

Edexcel Maths C2

Topic Questions from Papers

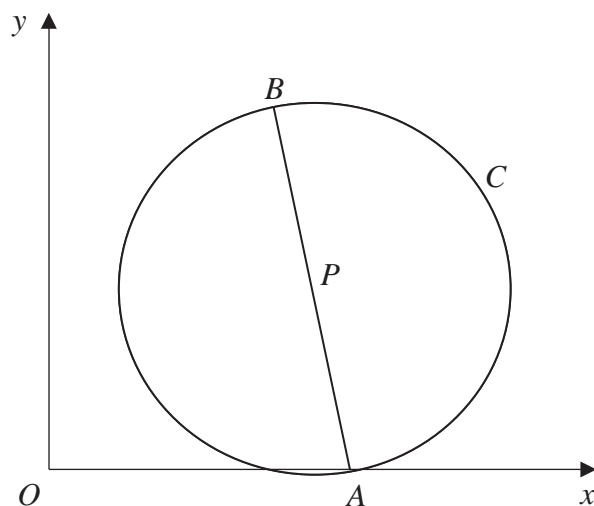
Coordinate Geometry





3.

Figure 1



In Figure 1,  $A(4, 0)$  and  $B(3, 5)$  are the end points of a diameter of the circle  $C$ .

Find

- (a) the exact length of  $AB$ , (2)
- (b) the coordinates of the midpoint  $P$  of  $AB$ , (2)
- (c) an equation for the circle  $C$ . (3)

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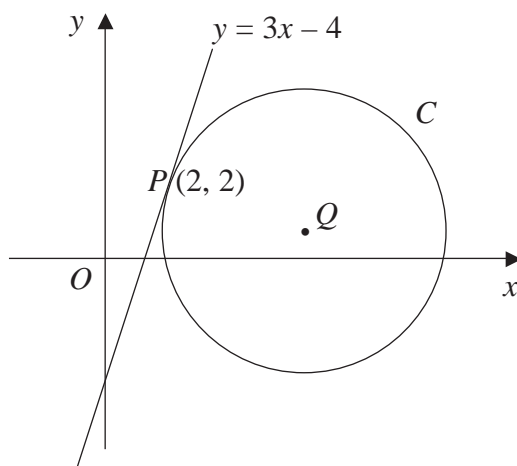




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7.

Figure 1



The line  $y = 3x - 4$  is a tangent to the circle  $C$ , touching  $C$  at the point  $P(2, 2)$ , as shown in Figure 1.

The point  $Q$  is the centre of  $C$ .

(a) Find an equation of the straight line through  $P$  and  $Q$ . (3)

Given that  $Q$  lies on the line  $y = 1$ ,

(b) show that the  $x$ -coordinate of  $Q$  is 5, (1)

(c) find an equation for  $C$ . (4)

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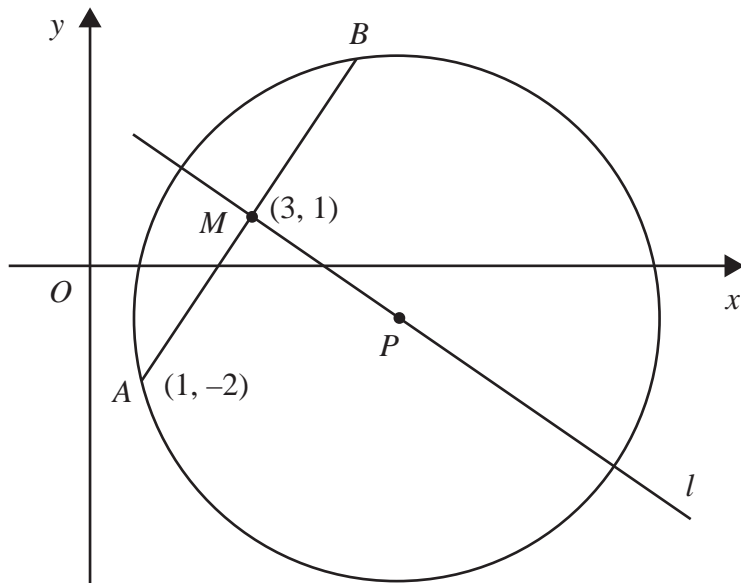


Figure 3

The points  $A$  and  $B$  lie on a circle with centre  $P$ , as shown in Figure 3. The point  $A$  has coordinates  $(1, -2)$  and the mid-point  $M$  of  $AB$  has coordinates  $(3, 1)$ . The line  $l$  passes through the points  $M$  and  $P$ .

