

7. The circle C_1 has equation

$$x^2 + y^2 + 8x - 10y = 29$$

- (a) (i) Find the coordinates of the centre of C_1
 (ii) Find the exact value of the radius of C_1

(3)

In part (b) you must show detailed reasoning.

The circle C_2 has equation

$$(x - 5)^2 + (y + 8)^2 = 52$$

- (b) Prove that the circles C_1 and C_2 neither touch nor intersect.

(3)

2. A circle C has equation

$$x^2 + y^2 + 4x - 10y - 21 = 0$$

Find

- (a) (i) the coordinates of the centre of C ,
 (ii) the exact value of the radius of C .

(3)

The point $P(5, 4)$ lies on C .

- (b) Find the equation of the tangent to C at P , writing your answer in the form $y = mx + c$, where m and c are constants to be found.

(4)

blank

6. The circle C has equation

$$x^2 + y^2 + 6x - 4y - 14 = 0$$

- (a) Find
 (i) the coordinates of the centre of C ,
 (ii) the exact radius of C .

(3)

The line with equation $y = k$, where k is a constant, is a tangent to C .

- (b) Find the possible values of k .

(2)

The line with equation $y = p$, where p is a negative constant, is a chord of C .

Given that the length of this chord is 4 units,

- (c) find the value of p .

(3)

2: The line joining the points $(-2, 5)$ and $(4, 15)$ is the diameter of a circle C .

(a) Find an equation for C .

(5)

(b) Hence find the exact coordinates of the point on C that is nearest the x -axis.

(2)

7 The curve with equation $e^{2x} - 18x + y^3 + y = 11$ has a stationary point at (p, q) .

(a) Find the exact value of p .

[4]

6. The circle C has equation

$$x^2 + y^2 + 8x - 4y = 0$$

(a) Find

(i) the coordinates of the centre of C ,

(ii) the exact radius of C .

(3)

The point P lies on C .

Given that the tangent to C at P has equation $x + 2y + 10 = 0$

(b) find the coordinates of P

(4)

(c) Find the equation of the normal to C at P , giving your answer in the form $y = mx + c$ where m and c are integers to be found.

(3)

3. A circle C has centre $(2, 5)$

Given that the point $P(8, -3)$ lies on C

(a) (i) find the radius of C

(ii) find an equation for C

(3)

(b) Find the equation of the tangent to C at P giving your answer in the form $ax + by + c = 0$ where a , b and c are integers to be found.

(4)

10. The circle C has centre $X(3, 5)$ and radius r

The line l has equation $y = 2x + k$, where k is a constant.

(a) Show that l and C intersect when

$$5x^2 + (4k - 26)x + k^2 - 10k + 34 - r^2 = 0$$

(3)

Given that l is a tangent to C ,

(b) show that $5r^2 = (k + p)^2$, where p is a constant to be found.

(3)

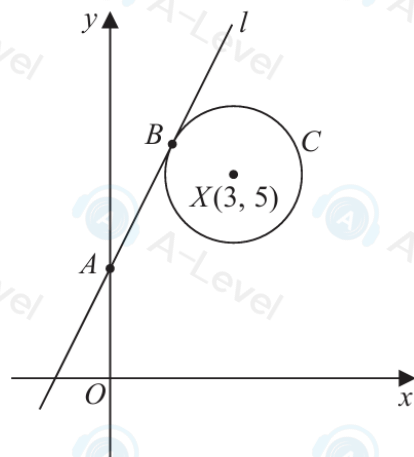


Figure 2

The line l

- cuts the y -axis at the point A
- touches the circle C at the point B

as shown in Figure 2.

Given that $AB = 2r$

(c) find the value of k

(6)

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3. The circle C

- has centre $A(3, 5)$
- passes through the point $B(8, -7)$

(a) Find an equation for C .

(3)

The points M and N lie on C such that MN is a chord of C .

Given that MN

- lies above the x -axis
- is parallel to the x -axis
- has length $4\sqrt{22}$

(b) find an equation for the line passing through points M and N .

(3)

6.

