Solutions by
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GCSE (9-1) Grade 8/9
Equations of Circles and Tangents



Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name.
- Answer **all** questions.

Answer the questions in the spaces provided
  – there may be more space than you need.

- **Show all your working out**

Information

- The total mark for this paper is 51.
- The marks for **each** question are shown in brackets.
  – use this as a guide as to how much time to spend on each question.
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed

Advice

- Read each question carefully before you start to answer it
- Attempt every question
- Check your answers if you have time at the end

1. A circle has equation $x^2 + y^2 = 10$

(a) Write down the centre of the circle

..... **(1)**

(b) Write down the exact length of the radius of the circle

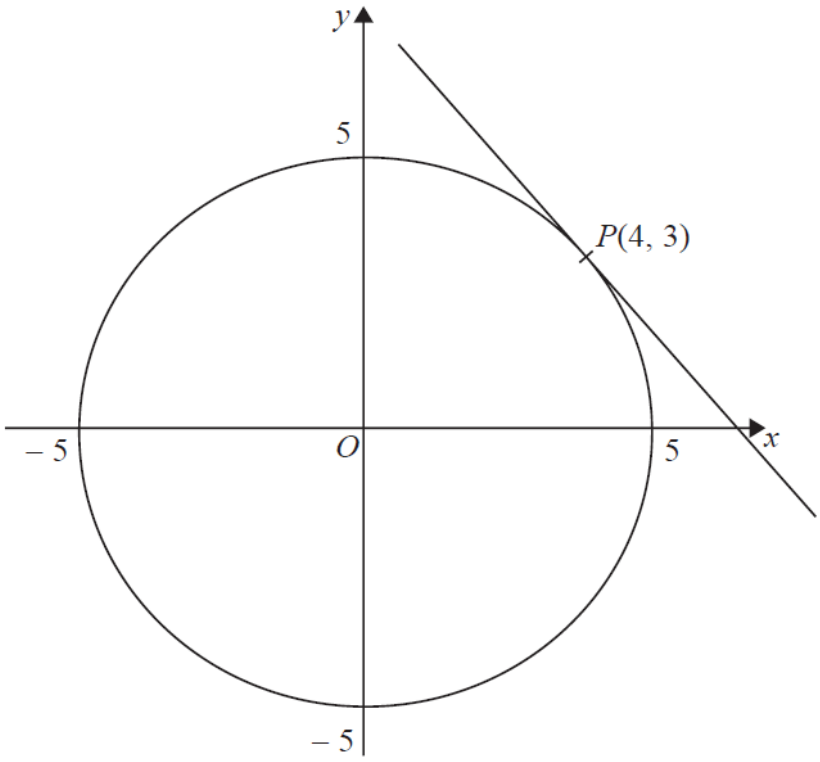
..... **(2)**

A point Q (1, 3) lies on the circle $x^2 + y^2 = 10$

(c) Find the equation of the tangent to the circle at Q

.....**(3)**

2. Here is a circle, centre *O*, and the tangent to the circle at the point *P*(4, 3) on the circle.



Find an equation of the tangent at the point *P*.

.....

(Total 3 marks)

3. **L** is the circle with equation $x^2 + y^2 = 4$

$P\left[\frac{3}{2}, \frac{\sqrt{7}}{2}\right]$ is a point on **L**

Find an equation of the tangent to **L** at the point P

.....

(Total 3 marks)

4. Find the equation of the tangent to $x^2 + y^2 = 45$ at the point $(2\sqrt{5}, -\sqrt{30})$

.....

(Total 3 marks)

5. The line **L** is a tangent to the circle $x^2 + y^2 = 45$ at the point (–3, 6).

The line **L** crosses the *x*-axis at the point *P*.

Work out the coordinates of *P*

.....

(Total 4 marks)

