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Surname

Other names

Edexcel

International GCSE

Centre Number

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Mathematics B

Paper 2 



Wednesday 16 May 2012 – Morning

Time: 2 hours 30 minutes

Paper Reference

4MB0/02

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 ELEVEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 $\mathcal{E} = \{ x : 1 \leq x \leq 10 \text{ and } x \text{ is an integer} \},$

$$A = \{ x : 1 < x < 10 \},$$

$$B = \{ x : 3 < x \leq 5 \},$$

$$C = \{ x : x \text{ is an even integer} \}.$$

Find the elements in

(a) A' (1)

(b) $B \cap C$ (1)

(c) $(A \cap C) \cup B$ (2)

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Question 1 continued

A series of horizontal dotted lines for writing.

(Total for Question 1 is 4 marks)



Question 2 continued

Handwriting practice area consisting of 25 horizontal dotted lines for writing.

(Total for Question 2 is 5 marks)



3 (a) Calculate the size, in degrees, of an exterior angle of a regular pentagon.

(2)

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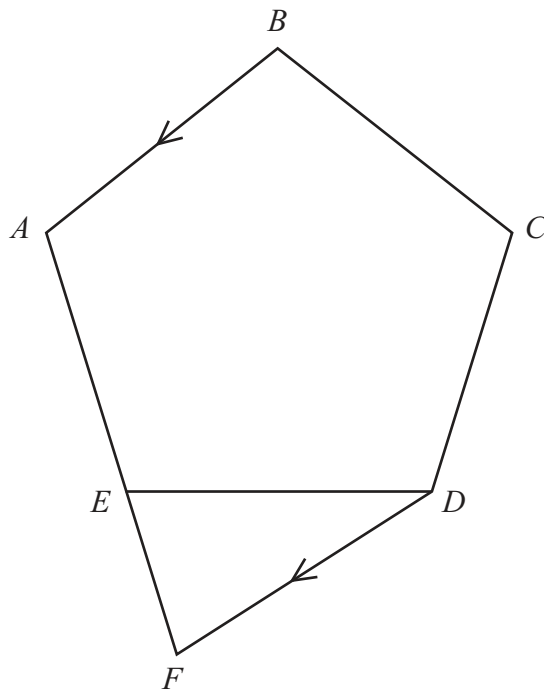


Diagram **NOT** accurately drawn

Figure 1

In Figure 1, $ABCDE$ is a regular pentagon. AE is extended to the point F such that DF is parallel to BA .

(b) Show, giving reasons, that triangle DEF is isosceles.

(4)

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Question 3 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

(Total for Question 3 is 6 marks)



4 One day a cinema showed the following four films

The Taking of Algebra 123
The Binary Knot
Carry On Subtracting
The Long Division

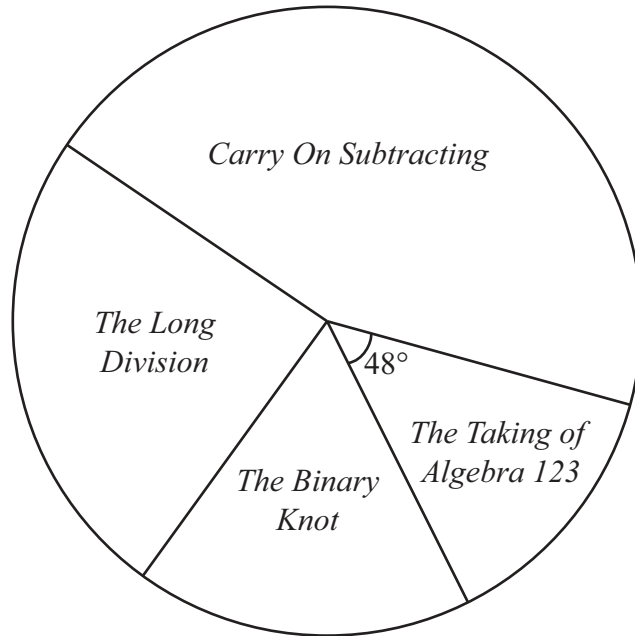


Diagram **NOT** accurately drawn

Figure 2

The pie chart in Figure 2 shows information about the number of people who watched each film that day.

