**Equations of Circles**

**Exercise 1 – Using equation of circle**

**Question 1**: Write down the equation of each of these circles:

1. Centre (0,3) radius 2.
2. Centre (1, -5) radius 4
3. Centre (-3, 4) radius
4. Centre (8, 15) radius 17
Does the circle pass through the origin? Show working to support your answer.

**Question 2**: Write down the centre and radius of each of these circles.

**Question 3**: Determine whether the point lies on each of these circles.

1. on
2. on

**Question 4**: [AQA] A circle has equation
Show that the point lies on the circle.

**Question 5**: [AQA] The point lies on the circle
Work out the two possible values of .

**Question 6:** [Jan 2013 Paper 2] Match each statement with an equation. You will not use all the equations.
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**Question 7:** [Jan 2012 Paper 2] A circle has the equation . Work out its circumference.

**Question 8**: [June 2013 Paper 2] The circle touches each side of the square as shown. Work out the total shaded area.



**Question 9: [AQA]**
Circle A has equation:
Circle has equation
(a) Work out the distance between the centres of the circles.
(b) Circle the correct statement:
The circles overlap The circles touch
The circles do not overlap

**Question 10:** Determine the coordinates of the points where the circle with equation:
intercepts either axis.

**Question 11:** Determine the points and where the circle with equation:
intersects the line with equation . Hence determine the length .

**Exercise 2 – Determining Centre/Radius**

**Question 1**: [AQA] is the diameter of a circle. is and is . Work out the equation of the circle.

**Question 2**: [AQA] is a diameter of a circle, centre .

(a) Work out the coordinates of .
(b) Work out the equation of the circle.

**Question 3**: [AQA] and are two points on a circle, centre .


1. Work out the coordinates of the midpoint of .
2. Show that the length
3. Work out the radius of the circle.

**Question 4**: [AQA] (0, -2), (0, 12) and (4, 12) are three points on a circle, centre . Work out the coordinate of .


**Question 5**: [June 2013 Paper 1 Q2] A is (-4,3) and B is (2,11). AB is a diameter of the circle.

1. Work out the coordinates of the centre of the circle.
2. Work out the radius of the circle.
3. Write down the equation of the circle.
4. P is another point on the circle. The gradient of the line is 2. Write down the gradient of the line .



 **Question 6**: [June 2012 Paper 2 Q14] The sketch shows a circle, centre C, radius 5. The circle passes through the points A(-2,8) and B(6,8). The -axis is a tangent to the circle.
Work out the equation of the circle.


**Question 7**: A circle passes through the points (0,3) and (0,11) and has centre (6,k).


1. Work out the value of .
2. Hence find the equation of the circle.

**Question 8**: AB is a diameter of the circle ABC. Work out the value of . *(Hint: What do you know about the line AC relative to CB? Can you find an equation of the line CB?)*


**Question 9**: ABCD is a square. is the point (5,13). is the point (5,5). The circle touches the sides of the square. Work out the equation of the circle.


**Exercise 3 – Perpendicular lines**

**Question 1**: [AQA Practice Paper] The sketch show point on a circle, centre C. The equation of the tangent at P is .


1. Work out the gradient of PC.
2. Work out the equation of the circle.

**Question 2**: [AQA Practice Paper] The sketch shows part of a circle, centre C, that intersects the axes at points and .


1. Explain why the centre of the circle lies on the line
2. Show that the line is the perpendicular bisector of the line .
3. Work out the equation of the circle.

**Question 3**: The points and form a diameter of a circle. The point is another point on the circle.

1. Determine the gradient of the line .
2. Hence determine the equation of the line .
3. Hence, given that the point lies on this line, determine the value of .



**Question 4**: The diagram shows points and . is the centre of the circle and form a chord of the circle. is the midpoint of .

1. Determine the gradient of and the coordinate of .
2. Hence find the equation of .
3. Hence determine the value of .
4. Find the equation of the circle.


**Question 5**: A line with equation is tangent to a circle at the point .

1. Determine the equation of .
2. Determine the value of .
3. Hence determine the equation of the circle.


**Question 6**: The points and lie on the circumference of a circle, and is at the top of the circle. Determine:

1. The centre of the circle.
2. The equation of the circle.