6. The line **L** is a tangent to the circle $x^2 + y^2 = 34$ at the point (–3, –5).

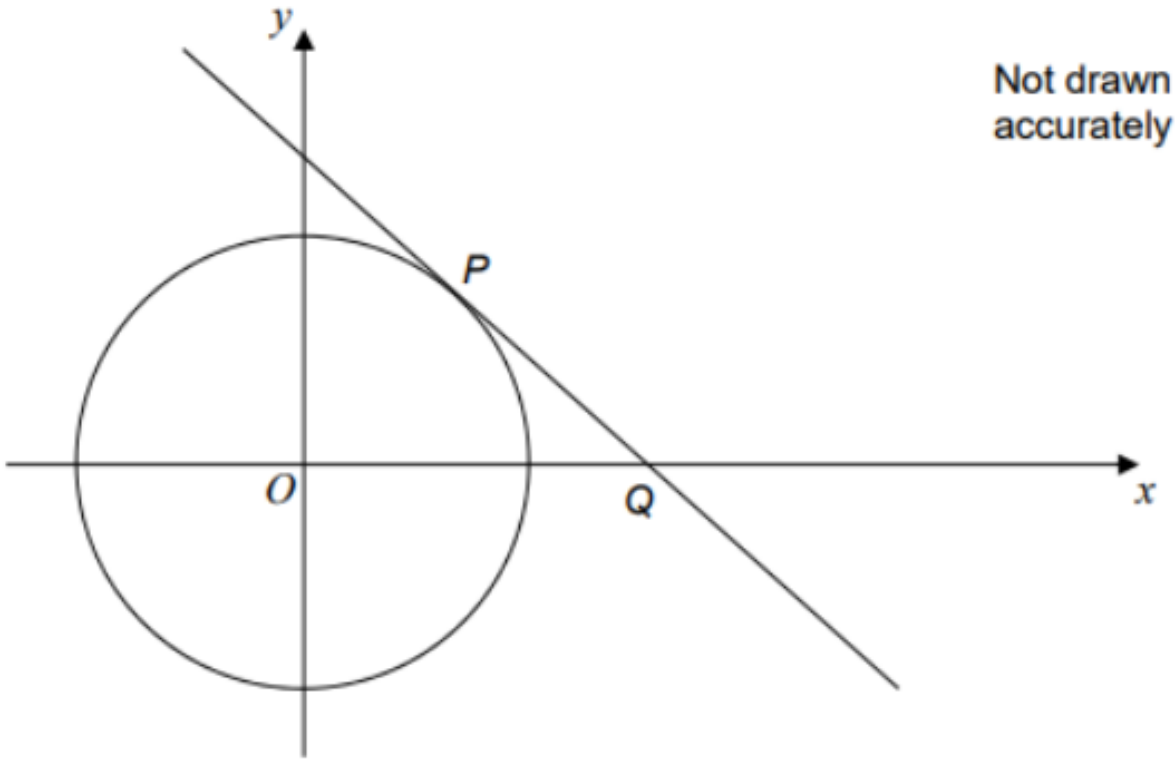
The line **L** crosses the *y*-axis at the point *P*.

Work out the coordinates of *P*

.....

(Total 4 marks)

7. The diagram shows the circle $x^2 + y^2 = 10$



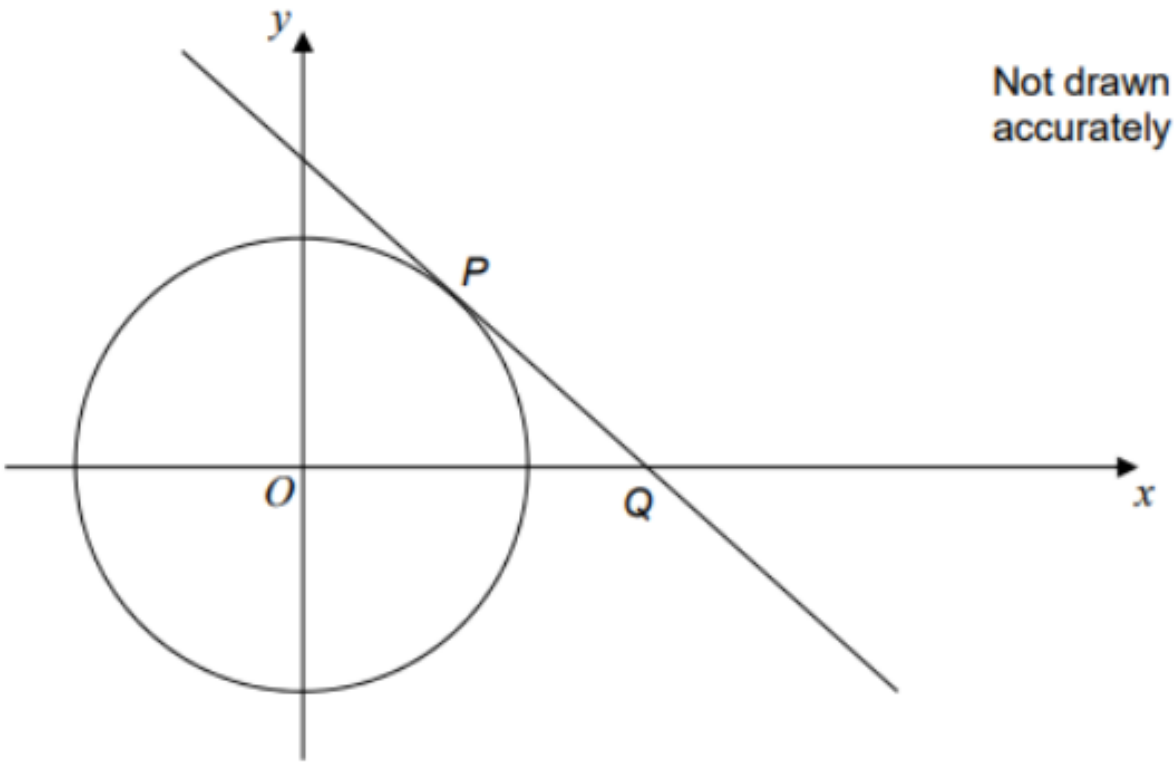
P lies on the circle and has x-coordinate 1
The tangent at P intersects the x-axis at Q

Find the coordinates of Q

.....