The angle of the sector for the film *The Taking of Algebra 123* is 48° and 80 people watched this film.

(a) Calculate the total number of people who watched these four films. (2)

The number of people who watched *The Binary Knot* was 115

(b) Calculate the angle of the sector for this film. (2)

The ratio of the number of people who watched *Carry on Subtracting* to the number of people who watched *The Long Division* was 2 : 1

(c) Calculate the number people who watched *Carry on Subtracting*. (2)

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Question 4 continued

A series of horizontal dotted lines for writing.

(Total for Question 4 is 6 marks)



5 Iftekhar travels to work each day either by bus or by train. The probability that he takes the bus is $\frac{4}{5}$. If he takes the bus, the probability that he buys a newspaper is $\frac{3}{4}$. If he takes the train, the probability that he buys a newspaper is $\frac{2}{3}$.

(a) Draw a tree diagram to represent this information.

(4)

(b) Calculate the probability that one particular day, Iftekhar will **not** buy a newspaper.

(3)

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Question 5 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

(Total for Question 5 is 7 marks)



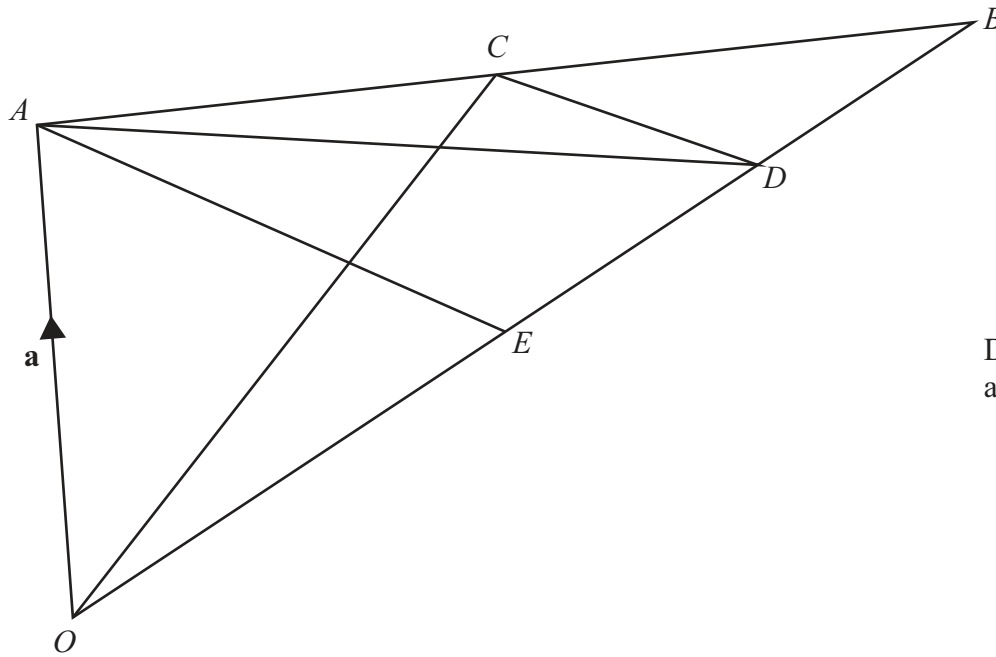


Diagram **NOT**
accurately drawn

Figure 3

In Figure 3, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

The point C is the midpoint of AB .

(a) Find, in terms of \mathbf{a} and \mathbf{b} , simplifying your answer

(i) \overrightarrow{AB} ,

(ii) \overrightarrow{OC} .

(3)

The point D is on OB such that $OD : DB = 3 : 1$

(b) Find, in terms of \mathbf{a} and \mathbf{b} , and simplifying your answer, \overrightarrow{CD} .