- (a) Find an equation for  $l$ . (4)

Given that the  $x$ -coordinate of  $P$  is 6,

- (b) use your answer to part (a) to show that the  $y$ -coordinate of  $P$  is  $-1$ , (1)

- (c) find an equation for the circle. (4)

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5. The circle **C** has centre  $(3, 1)$  and passes through the point  $P(8, 3)$ .

(a) Find an equation for **C**. **(4)**

(b) Find an equation for the tangent to **C** at **P**, giving your answer in the form **ax + by + c = 0**, where **a, b** and **c** are integers. **(5)**

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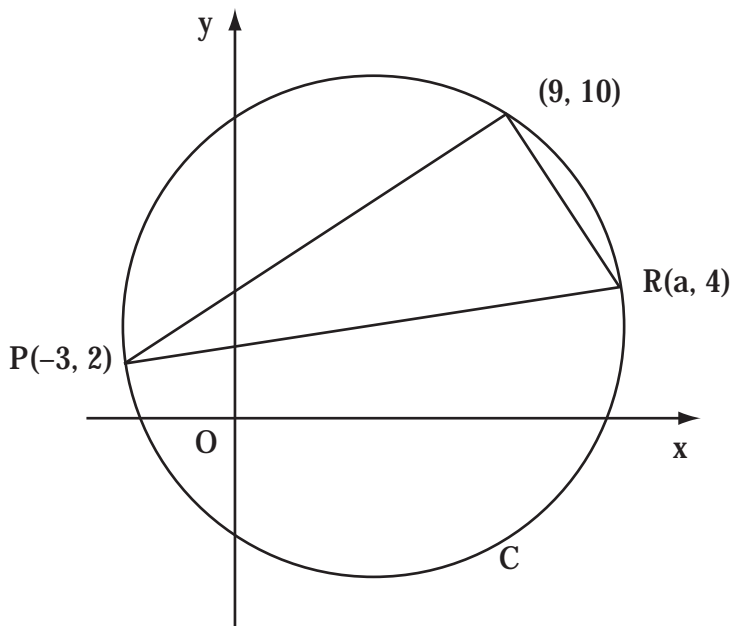
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5.



**Figure 2**

The points  $P(-3, 2)$ ,  $(9, 10)$  and  $R(a, 4)$  lie on the circle  $C$ , as shown in Figure 2. Given that  $PR$  is a diameter of  $C$ ,

(a) show that  $a = 13$ , (3)

(b) find an equation for  $C$ . (5)

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**Question 5 continued**

Lined area for writing the answer to Question 5.



H 3 0 9 5 7 A 0 1 1 2 8





8.

