

AQA IGCSE FM "Full Coverage": Equations of Circles

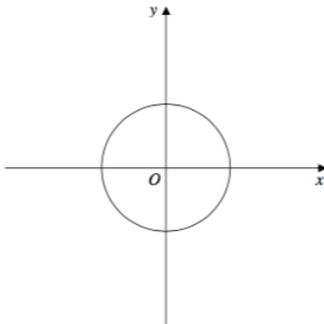
This worksheet is designed to cover one question of each type seen in past papers, for each AQA IGCSE Further Maths topic. This worksheet was automatically generated by the DrFrostMaths Homework Platform: students can practice this set of questions interactively by going to www.drfrostmaths.com/homework, logging on, *Practise* → *Past Papers/Worksheets* (or *Library* → *Past/Past Papers* for teachers), and using the 'Revision' tab.

Question 1

Categorisation: Determine the equation of a circle centred at the origin.

[AQA IGCSE FM SAM P2 Q14a]

On the axes below is a circle centre (0, 0) and passing through the point (3, 0).



Write down the equation of the circle.

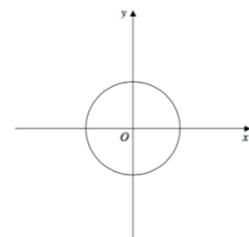
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Question 2

Categorisation: Determine whether a point lies inside or outside a circle (centred at the origin).

[AQA IGCSE FM SAM P2 Q14b Edited]

On the axes below is a circle centre (0, 0) and passing through the point (3, 0).



Decide whether the point (2, 2) is inside or outside the circle.

[] Inside [] Outside

Question 3

Categorisation: Use the circumference or area of a circle to find its radius, and hence its equation.

[AQA IGCSE FM June2015-P2 Q1]

A circle, centre (0,0) , has circumference 12π

Work out the equation of the circle.

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Question 4

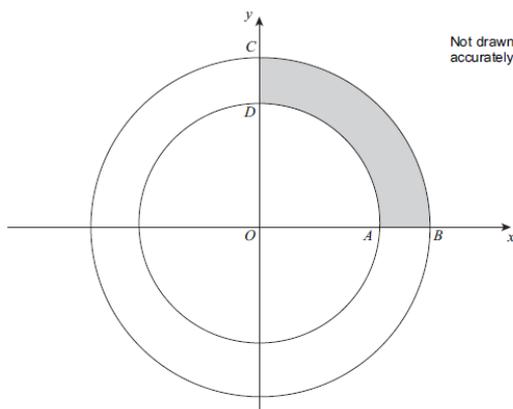
Categorisation: Use the equations of circles to determine areas and perimeters.

[AQA IGCSE FM June2014-P2 Q6]

Two circles, each with centre O, are shown.

The equations of the circles are

$$x^2 + y^2 = 289 \quad \text{and} \quad x^2 + y^2 = 121$$



Work out the **perimeter** of the shaded section ABCD.

Input note: give your answer in terms of π .

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Question 5

Categorisation: Match equations (including those of circles) with their respective properties.

[AQA IGCSE FM Jan2013-P2 Q4]

Match each statement with an equation. You will **not** use all of the equations.

One has been done for you.

A	A curve passing through (0, 0)	$x^2 + y^2 = 10$	1
B	A curve passing through (1, 0)	$(x + 2)^2 + (y - 1)^2 = 1$	2
C	A circle centre (2, -1)	$y = x^3$	3
D	A circle passing through (3, 1)	$y = x^3 + x - 2$	4
		$(x - 2)^2 + (y + 1)^2 = 1$	5
		$y = x^2 - 2$	6

B matches with

C matches with

D matches with

Question 6

Categorisation: Find the centre and radius of a circle given its equation.

[AQA IGCSE FM June2016-P1 Q4b]

The equation of a circle is $(x + 5)^2 + (y - 8)^2 = 10$

Write down the radius of the circle.

Input note: leave your answer as an exact value.

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Question 7

Categorisation: As above.

