Write your name here

Surname	Other Names

AS/A Level Mathematics

The Equation of a Circle

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled..
- Answer the questions in the spaces provided
– there may be more space than you need.
- You should show sufficient working to make your methods clear.
Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

Information

- 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.
- Try to answer every question.
- Check your answers if you have time at the end.

1 The circle C has the equation $x^2 + y^2 - 2x + 6y = 26$

Find:

(i) The coordinates of the centre of C

(ii) the radius of C

(Total for question 1 is 3 marks)

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2 The circle C has centre (2, 5) and passes through point (4, 9).

Find and equation for C.

(Total for question 2 is 3 marks)

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3 The circle C has centre (–2, 3) and passes through point (1, 8).

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

(b) Show that the point (3, 6) lies on C. **(1)**

(c) Find the equation to the tangent to C at (3,6). **(5)**
Give your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(Total for question 3 is 10 marks)

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4 The circle C has centre (2, 5) and radius 7.

(a) Find and equation for C. **(2)**

The line $y = 3x - 1$ intersects C at the points A and B.

(b) Find the exact coordinates of A and B. **(6)**

(Total for question 4 is 8 marks)

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5 The circle C has the equation $x^2 + y^2 + 8x - 4y + k = 0$
Where k is a constant.

Given that the point (1, 5) lies on C.

(a) Find the value of k **(2)**

(b) Find the coordinates of the centre and the radius of C **(3)**

A straight line that passes through the point A (3, 7) is a tangent to the circle C at the point B

(c) Find the exact length of the line AB **(5)**

(Total for question 5 is 10 marks)

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6 The points D, E and F have coordinates (-3, 2), (4, -1) and (1, -8) respectively.

(a) Show that angle DEF is a right angle. **(4)**

Given that D, E and F all lie on the circle C.

(b) Find the coordinates of the centre of C. **(3)**

(c) Find the equation of the circle C. **(3)**

(Total for question 6 is 10 marks)

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7 The circle C has the equation $x^2 + y^2 - 6x + 2y = 6$

(a) Find the coordinates of the centre and the radius of C **(3)**

C crosses the y axis at the points A and B

(b) Find the coordinates of the points A and B **(3)**

(Total for question 7 is 6 marks)

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8 The points A and B have coordinates (-3, 5) and (13, -4) respectively.

Given that AB is a diameter of the circle C.

Find an equation for C.

(Total for question 8 is 6 marks)

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9 The circle C has centre (1, 5) and passes through the point A (-4, 3).

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

(b) Find an equation for the tangent to C and A, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers **(4)**

(Total for question 9 is 8 marks)

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10 The circle C has centre $(5, k)$, where k is a constant.

The line $y = 2x + 1$ is a tangent to the circle C, touching C at the point A (3, 7).

Find an equation for C.

(Total for question 10 is 5 marks)