

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						7	3	6	1	/	0	2	Signature	

Paper Reference(s)

7361/02

**London Examinations GCE
Mathematics Syllabus B
Ordinary Level**

Paper 2

Wednesday 6 May 2009 – Afternoon

Time: 2 hours 30 minutes

Examiner's use only

--	--	--

Team Leader's use only

--	--	--

Materials required for examination

Nil

Items included with question papers

Nil

Candidates are expected to have an electronic calculator when answering this paper.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper. If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2). Full marks may be obtained for answers to ALL questions. There are 11 questions in this question paper. The total mark for this paper is 100. There are 28 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and legibly.

This publication may be reproduced only in accordance with Edexcel Limited copyright policy. ©2009 Edexcel Limited.

Printer's Log. No.
N33418A

W850/U7361/57570 3/4/5/



Turn over

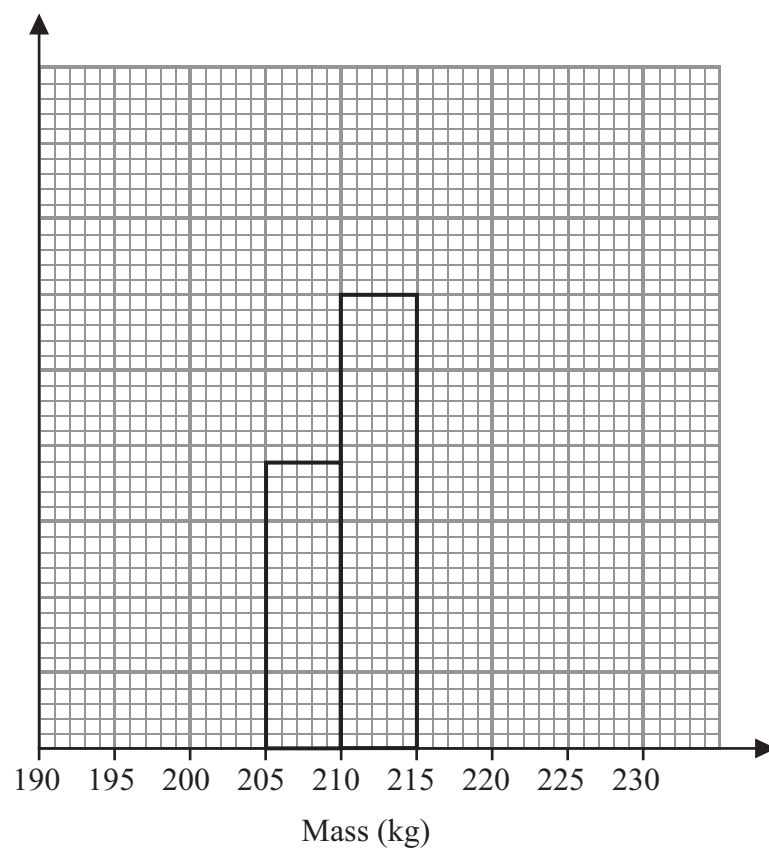
edexcel 
advancing learning, changing lives

Leave blank

2. Farmer Sue Tickle has 100 cows. Information about the masses of these cows is given in the incomplete table and the incomplete histogram.

(a) Complete the table and the histogram.

Mass of cow (m kg)	$190 \leq m < 205$	$205 \leq m < 210$	$210 \leq m < 215$	$215 \leq m < 220$	$220 \leq m < 230$
Frequency	9		30		18



(4)

One of these cows is to be chosen at random to be taken to market.

(b) Write down the probability that the cow will have a mass greater than or equal to 215 kg.

(1)

Q2

(Total 5 marks)



4.