[AQA IGCSE FM June2016-P1 Q4a]

The equation of a circle is $(x + 5)^2 + (y - 8)^2 = 10$

What are the coordinates of the centre of the circle?

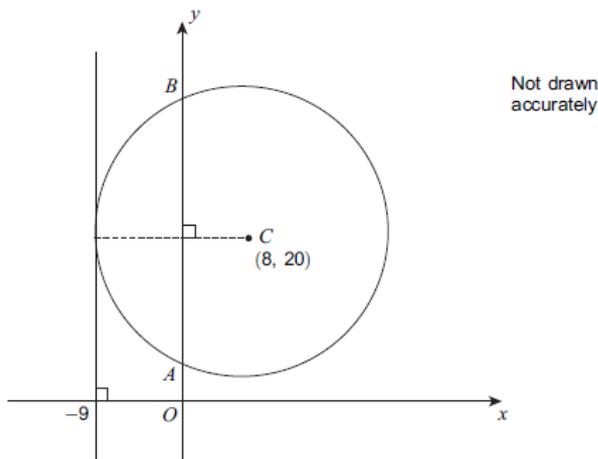
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Question 8

Categorisation: Make basic geometric deductions to find the radius or centre of a circle.

[AQA IGCSE FM June2014-P1 Q12a Edited]

The line $x = -9$ is a tangent to the circle, centre $C(8,20)$



Work out the radius of the circle.

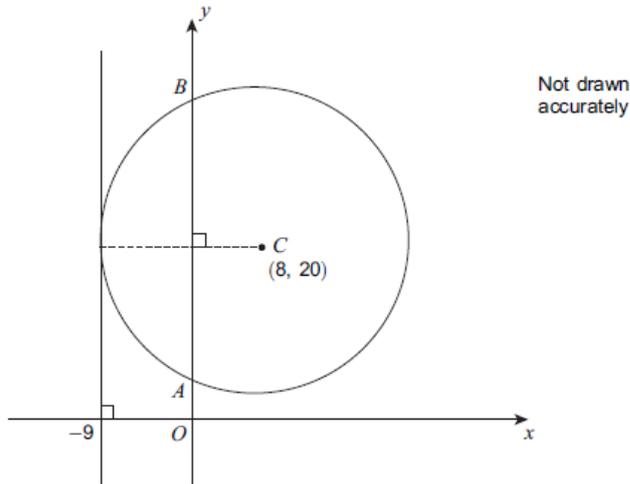
..... units

Question 9

Categorisation: Use Pythagoras to find lengths within circles, including the radius, lengths of chords and lengths of tangents.

[AQA IGCSE FM June2014-P1 Q12b Edited]

The line $x = -9$ is a tangent to the circle, centre $C(8,20)$



The circle intersects the y -axis at A and B. Find the length of AB .

$AB = \dots\dots\dots$ units

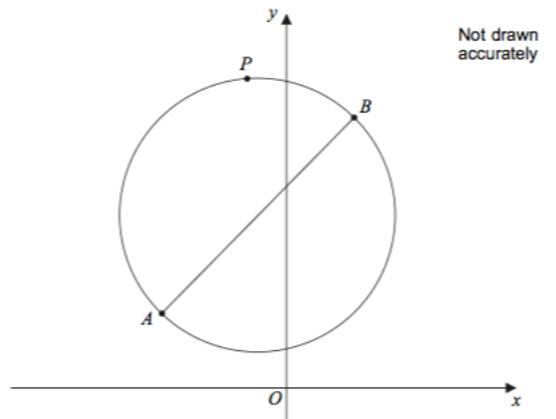
Question 10

Categorisation: Determine the radius of a circle given its centre and a point on the radius, or the two ends of a diameter.

[AQA IGCSE FM June2013-P1 Q2b Edited]

A is $(-4,3)$ and B is $(2,11)$
 AB is a diameter of the circle.

The centre of the circle is $(-1,7)$
 Work out the radius of the circle.



