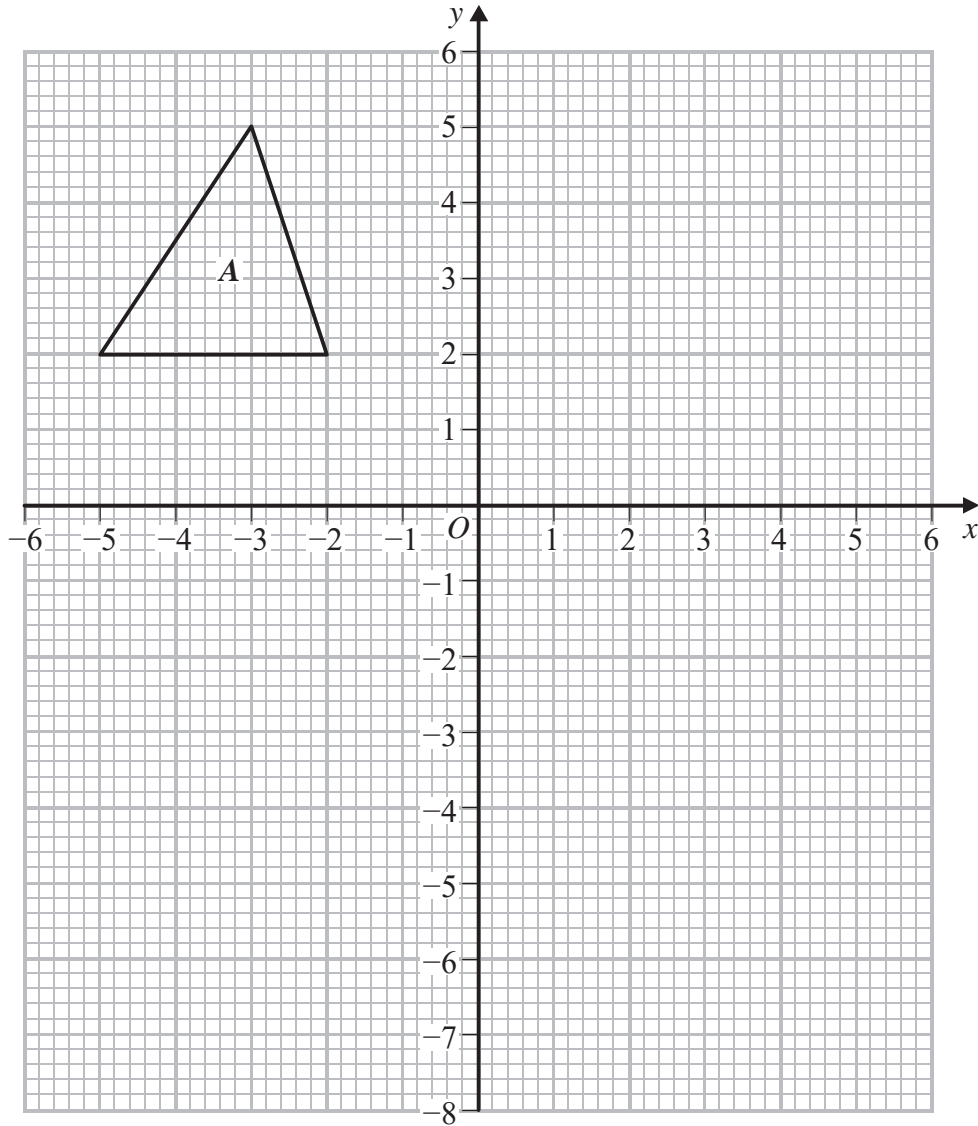
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24



Triangle B is the image of triangle A under a reflection in the x -axis.

(a) On the grid, draw and label triangle B .

(1)

Triangle C is the image of triangle B under the translation $\begin{pmatrix} 7 \\ -2 \end{pmatrix}$

(b) On the grid, draw and label triangle C .

(1)

Triangle D is the image of triangle C under a rotation of 180° about the point $(3.5, -1)$

(c) On the grid, draw and label triangle D .

(1)

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(d) Find the 2×2 matrix that represents the transformation of triangle D onto triangle A .

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

(2)

(Total for Question 24 is 5 marks)

25 y varies directly as the cube of x .

$$y = 9 \text{ when } x = \frac{1}{2}$$

(a) Find a formula for y in terms of x .

$$y = \dots\dots\dots$$

(3)

(b) Find the value of x when $y = \frac{125}{3}$

$$x = \dots\dots\dots$$

(2)

(Total for Question 25 is 5 marks)

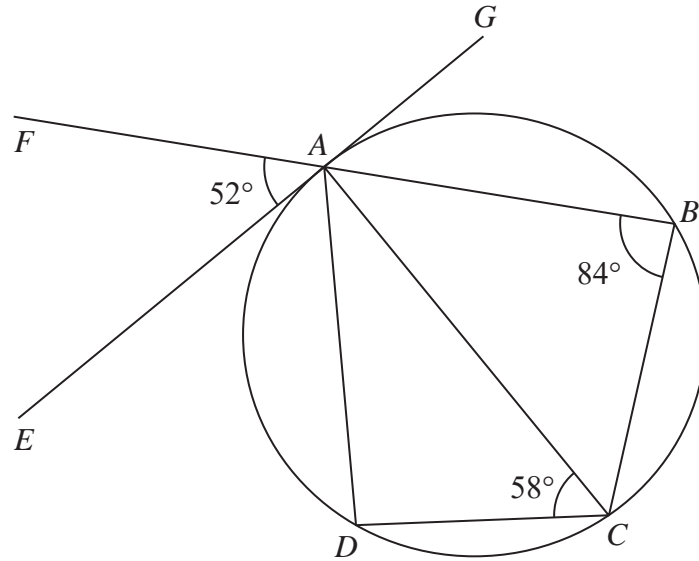
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26