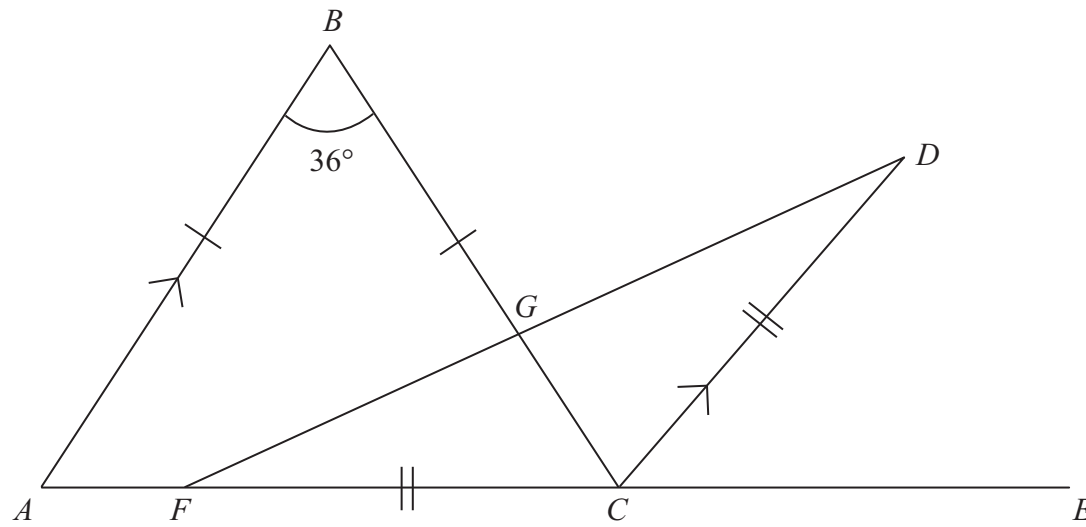


Figure 1

Figure 1 shows a triangle ABC with $BA = BC$ and $\angle ABC = 36^\circ$. The line AC is extended to the point E and CD is parallel to AB . The point F on AC is such that $DC = CF$ and the point G is the intersection of the straight line DF with BC .

Giving reasons,

(a) find the size, in degrees, of $\angle FDC$, (4)

(b) show that $ABGF$ is a cyclic quadrilateral. (2)



5. On Monday, 12 fishermen went fishing and caught a total of x fish.

- (a) Write down an expression in terms of x for the mean number of fish caught by the fishermen on Monday. (1)

On Tuesday, 15 fishermen went fishing and caught a total of $(x + 81)$ fish.

- (b) Write down an expression in terms of x for the mean number of fish caught by the fishermen on Tuesday. (1)

The mean number of fish caught by the fishermen on Tuesday is 2 more than the mean number of fish caught by the fishermen on Monday.

- (c) Write down an equation in x . (1)
- (d) By solving your equation, find the mean number of fish caught by the fishermen on Monday. (3)



6. $\mathcal{E} = \{a, b, c, d, e, f, g, h, i, j, k\}$,

$A = \{a, e, f, g, h, j\}$,

$B = \{c, g, i, j, k\}$,

$C = \{d, e, i, j\}$.