(3)

The point E is on OB such that $\triangle BCD$ is similar to $\triangle BAE$.

(c) Find, in terms of \mathbf{a} and \mathbf{b} , \overrightarrow{AE} .

(2)

(d) Write down the ratio of $OE : EB$ in the form $m : n$ where m and n are integers.

(1)

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Question 6 continued

Ruled area for writing answers.

(Total for Question 6 is 9 marks)



7 In 2010 Neucamp Productions employed 3750 people. Of these 36% were clerical staff.

(a) Calculate the number of clerical staff employed in 2010 (2)

The other employees of Neucamp Productions are either skilled manual workers or unskilled manual workers. The ratio of the number of skilled manual workers to the number of unskilled manual workers was 3 : 2 in 2010

(b) Calculate the number of skilled manual workers employed in 2010 (2)

In 2011 the number of skilled manual workers was 25% less than the number of skilled manual workers in 2010

The numbers of clerical staff and unskilled manual workers remained the same in 2011 as in 2010

(c) Calculate the number of skilled manual workers employed in 2011 (2)

The total number of people employed by Neucamp Productions in 2011 was 75% of the total number employed by Neucamp Productions in 2009

(d) Calculate the total number of people employed by Neucamp Productions in 2009 (3)

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Question 7 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

(Total for Question 7 is 9 marks)



8 The points $(1, -1)$, $(4, -2)$ and $(3, -5)$ are the vertices of triangle A .

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

(1)

Triangle A is transformed to triangle B under the transformation with matrix \mathbf{N} where

$$\mathbf{N} = \begin{pmatrix} -2 & -1 \\ \frac{3}{2} & \frac{1}{2} \end{pmatrix}$$

(b) Find the coordinates of the vertices of B .

(2)

(c) On the grid, draw and label B .

(1)

Triangle B is transformed to triangle C under the transformation with matrix \mathbf{M} where

$$\mathbf{M} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

(d) Find the coordinates of the vertices of C .

(2)

(e) On the grid, draw and label C .