$\dots\dots\dots$ units

Question 11

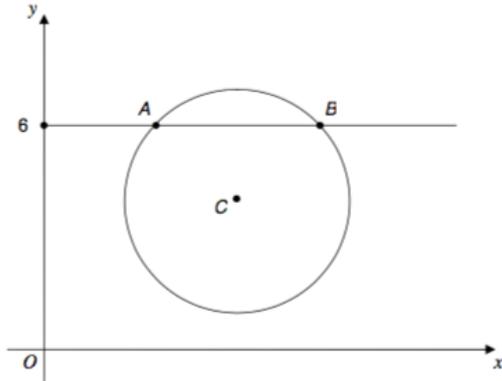
Categorisation: Find the points of intersection of horizontal or vertical line with a circle, by appropriate substitution.

[AQA IGCSE FM Practice paper set 2 P1 Q12 Edited]

The diagram shows a sketch of the circle $(x - 7)^2 + (y - 4)^2 = 9$ with centre C.

The line $y = 6$ intersects the circle at A and B.

Find the length of AB, giving your answer as an exact value.



AB = units

Question 12

Categorisation: Determine the equation of a circle given two points on its diameter.

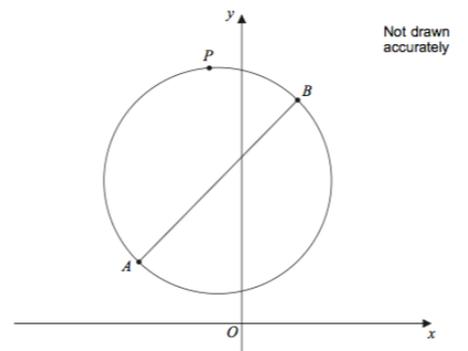
[AQA IGCSE FM June2013-P1 Q2c Edited]

A is $(-4,3)$ and B is $(2,11)$

AB is a diameter of the circle.

The centre of the circle is $(-1,7)$ and the radius is 5.

Write down the equation of the circle.



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Question 13

Categorisation: Reason about the interaction of circles given their equations.

[AQA IGCSE FM Practice paper set 4 P2 Q4b Edited]

Circle A has equation $x^2 + y^2 = 16$

Circle B has equation $(x + 6)^2 + (y - 8)^2 = 25$

Select the correct statement.

- The circles overlap
 - The circles touch
 - The circles do not overlap
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Question 14

Categorisation: Determine the equation of a circle given two points generally.

[AQA IGCSE FM Practice paper set 4 P1 Q13]

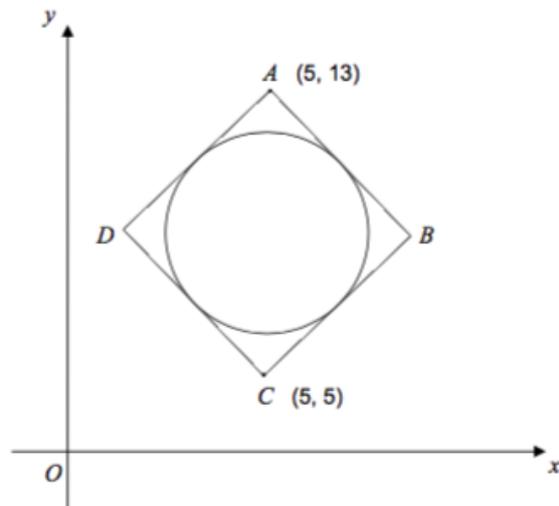
ABCD is a square.

A is the point (5, 13)

C is the point (5, 5)

The circle touches the sides of the square.

Work out the equation of the circle.



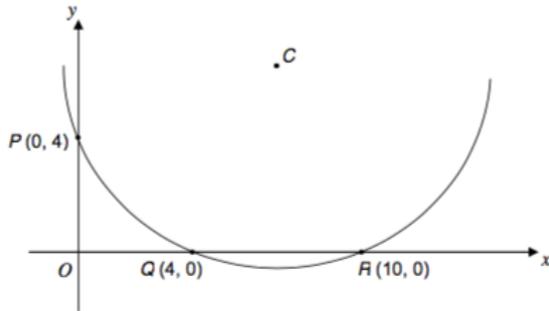
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Question 15

Categorisation: Recognise that the perpendicular bisector of a chord goes through the centre of a circle, and therefore recognise that the equation of this bisector is easy to determine when the chord is either horizontal, vertical, or at 45° .

