

6.4) Use tangent and chord properties

Worked example

Find the equation of the tangent to $x^2 + y^2 = 25$ at the point $(3, 4)$

Your turn

Find the equation of the tangent to $x^2 + y^2 = 25$ at the point $(4, 3)$

$$y = -\frac{4}{3}x + \frac{25}{3}$$

Worked example

Find the equation of the tangent to $x^2 + y^2 = 169$ at the point $(5, 12)$

Your turn

Find the equation of the tangent to $x^2 + y^2 = 169$ at the point $(-5, 12)$

$$y = \frac{5}{12}x + \frac{169}{12}$$

Worked example

The circle C has equation

$$(x - 3)^2 + (y - 7)^2 = 100$$

- a) Verify the point $P(11,1)$ lies on C .
- b) Find an equation of the tangent to C at the point P , giving your answer in the form $ax + by + c = 0$

Your turn

The circle C has equation

$$(x - 2)^2 + (y - 6)^2 = 100$$

- a) Verify the point $P(10,0)$ lies on C .
- b) Find an equation of the tangent to C at the point P , giving your answer in the form $ax + by + c = 0$

a) Verified using substitution

b) $4x - 3y = 40 = 0$

Worked example

A circle C has equation

$$(x - 4)^2 + (y + 4)^2 = 10$$

The line l is a tangent to the circle and has gradient -3 . Find two possible equations for l , giving your answers in the form $y = mx + c$.

Your turn

A circle C has equation

$$(x - 5)^2 + (y + 3)^2 = 10$$

The line l is a tangent to the circle and has gradient -3 . Find two possible equations for l , giving your answers in the form $y = mx + c$.

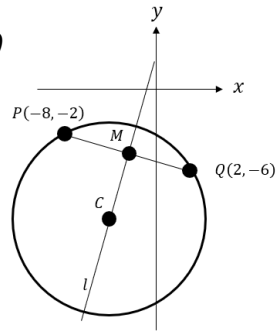
$$y = -3x + 2 \text{ and } y = -3x + 22$$

Worked example

The point P has coordinates $(-8, -2)$ and the point Q has coordinates $(2, -6)$.

M is the midpoint of the line segment PQ

- a) Find an equation for l .
- b) Given that the y -coordinate of C is -9 :
 - i) show that the x -coordinate of C is -5 .
 - ii) find an equation of the circle.

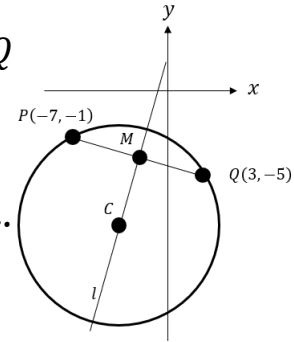


Your turn

The point P has coordinates $(-7, -1)$ and the point Q has coordinates $(3, -5)$.

M is the midpoint of the line segment PQ

- a) Find an equation for l .
- b) Given that the y -coordinate of C is -8 :
 - i) show that the x -coordinate of C is -4 .
 - ii) find an equation of the circle.



a) $y = \frac{5}{2}x + 2$

b) i) Shown

ii) $(x + 4)^2 + (y + 8)^2 = 58$

Worked example

The line with equation $4x + y - 5 = 0$ is a tangent to the circle with equation $(x - 3)^2 + (y - p)^2 = 2$.

Find the two possible values of p

Your turn

The line with equation $4x + y - 3 = 0$ is a tangent to the circle with equation $(x - 2)^2 + (y - p)^2 = 5$.

Find the two possible values of p

$$p = 3 \pm \sqrt{19}$$

Worked example

A circle has centre $C(5,3)$, and passes through the point $P(2,6)$.

Find the equation of the tangent of the circle at the point P , giving your equation in the form $ax + by + c = 0$ where a, b, c are integers..

Your turn

A circle has centre $C(3,5)$, and passes through the point $P(6,9)$.

Find the equation of the tangent of the circle at the point P , giving your equation in the form $ax + by + c = 0$ where a, b, c are integers..

$$3x + 4y - 54 = 0$$

Worked example

A circle passes through the points $A(0,0)$ and $B(2,8)$.

The centre of the circle has x value -2 .

Determine the equation of the circle.

Your turn

A circle passes through the points $A(0,0)$ and $B(4,2)$.

The centre of the circle has x value -1 .

Determine the equation of the circle.

$$(x + 1)^2 + (y - 7)^2 = 50$$