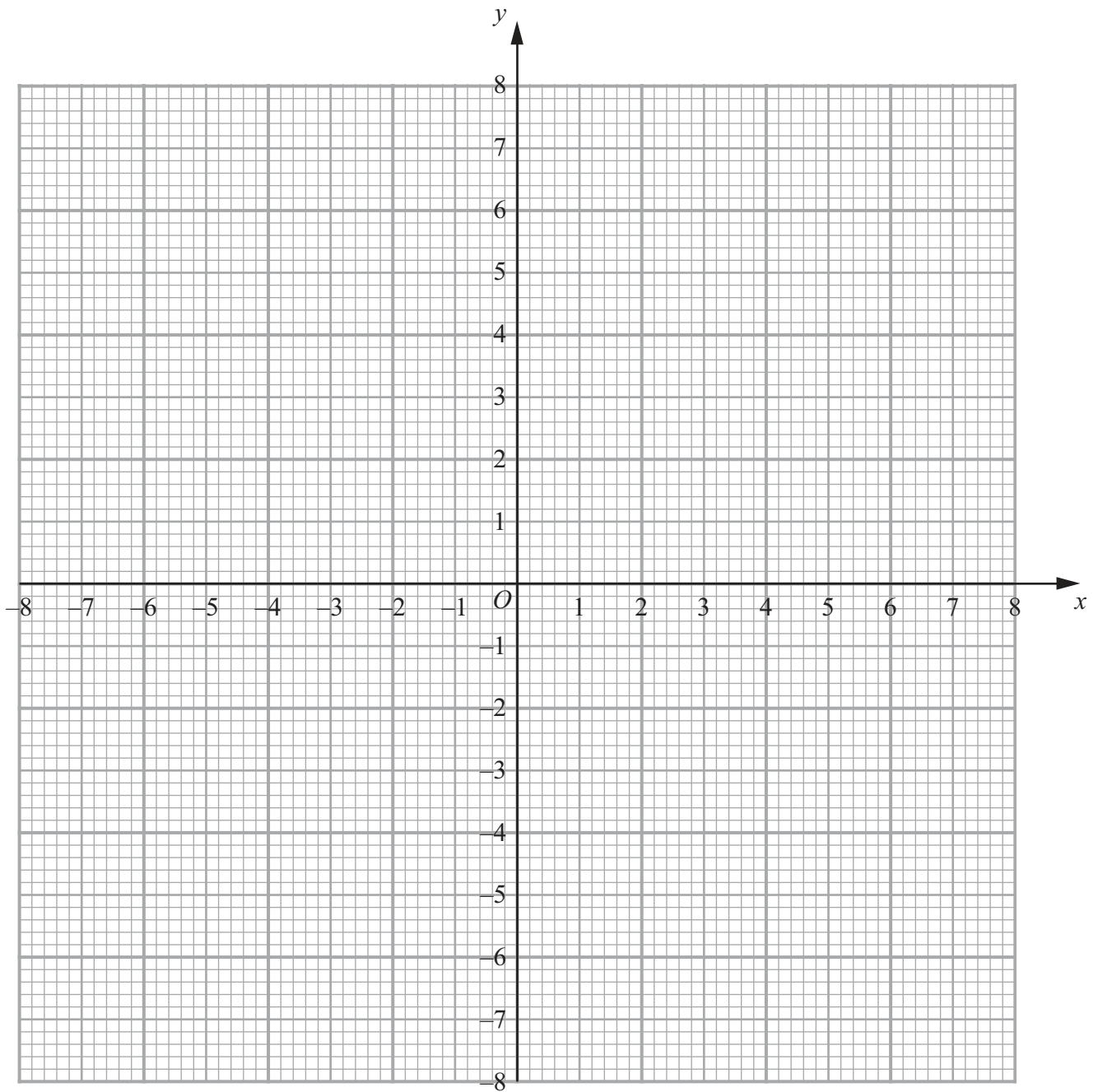
(1)

(f) Describe fully the single transformation which maps triangle C onto triangle A .

(2)



Question 8 continued



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Question 8 continued

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 8 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

(Total for Question 8 is 9 marks)



9

$$f: x \mapsto x^2 - 3x - 6$$

$$g: x \mapsto 2 + \frac{4}{x}$$

(a) Find

(i) $f(-4)$

(ii) $fg\left(\frac{1}{3}\right)$

(3)

(b) State the value of x which must be excluded from any domain of g .

(1)

(c) Find the values of x for which $gf(x) = 0$

(5)

(d) Find g^{-1} . Give your answer in the form $g^{-1}: x \mapsto \dots$

(4)

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Question 9 continued

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 9 continued

A large rectangular area containing 25 horizontal dotted lines for writing answers.



Question 9 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

(Total for Question 9 is 13 marks)



10

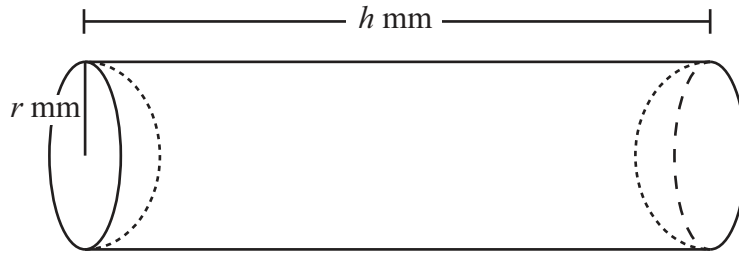


Figure 4

A solid S is made by removing a hemisphere of radius r mm from each end of a solid right circular cylinder of radius r mm and length h mm as shown in Figure 4. The volume of the solid S is V mm³.

(a) Find an expression for V in terms of r and h . (1)

The sum of the length of the cylinder and its diameter is 20 mm.