[AQA IGCSE FM Practice paper set 3 P1 Q14c]

The sketch shows part of a circle, centre C, that intersects the axes at points P, Q and R.



Work out the equation of the circle.

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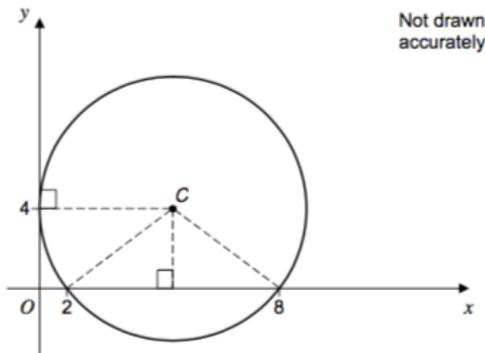
Question 16

Categorisation: As above.

[AQA IGCSE FM Practice paper set 1 P2 Q18]

The diagram shows a circle, centre C. The circle touches the y-axis at (0,4)

The circle intersects the x-axis at (2,0) and (8,0)



Work out the equation of the circle.

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Question 17

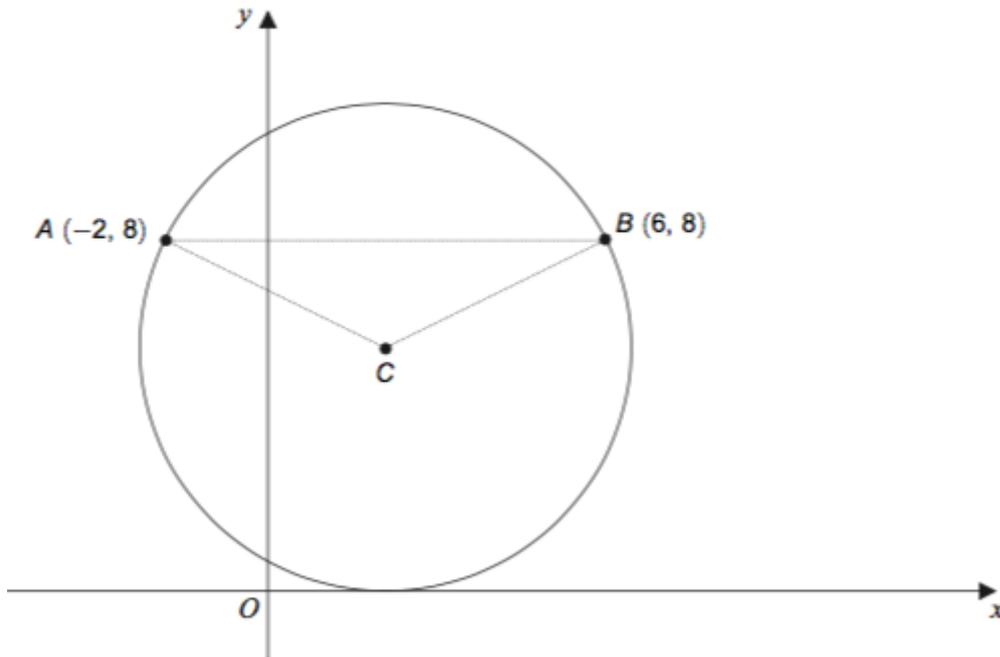
Categorisation: As above, but using the radius of the circle (combined with Pythagoras) to find one of x and y of the centre of the circle.

[AQA IGCSE FM June2012-P2 Q14]

The sketch shows a circle, centre C , radius 5.

The circle passes through the points $A(-2,8)$ and $B(6,8)$

The x -axis is a tangent to the circle.