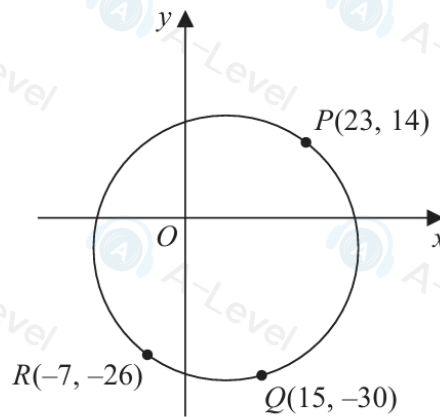


Figure 1

The points $P(23, 14)$, $Q(15, -30)$ and $R(-7, -26)$ lie on the circle C , as shown in Figure 1.

(a) Show that angle $PQR = 90^\circ$

(2)

(b) Hence, or otherwise, find

- the centre of C ,
- the radius of C .

(3)

Given that the point S lies on C such that the distance QS is greatest,

(c) find an equation of the tangent to C at S , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers to be found.

(3)

blank

6. (i) The circle C_1 has equation

$$x^2 + y^2 + 10x - 12y = k \quad \text{where } k \text{ is a constant}$$

- (a) Find the coordinates of the centre of C_1

(2)

- (b) State the possible range in values for k .

(2)

- (ii) The point $P(p, 0)$, the point $Q(-2, 10)$ and the point $R(8, -14)$ lie on a different circle, C_2

Given that

- p is a positive constant
- QR is a diameter of C_2

find the exact value of p .

(4)

6. A circle has equation

$$x^2 - 6x + y^2 + 8y + k = 0$$

where k is a positive constant.

Given that the x -axis is a tangent to this circle,

- (a) find the value of k .

(3)

The circle meets the coordinate axes at the points R , S and T .

- (b) Find the exact area of the triangle RST .

(4)

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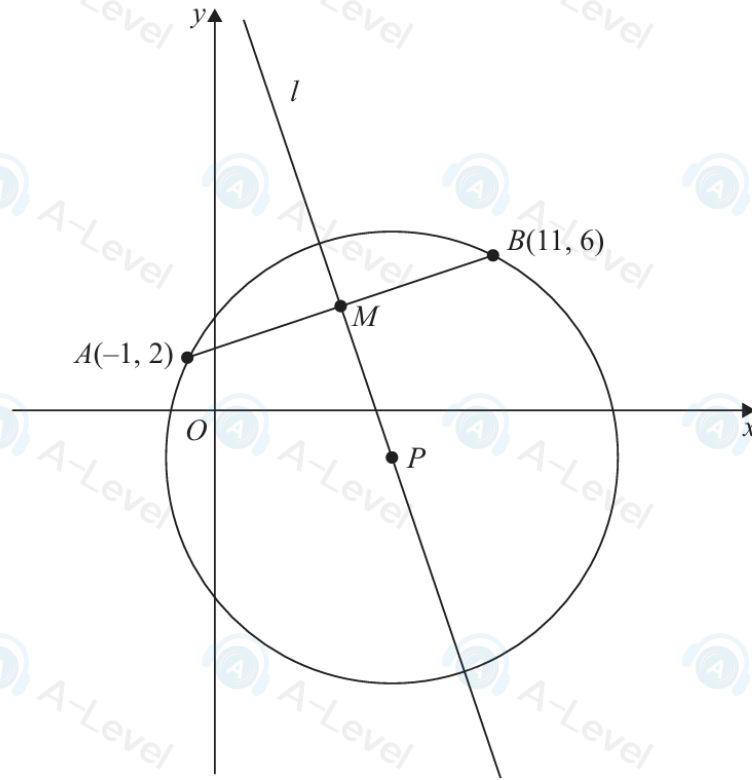


Figure 2

The point $A(-1, 2)$ and the point $B(11, 6)$ both lie on a circle with centre P .

The point M is the midpoint of AB .

Given that the line l passes through M and P , as shown in Figure 2,

- (a) find an equation for l , giving your answer in the form $y = mx + c$, where m and c are constants.

(4)

Given that P has coordinates $(7, k)$, where k is a constant,

- (b) find the value of k ,

(1)

- (c) find an equation for the circle.

(3)