(b) Write down a formula for h in terms of r . (1)

(c) Hence show that $V = \frac{10\pi}{3}(6r^2 - r^3)$ (2)

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Question 10 continued

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 10 continued

(d) For $y = 6r^2 - r^3$, complete the table.

r	0	1	2	3	4	5	6
$6r^2$	0	6		54			216
$-r^3$	0	-1		-27			-216
y	0	5		27			0

(3)

(e) On the grid, plot the points from your completed table and join them to form a smooth curve.

(3)

(f) By drawing a suitable straight line on your grid, find the value of y when $r = 3.3$

(2)

Given that $V = 180$,

(g) use your graph to find, to one decimal place, the two possible values of r .

(4)

$$\left[\text{Volume of sphere} = \frac{4}{3}\pi r^3 \right.$$

$$\left. \text{Area of circle} = \pi r^2 \right]$$

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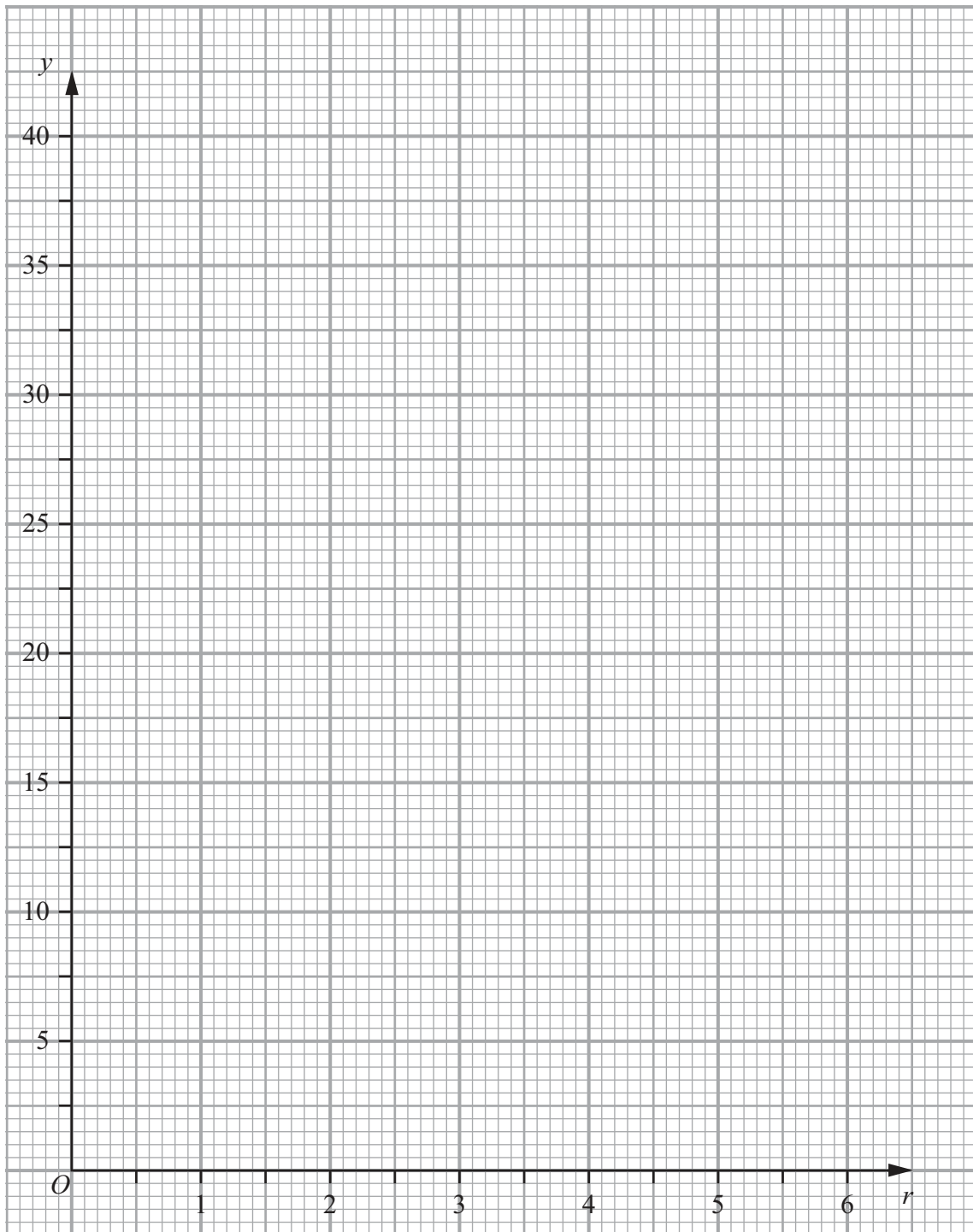
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Question 10 continued