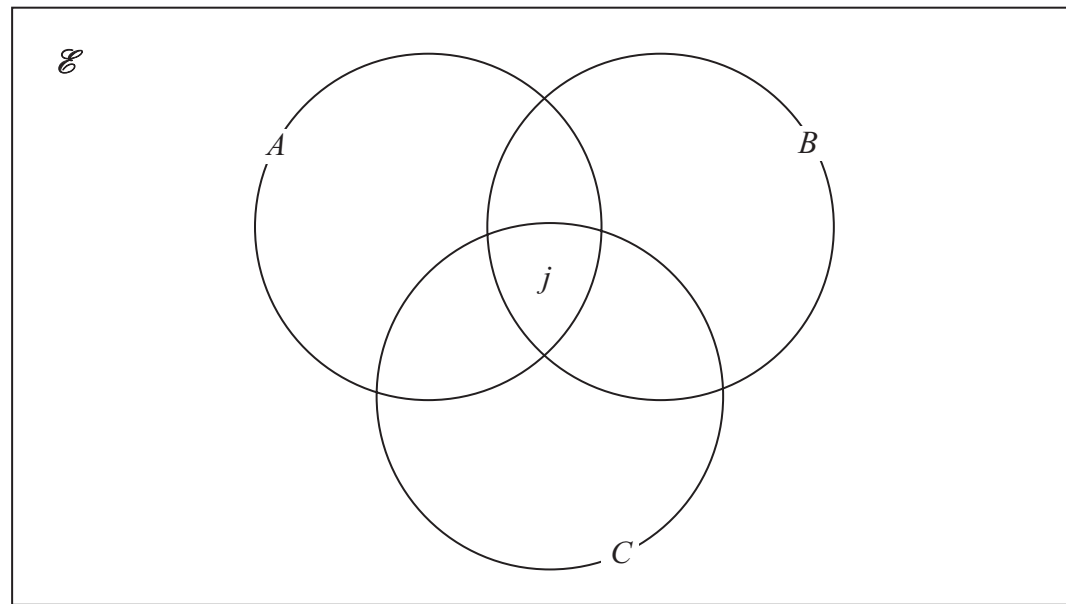


Figure 2

(a) Complete the Venn diagram in Figure 2. (4)

(b) List the members of
 (i) $A \cap B$, (ii) $B' \cup C$, (iii) $(B \cap C) \cup A'$. (3)



[Circumference of a circle = $2\pi r$. Area of a circle = πr^2 .]

7.

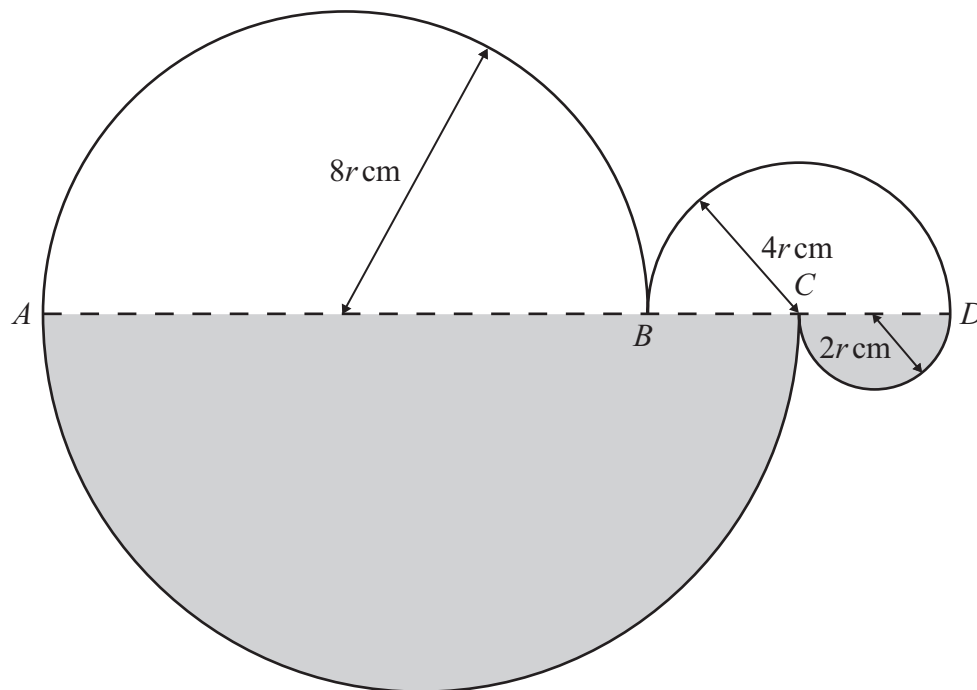


Figure 3

Figure 3 shows the design for a logo which is made using four semicircles.

The semicircle with diameter AB has radius $8r$ cm.
 The semicircle with diameter BD has radius $4r$ cm.
 The semicircle with diameter CD has radius $2r$ cm.

The fourth semicircle has diameter AC .