Diagram **NOT**
accurately drawn

In the diagram, A , B , C and D are points on the circumference of a circle. FAB is a straight line and EAG is the tangent to the circle at the point A .

$$\angle ABC = 84^\circ, \angle ACD = 58^\circ \text{ and } \angle EAF = 52^\circ$$

Giving your reasons, calculate the size, in degrees, of

(a) $\angle ADC$,

$$\angle ADC = \dots\dots\dots^\circ$$

(2)

(b) $\angle EAD$,

$$\angle EAD = \dots\dots\dots^\circ$$

(2)

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(c) $\angle ACB$.

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

(2)

(Total for Question 26 is 6 marks)

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Turn over for Question 27

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27 Find the values of x which satisfy $x + \frac{1}{x-2} = \frac{9}{2}$

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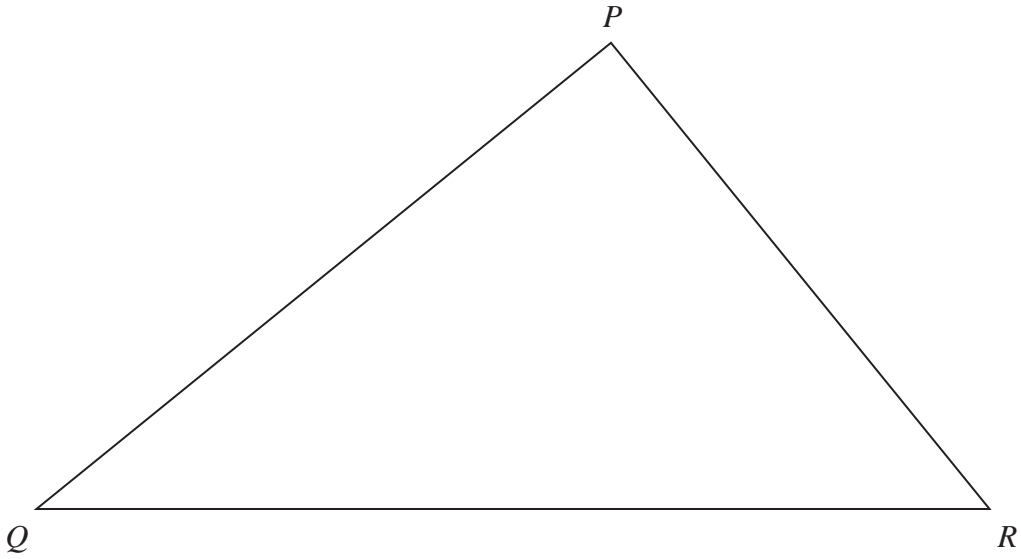
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(Total for Question 27 is 5 marks)



28



PQR is a triangle.

Leaving in all of your construction lines, construct the locus of all points inside the triangle which are

- (a) 6 cm from P , (1)
- (b) equidistant from Q and R , (2)
- (c) equidistant from the lines QP and QR . (2)

The region **T** consists of all the points inside the triangle which are less than 6 cm from P , closer to R than to Q and closer to QR than to QP .

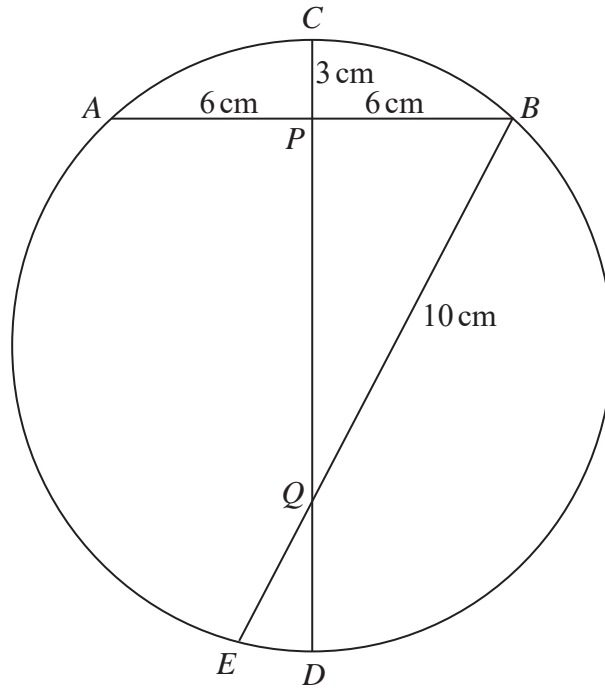
- (d) Show, by shading, the region **T**. Label the region **T**. (1)

(Total for Question 28 is 6 marks)

Turn over for Question 29



29

Diagram NOT
accurately drawn

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A , B , C , D and E are points on the circumference of a circle with diameter CD .

The chord AB of the circle intersects the diameter CD at P such that $AP = PB = 6\text{ cm}$ and $PC = 3\text{ cm}$.

The chord BE of the circle intersects the diameter at Q and $BQ = 10\text{ cm}$.

(a) Find the length, in cm, of PQ .

$PQ = \dots\dots\dots\text{ cm}$
(2)

(b) Find the radius, in cm, of the circle.

$\dots\dots\dots\text{ cm}$
(3)



(c) Find the length, in cm, of QE .

$QE = \dots\dots\dots$ cm

(2)

(Total for Question 29 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS

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