(Total for Question 10 is 16 marks)



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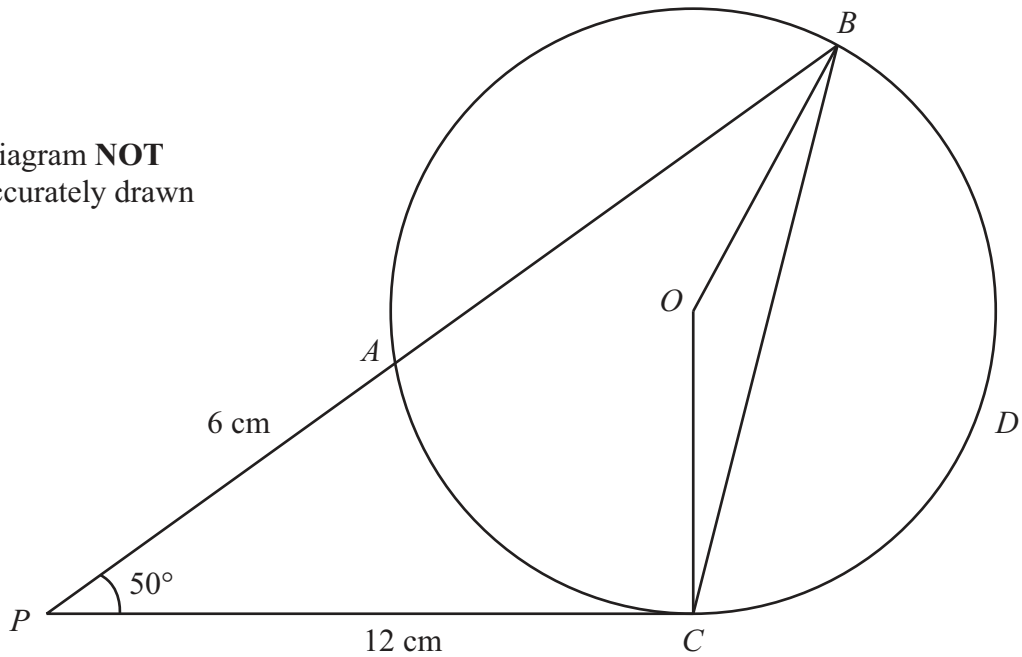


Figure 5

In Figure 5, $ABDC$ is a circle with centre O . The tangent at C meets BA produced at P .

$PA = 6$ cm, $PC = 12$ cm.

(a) Give a reason why $\angle OCP$ is 90° . (1)

(b) Show that $PB = 24$ cm. (2)

Given that $\angle BPC = 50^\circ$ find, giving all your answers to 3 significant figures,

(c) the length, in cm, of BC , (3)

(d) the size, in degrees, of $\angle BCO$, (4)

(e) the radius, in cm, of the circle, (3)

(f) the area, in cm^2 , of the sector $OBDC$. (3)

$$[\text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Area of circle} = \pi r^2]$$



Question 11 continued

A series of horizontal dotted lines for writing.



Question 11 continued

Ruled area for writing answers with horizontal dotted lines.

(Total for Question 11 is 16 marks)

TOTAL FOR PAPER IS 100 MARKS



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