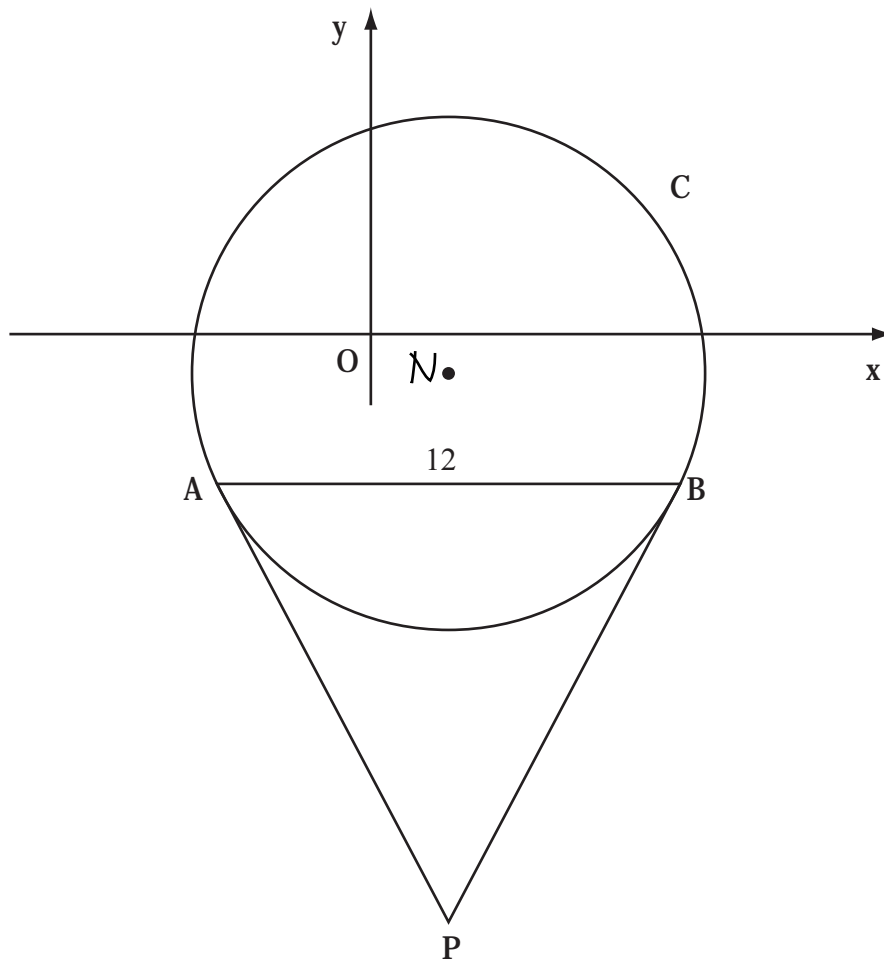


Figure 3

Figure 3 shows a sketch of the circle C with centre N and equation

$$(x - 2)^2 + (y + 1)^2 = \frac{169}{4}$$

(a) Write down the coordinates of N. (2)

(b) Find the radius of C. (1)

The chord AB of C is parallel to the x-axis, lies below the x-axis and is of length 12 units as shown in Figure 3.

(c) Find the coordinates of A and the coordinates of B (5)

(d) Show that angle ANB = 134.8°, to the nearest 0.1 of a degree. (2)

The tangents to C at the points A and B meet at the point P

(e) Find the length AP, giving your answer to 3 significant figures. (2)







10. The circle C has centre A(2, 1) and passes through the point B(10, 7).

(a) Find an equation for C. (4)

The line  $l_1$  is the tangent to C at the point B.

(b) Find an equation for  $l_1$ . (4)

The line  $l_2$  is parallel to  $l_1$  and passes through the mid-point of AB.

Given that  $l_2$  intersects C at the points P and Q,

(c) find the length of PQ, giving your answer in its simplest surd form. (3)

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**Question 10 continued**

[Handwriting area with horizontal lines]

**Q10**

**(Total 11 marks)**

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**TOTAL FOR PAPER: 75 MARKS**

**END**

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9. The points  $A$  and  $B$  have coordinates  $(-2, 11)$  and  $(8, 1)$  respectively.

Given that  $AB$  is a diameter of the circle  $C$ ,

(a) show that the centre of  $C$  has coordinates  $(3, 6)$ , **(1)**

(b) find an equation for  $C$ . **(4)**

(c) Verify that the point  $(10, 7)$  lies on  $C$ . **(1)**

(d) Find an equation of the tangent to  $C$  at the point  $(10, 7)$ , giving your answer in the form  $y = mx + c$ , where  $m$  and  $c$  are constants. **(4)**

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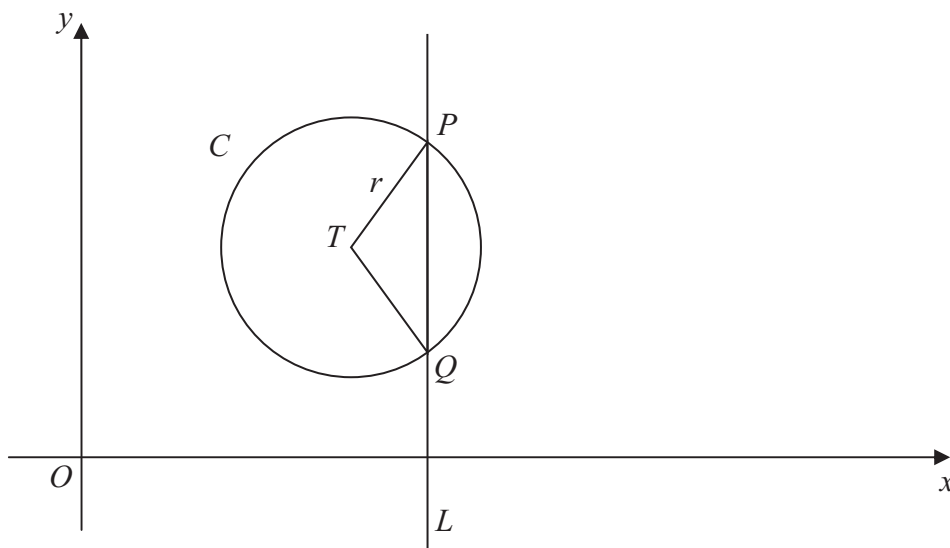


Figure 1

The circle  $C$  with centre  $T$  and radius  $r$  has equation

$$x^2 + y^2 - 20x - 16y + 139 = 0$$

(a) Find the coordinates of the centre of  $C$ . (3)

(b) Show that  $r = 5$  (2)

The line  $L$  has equation  $x = 13$  and crosses  $C$  at the points  $P$  and  $Q$  as shown in Figure 1.