- (a) Find, in terms of r , the radius of the semicircle with diameter AC in cm. (1)
- (b) Find, in terms of r and π , the length of the perimeter of the logo in cm. (2)
- (c) Show that the area of the shaded part of the logo is 30% larger than the area of the unshaded part of the logo. (6)





Question 7 continued

Leave
blank

Ruled lines for writing.



N 3 3 4 1 8 A 0 1 3 2 8





Question 7 continued

Leave blank

Lined area for student response, consisting of multiple horizontal lines.



8.

$$f : x \mapsto \frac{1}{3}x + 2$$

$$g : x \mapsto x^2 + 2x + 3$$

$$h : x \mapsto \frac{6}{x}, \quad x \neq 0$$

(a) Find (i) $g(-2)$, (ii) $h(\frac{1}{3})$, (iii) $fg(-6)$. (3)

(b) Solve $h(x) = \frac{1}{2}$ (1)

(c) For the composite function hf , copy, complete and simplify $hf : x \mapsto \dots$ (2)

(d) State the value of x which must be excluded from the domain of hf . (1)

(e) Find the two values of x which satisfy $f(x) = g(x) - 5$ (5)



Question 8 continued

Leave
blank

Lined area for writing the answer to Question 8.

(Total 12 marks)

Q8

17

Turn over



9.

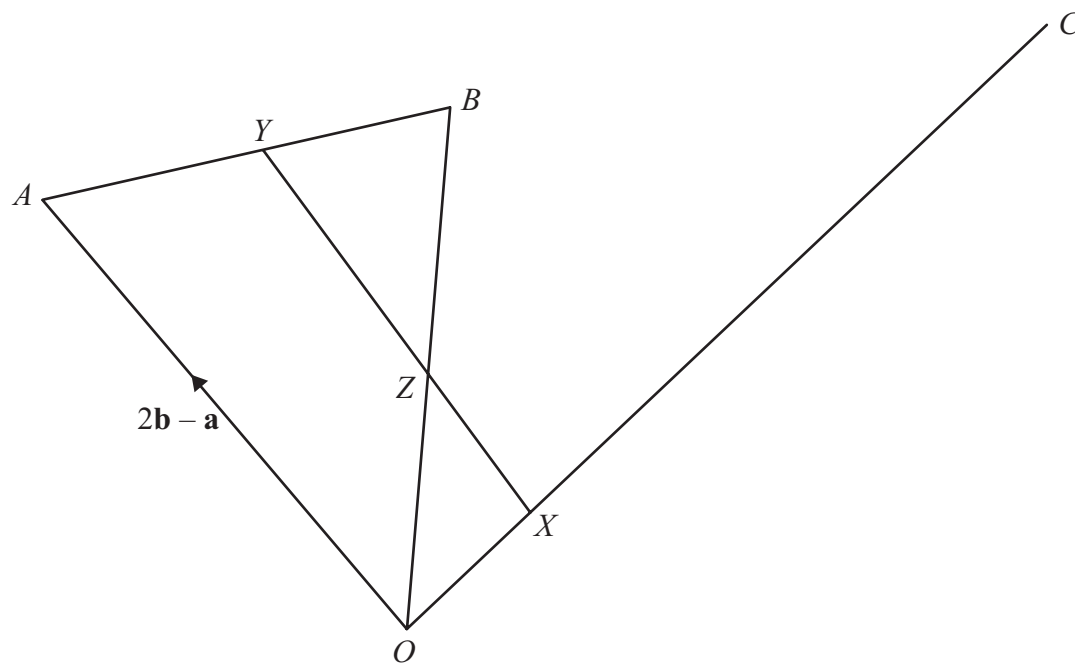


Figure 4

In Figure 4, $\overrightarrow{OA} = 2\mathbf{b} - \mathbf{a}$, $\overrightarrow{OB} = 2\mathbf{a} + \mathbf{b}$ and $\overrightarrow{OC} = 8\mathbf{a} - \mathbf{b}$.