Work out the equation of the circle.

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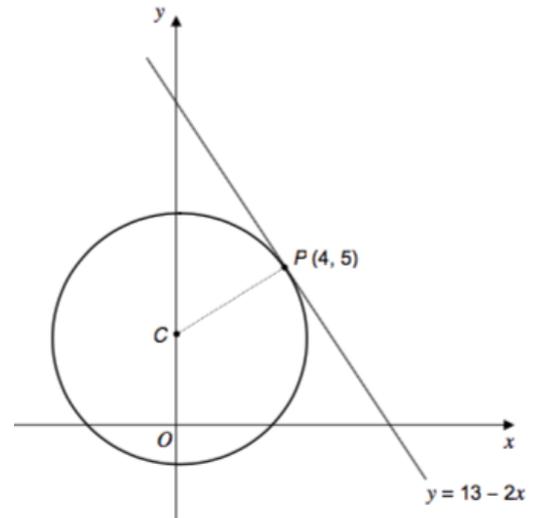
Question 18

Categorisation: Solve problems involving the tangent of a circle.

[AQA IGCSE FM Practice paper set 2 P2 Q19b]

The sketch shows point P on a circle, centre C.
The equation of the tangent at P is $y = 13 - 2x$

Work out the equation of the circle.



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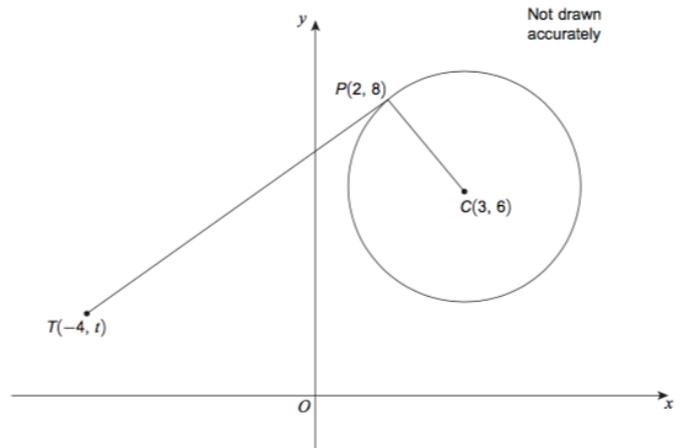
Question 19

Categorisation: As above.

[AQA IGCSE FM June2015-P2 Q10]

The diagram shows a circle, centre C.
TP is a tangent to the circle at P.

Work out the value of t .



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Question 20

Categorisation: Complete the square in order to find the centre and radius of a circle.

[AQA IGCSE FM Jan2013-P1 Q14]

$x^2 - 2x + y^2 - 6y = 0$ is the equation of a circle.

By writing the equation in the form $(x - a)^2 + (y - b)^2 = r^2$ work out the centre and radius of the circle.

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Answers

Question 1

$$x^2 + y^2 = 9$$

Question 2

Inside

Question 3

$$x^2 + y^2 = 36$$

Question 4

$$14\pi + 12$$

Question 5

B matches with 4 and C matches with 5
and D matches with 1

Question 6

$$\sqrt{10}$$

Question 7

$$(-5, 8)$$

Question 8

17 units

Question 9

$$AB = 30 \text{ units}$$

Question 10

5 units

Question 11

$$AB = 2\sqrt{5}$$

Question 12

$$(x + 1)^2 + (y - 7)^2 = 25$$

Question 13

The circles do not overlap

Question 14

$$(x - 5)^2 + (y - 9)^2 = 8$$

Question 15

$$(x - 7)^2 + (y - 7)^2 = 58$$

Question 16

$$(x - 5)^2 + (y - 4)^2 = 25$$

Question 17

$$(x - 2)^2 + (y - 5)^2 = 25$$

Question 18

$$x^2 + (y - 3)^2 = 20$$

Question 19

$$t = 5$$

Question 20

$$\text{Centre} = (1, 3), \text{Radius} = \sqrt{10}$$