(Total 5 marks)

8. A point A lies on the circle with equation $x^2 + y^2 = 13$ and has y- coordinate of 2.



The tangent line to the circle at P intersects the x- axis at point Q

Find coordinates of Q

.....

(Total 5 marks)

9. The line l is a tangent to the circle $x^2 + y^2 = 40$ at the point *A*

A is the point (2, 6). The line l crosses the x-axis at the point *P.*

Work out the area of triangle *OAP*

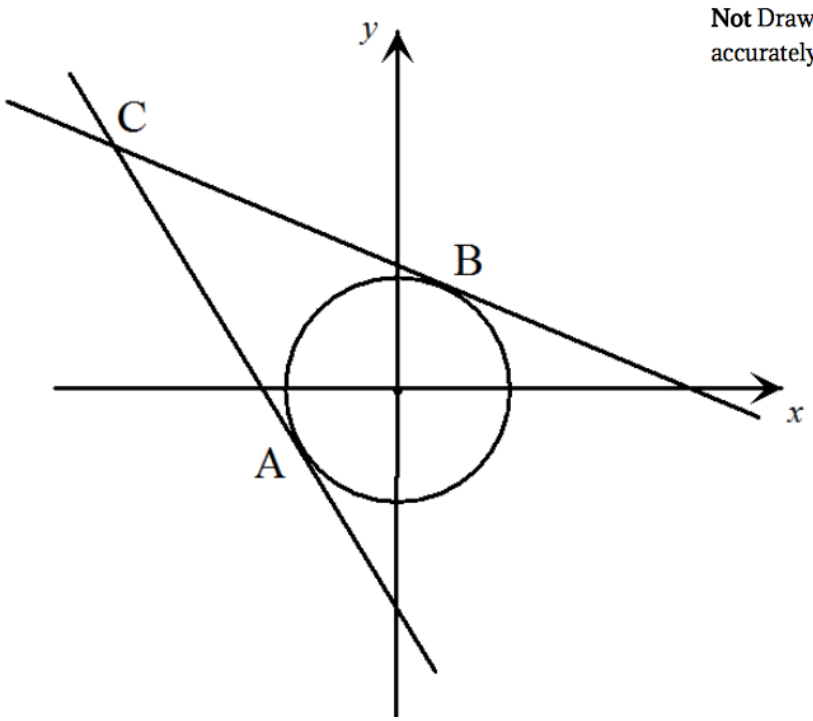
.....

(Total 5 marks)

10. A point A lies on the circle with equation $x^2 + y^2 = 20$ and has y-coordinate -4

A point B lies on the circle and has x-coordinate $\sqrt{10}$

A tangent line at A intersects the tangent line at B at point C



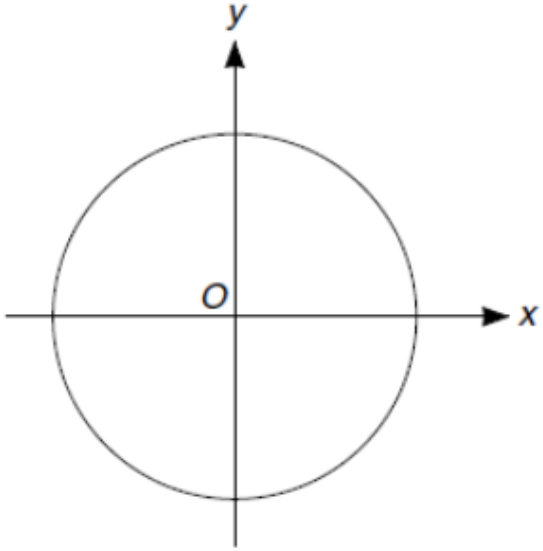
Not Drawn accurately

Work out the coordinates of C

.....

(Total 5 marks)

11. (a) The diagram shows a circle, centre O



The circumference of the circle is 16π cm.

Find the equation of the circle

.....**(4)**

(b) The line $10x + py = q$ is a tangent at the point (5, 4) in another circle with centre (0, 0)

Find the value of p and q

p= .....**(2)**

q= .....**(2)**

TOTAL FOR PAPER: 51 MARKS