(a) Find, in terms of \mathbf{a} and \mathbf{b} , simplifying where possible, \overrightarrow{AB} . (2)

(b) Show that A , B and C are collinear. (2)

Y is the midpoint of AB and X is the point on OC such that $OX:OC = 1:6$

(c) Find, in terms of \mathbf{a} and \mathbf{b} , simplifying where possible, \overrightarrow{XY} . (3)

The point of intersection of OB and XY is Z . Given that $\overrightarrow{OZ} = \mu\overrightarrow{OB}$,

(d) write down \overrightarrow{OZ} in terms of \mathbf{a} , \mathbf{b} and μ . (1)

Given also that $\overrightarrow{XZ} = \lambda\overrightarrow{XY}$,

(e) write down an expression for \overrightarrow{OZ} in terms of \mathbf{a} , \mathbf{b} and λ . (1)

(f) Hence calculate the value of μ and the value of λ . (4)

(g) Write down what this result shows about the point Z . (1)



┌

Question 9 continued

Leave
blank

Lined writing area for the answer to Question 9.



N 3 3 4 1 8 A 0 1 9 2 8



└



Question 9 continued

Leave
blank

Lined area for writing the answer to Question 9.



10.

[Area of a circle = πr^2 . Volume of a sphere = $\frac{4}{3}\pi r^3$.]

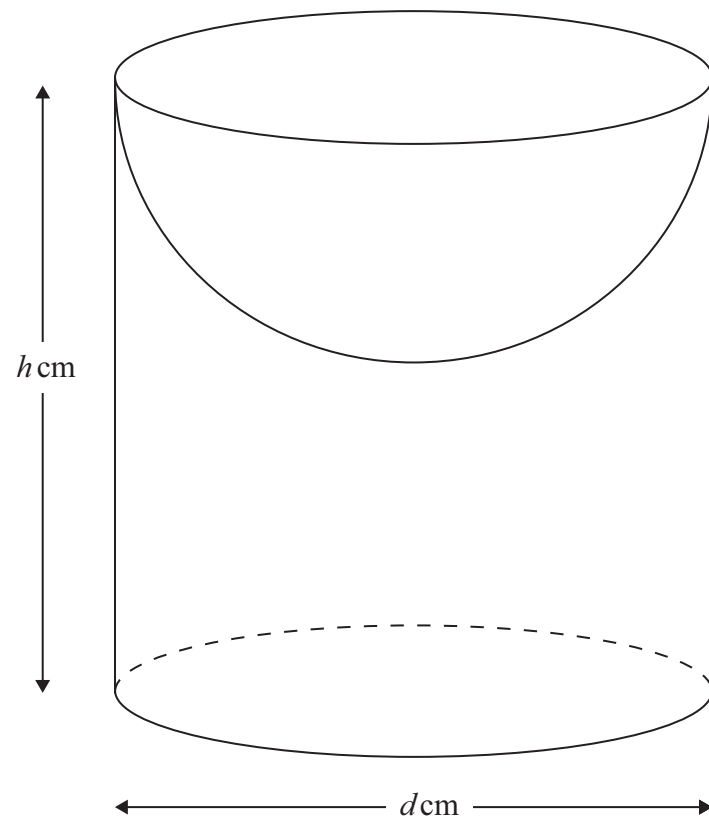


Figure 5

From the top of a solid right circular cylinder of height h cm and base diameter d cm, a hemisphere of diameter d cm is removed, as shown in Figure 5, to form a solid S .

Given that $h + d = 20$, and that r cm is the radius of the cylinder,

- (a) write down an expression for h in terms of r . (1)

The volume of S is V cm³.