(c) Find the  $y$  coordinate of  $P$  and the  $y$  coordinate of  $Q$ . (3)

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**Question 3 continued**

Lined area for writing the answer to Question 3.



5. The circle  $C$  has equation

$$x^2 + y^2 - 20x - 24y + 195 = 0$$

The centre of  $C$  is at the point  $M$ .

(a) Find

- (i) the coordinates of the point  $M$ ,
- (ii) the radius of the circle  $C$ .

(5)

$N$  is the point with coordinates  $(25, 32)$ .

(b) Find the length of the line  $MN$ .

(2)

The tangent to  $C$  at a point  $P$  on the circle passes through point  $N$ .

(c) Find the length of the line  $NP$ .

(2)

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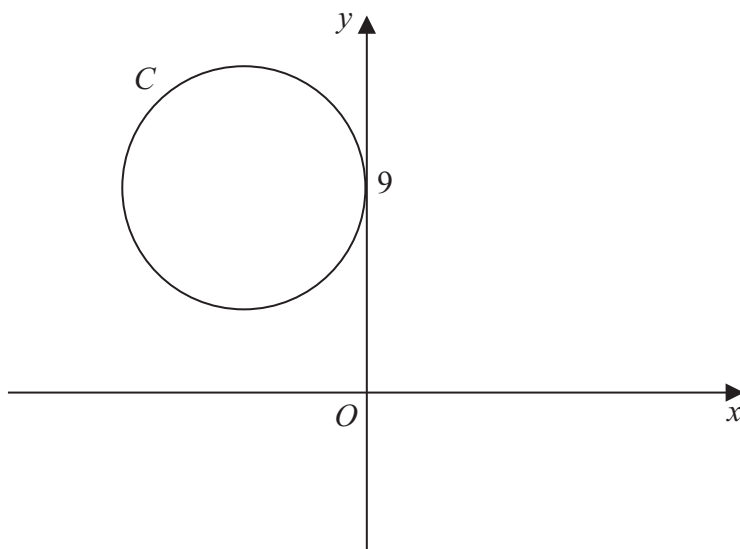


Figure 4

The circle  $C$  has radius 5 and touches the  $y$ -axis at the point  $(0, 9)$ , as shown in Figure 4.

(a) Write down an equation for the circle  $C$ , that is shown in Figure 4. (3)

A line through the point  $P(8, -7)$  is a tangent to the circle  $C$  at the point  $T$ .

(b) Find the length of  $PT$ . (3)

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**Question 10 continued**

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**(Total 6 marks)**

**Q10**

**TOTAL FOR PAPER: 75 MARKS**

**END**



## Core Mathematics C2

Candidates sitting C2 may also require those formulae listed under Core Mathematics C1.

### *Cosine rule*

$$a^2 = b^2 + c^2 - 2bc \cos A$$

### *Binomial series*

$$(a+b)^n = a^n + \binom{n}{1} a^{n-1}b + \binom{n}{2} a^{n-2}b^2 + \dots + \binom{n}{r} a^{n-r}b^r + \dots + b^n \quad (n \in \mathbb{N})$$

$$\text{where } \binom{n}{r} = {}^n C_r = \frac{n!}{r!(n-r)!}$$

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{1 \times 2} x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{1 \times 2 \times \dots \times r} x^r + \dots \quad (|x| < 1, n \in \mathbb{R})$$

### *Logarithms and exponentials*

$$\log_a x = \frac{\log_b x}{\log_b a}$$

### *Geometric series*

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$S_\infty = \frac{a}{1-r} \text{ for } |r| < 1$$

### *Numerical integration*

The trapezium rule:  $\int_a^b y \, dx \approx \frac{1}{2} h \{ (y_0 + y_n) + 2(y_1 + y_2 + \dots + y_{n-1}) \}$ , where  $h = \frac{b-a}{n}$

## Core Mathematics C1

### *Mensuration*

$$\text{Surface area of sphere} = 4\pi r^2$$

$$\text{Area of curved surface of cone} = \pi r \times \text{slant height}$$

### *Arithmetic series*

$$u_n = a + (n - 1)d$$

$$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$$