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A circle C has centre $(-1, 7)$ and passes through the point $(0, 0)$. Find an equation for C .

(4)

2. A circle C with centre at the point $(2, -1)$ passes through the point A at $(4, -5)$.

(a) Find an equation for the circle C .

(3)

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

(4)

3. The circle C has equation $x^2 + y^2 + 4x - 2y - 11 = 0$

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Find

- (a) the coordinates of the centre of C ,

(2)

- (b) the radius of C ,

(2)

- (c) the coordinates of the points where C crosses the y -axis, giving your answers as simplified surds.

(4)

Diagram not
drawn to scale

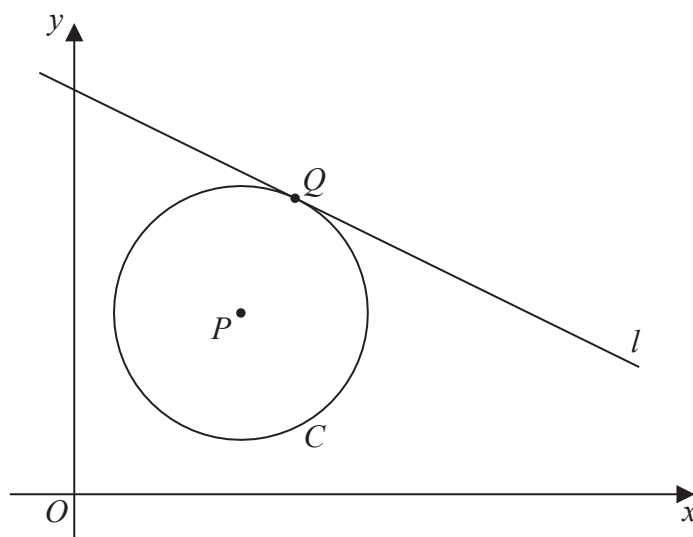


Figure 2

(a) Find the length PQ , giving your answer as an exact value. (2)

(b) Hence write down an equation for C . (2)

(c) Find an equation for l , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. (4)

5. The circle C has equation

$$x^2 + y^2 - 20x - 24y + 195 = 0$$

The centre of C is at the point M .

(a) Find

- (i) the coordinates of the point M ,
- (ii) the radius of the circle C .

(5)

N is the point with coordinates $(25, 32)$.

(b) Find the length of the line MN .

(2)

The tangent to C at a point P on the circle passes through point N .

(c) Find the length of the line NP .

(2)

6. The circle C has equation

$$x^2 + y^2 - 10x + 6y + 30 = 0$$

Find

- (a) the coordinates of the centre of C , (2)
- (b) the radius of C , (2)
- (c) the y coordinates of the points where the circle C crosses the line with equation $x = 4$, giving your answers as simplified surds. (3)

A coordinate plane with a horizontal x-axis and a vertical y-axis. The origin is labeled O . The x-axis is labeled x at its right end, and the y-axis is labeled y at its top end. A circle, labeled C , is shown in the second quadrant. The circle is tangent to the y-axis at the point $(0, 9)$, which is labeled with the number 9. The circle's center is located in the second quadrant, and its radius is equal to its distance from the y-axis.

Figure 4

The circle C has radius 5 and touches the y -axis at the point $(0, 9)$, as shown in Figure 4.

- (a) Write down an equation for the circle C , that is shown in Figure 4. (3)

A line through the point $P(8, -7)$ is a tangent to the circle C at the point T .

- (b) Find the length of PT . (3)

A geometric diagram in the first quadrant of a Cartesian coordinate system. A circle C is tangent to a line segment starting from the origin O . The point of tangency is T . The center of the circle is Q . The distance OQ is labeled $6\sqrt{5}$. The radius QT is labeled 4 . The circle is tangent to the line segment OT at point T .

Figure 3

Figure 3 shows a circle C with centre Q and radius 4 and the point T which lies on C .

The tangent to C at the point T passes through the origin O and $OT = 6\sqrt{5}$

Given that the coordinates of Q are $(11, k)$, where k is a positive constant,

- (a) find the exact value of k , **(3)**
- (b) find an equation for C . **(2)**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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A circle C has equation

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

(a) Find

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

(3)

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

(b) Find the possible values for k .

(2)

[illegible]

10.

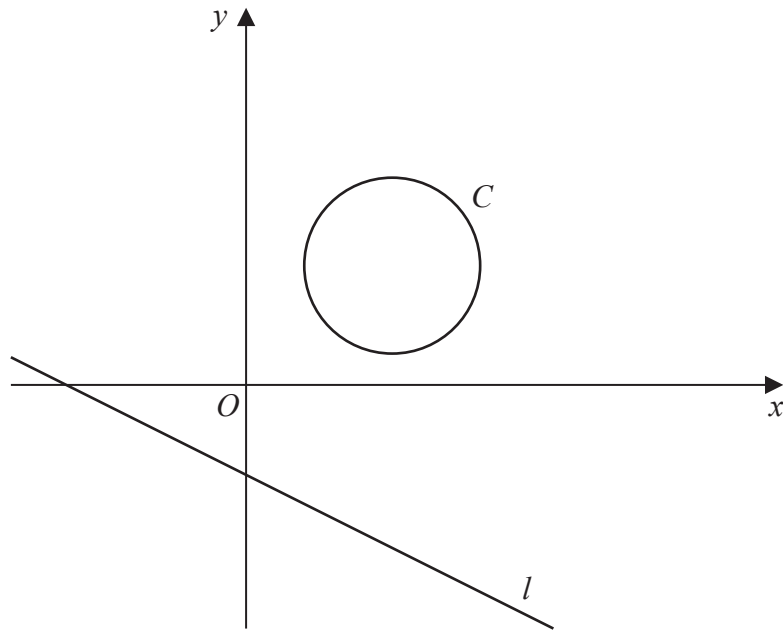


Figure 3

Figure 3 shows the circle C with equation

$$x^2 + y^2 - 10x - 8y + 32 = 0$$

and the line l with equation

$$2y + x + 6 = 0$$

(a) Find

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

(3)

(b) Find the shortest distance between C and l .

(5)

The diagram shows a Cartesian coordinate system with a horizontal x-axis and a vertical y-axis intersecting at origin O. A line l passes through the origin and extends into the first quadrant. A circle C is positioned in the first quadrant, tangent to the line l at point P. The center of the circle is marked with a dot and labeled N.

Figure 4 shows a sketch of a circle C with centre $N(7, 4)$

Find

- (b) an equation for C .

(c) Find the value of k . (3)

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The circle C has equation

$$x^2 + y^2 - 6x + 10y + 9 = 0$$

(a) Find

- (i) the coordinates of the centre of C
- (ii) the radius of C

(3)

The line with equation $y = kx$, where k is a constant, cuts C at two distinct points.

(b) Find the range of values for k .

(6)

[illegible]

13. (i) A circle C_1 has equation

$$x^2 + y^2 + 18x - 2y + 30 = 0$$

The line l is the tangent to C_1 at the point $P(-5, 7)$.

Find an equation of l in the form $ax + by + c = 0$, where a , b and c are integers to be found.

(5)

(ii) A different circle C_2 has equation

$$x^2 + y^2 - 8x + 12y + k = 0$$

where k is a constant.

Given that C_2 lies entirely in the 4th quadrant, find the range of possible values for k .

(4)