- (b) Write down a formula for V in terms of π , h and r . (1)

- (c) Hence show that $V = \frac{1}{3}\pi r^2(60 - 8r)$. (2)

- (d) Using calculus, find the value of r for which V has a maximum value. (4)



7

Leave blank

Question 10 continued

(e) Complete the table for $V = \frac{1}{3}\pi r^2(60 - 8r)$, giving each value of V to the nearest integer.

r	0	1	2	3	4	5	6	7
$60 - 8r$	60	52		36	28			4
$\frac{1}{3}\pi r^2$	0	1.047		9.425	16.76			51.31
V	0	54		339	469			205

(3)

(f) Draw the graph of $V = \frac{1}{3}\pi r^2(60 - 8r)$ for values of r from 0 to 7

(3)

(g) From your graph, find an estimate, to one decimal place, of the two values of r for which $V = 400$

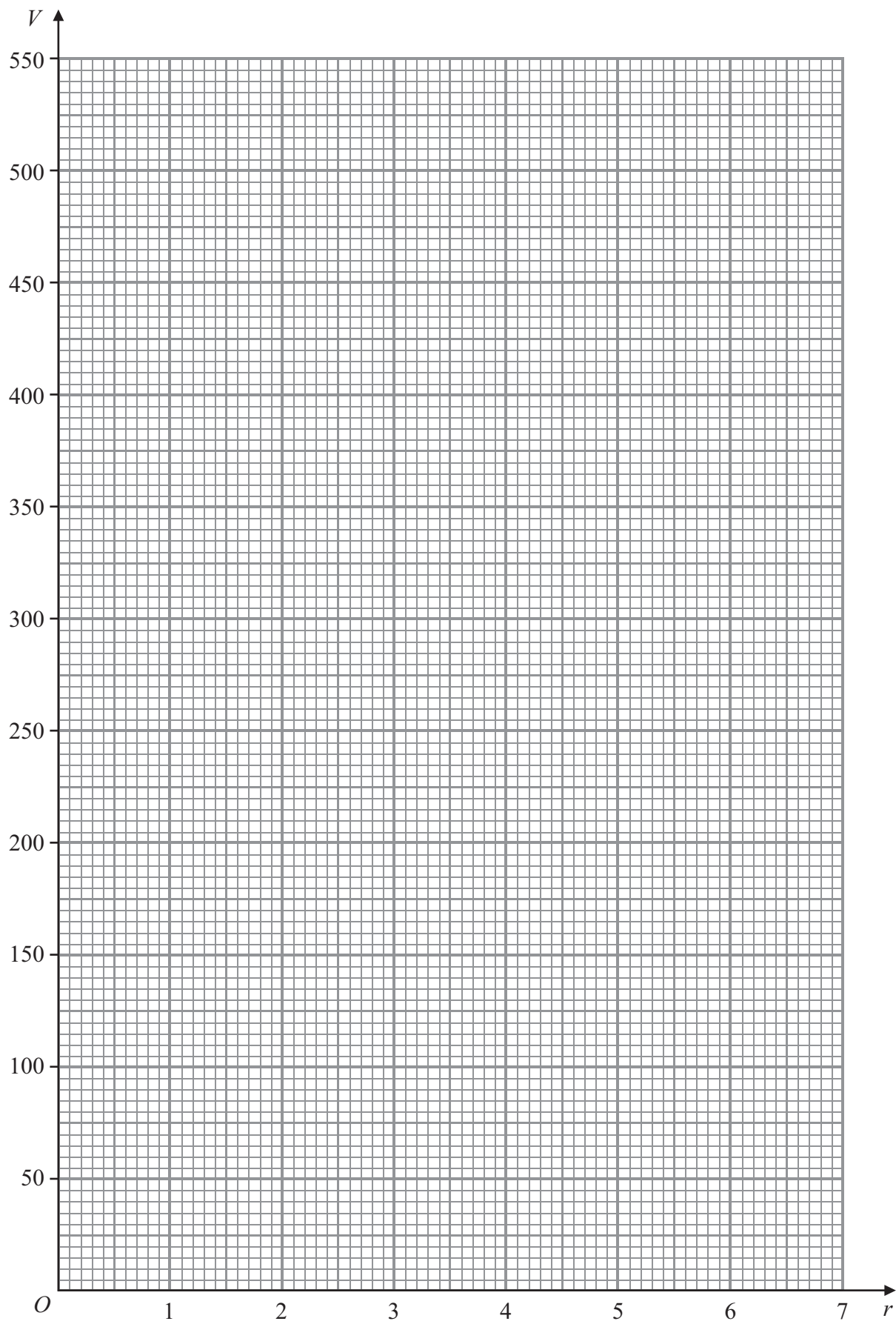
(2)



