



AS Mathematics Exam Questions by Topic
Chapter 5b: Circles

These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: <https://amzn.to/39umfr5> and <https://amzn.to/3hE8kBL>). There are a mixture of questions from OCR A, OCR B (MEI) and Edexcel. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

<https://mathsaurus.com/>

Edexcel AS 2018 Paper 1 Question 14:

14. The circle C has equation

$$x^2 + y^2 - 6x + 10y + 9 = 0$$

(a) Find

- (i) the coordinates of the centre of C
- (ii) the radius of C

(3)

The line with equation $y = kx$, where k is a constant, cuts C at two distinct points.

(b) Find the range of values for k .

(6)

6.

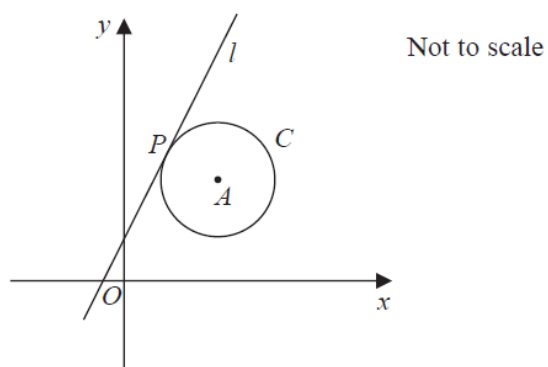


Figure 3

The circle C has centre A with coordinates $(7, 5)$.

The line l , with equation $y = 2x + 1$, is the tangent to C at the point P , as shown in Figure 3.

(a) Show that an equation of the line PA is $2y + x = 17$ (3)

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

The line with equation $y = 2x + k$, $k \neq 1$ is also a tangent to C .

(c) Find the value of the constant k . (3)

Edexcel AS Sample Paper 1 Question 17:

17. A circle C with centre at $(-2, 6)$ passes through the point $(10, 11)$.

- (a) Show that the circle C also passes through the point $(10, 1)$. (3)

The tangent to the circle C at the point $(10, 11)$ meets the y axis at the point P and the tangent to the circle C at the point $(10, 1)$ meets the y axis at the point Q .

- (b) Show that the distance PQ is 58 explaining your method clearly. (7)

Edexcel Sample Paper 1 Question 3:

3. A circle C has equation

$$x^2 + y^2 - 4x + 10y = k$$

where k is a constant.

- (a) Find the coordinates of the centre of C . (2)

- (b) State the range of possible values for k . (2)
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OCR A 2018 Paper 1 Question 5:

- 5 The equation of a circle is $x^2 + y^2 + 6x - 2y - 10 = 0$.
- (i) Find the centre and radius of the circle. [3]
- (ii) Find the coordinates of any points where the line $y = 2x - 3$ meets the circle $x^2 + y^2 + 6x - 2y - 10 = 0$. [4]
- (iii) State what can be deduced from the answer to part (ii) about the line $y = 2x - 3$ and the circle $x^2 + y^2 + 6x - 2y - 10 = 0$. [1]

OCR A 2018 Paper 3 Question 1:

- 1 A circle with centre C has equation $x^2 + y^2 + 8x - 2y - 7 = 0$.
- Find
- (i) the coordinates of C , [2]
- (ii) the radius of the circle. [1]

OCR A AS 2018 Paper 1 Question 8:

- 8 In this question you must show detailed reasoning.

The lines $y = \frac{1}{2}x$ and $y = -\frac{1}{2}x$ are tangents to a circle at $(2, 1)$ and $(-2, 1)$ respectively. Find the equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$, where a , b and c are constants. [6]

OCR A AS Sample Paper 1 Question 2:

- 2 Points A and B have coordinates $(3, 0)$ and $(9, 8)$ respectively. The line AB is a diameter of a circle.
- (i) Find the coordinates of the centre of the circle. [2]
- (ii) Find the equation of the tangent to the circle at the point B . [3]

OCR B MEI AS 2018 Paper 2 Question 8:

- 8 In this question you must show detailed reasoning.

The centre of a circle C is at the point $(-1, 3)$ and C passes through the point $(1, -1)$. The straight line L passes through the points $(1, 9)$ and $(4, 3)$. Show that L is a tangent to C . [7]

OCR B MEI 2018 Paper 1 Question 12:

- 12 Fig. 12 shows the circle $(x-1)^2 + (y+1)^2 = 25$, the line $4y = 3x - 32$ and the tangent to the circle at the point A (5, 2). D is the point of intersection of the line $4y = 3x - 32$ and the tangent at A.

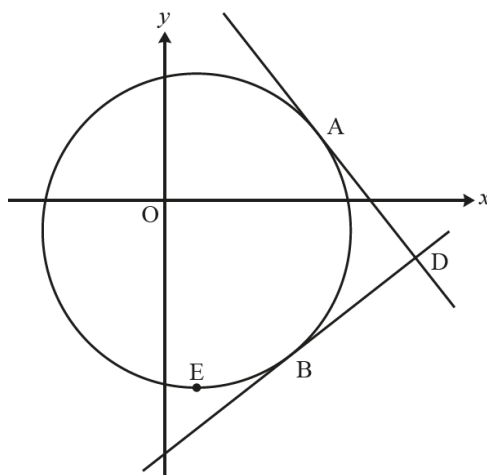


Fig. 12

- (i) Write down the coordinates of C, the centre of the circle. [1]
- (ii) (A) Show that the line $4y = 3x - 32$ is a tangent to the circle. [4]
- (B) Find the coordinates of B, the point where the line $4y = 3x - 32$ touches the circle. [1]
- (iii) Prove that ADBC is a square. [3]
- (iv) The point E is the lowest point on the circle. Find the area of the sector ECB. [5]

OCR B MEI AS Sample Paper 1 Question 8:

- 8 A circle has equation $(x-2)^2 + (y+3)^2 = 25$.
- (i) Write down
- The radius of the circle.
 - The coordinates of the centre of the circle. [2]
- (ii) Find, in exact form, the coordinates of the points of intersection of the circle with the y -axis. [3]
- (iii) Show that the point (1, 2) lies outside the circle. [2]
- (iv) The point P(-1, 1) lies on the circle. Find the equation of the tangent to the circle at P. [4]
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