7

Question 10 continued

Leave
blank



(Total 16 marks)

Q10

25

Turn over



N 3 3 4 1 8 A 0 2 5 2 8

[Solutions of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$]

11.

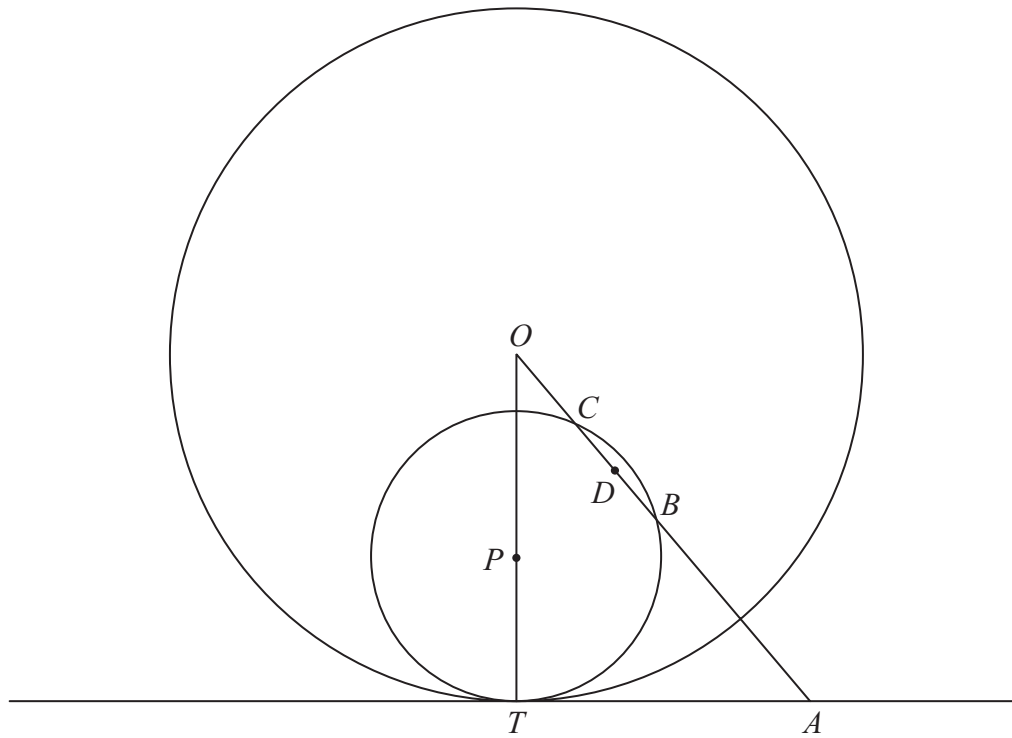


Figure 6

Figure 6 shows two circles, centres O and P , which touch at the point T . The line AT is the tangent to both circles at T where $AT = 8$ cm, $AP = 10$ cm and $AO = 17$ cm.

Given that $OCDBA$ is a straight line where D is the midpoint of BC , calculate

- (a) the length, in cm, of OT , (2)
- (b) the length, in cm, of OP , (2)
- (c) the size, in degrees to 3 significant figures, of $\angle PAO$, (3)
- (d) the length, in cm to 3 significant figures, of PD , (2)
- (e) the length, in cm to 3 significant figures, of BC , (3)
- (f) the length, in cm to 3 significant figures, of AB . (4)



