2.2 Circles

Question Paper

Course	CIE AS Maths
Section	2. Coordinate Geometry
Topic	2.2 Circles
Difficulty	Hard

Time allowed: 60

Score: /45

Percentage: /100

Question 1

The points $A(-3, 1)$ and $B(3, -7)$ are the two endpoints of the diameter AB of a circle. Find the equation of the circle.

[5 marks]

Question 2a

(a) Show that $x^2 + y^2 + 5x - 2y - 5 = 0$ can be written in the form
$(x - a)^2 + (y - b)^2 = r^2$, where a, b and r are constants to be found.

[2 marks]

Question 2b

(b) Hence write down the centre and radius of the circle with equation
$x^2 + y^2 + 5x - 2y - 5 = 0$.

[2 marks]

Question 3

The line $y + 2x = 11$ meets the circle with equation $x^2 + y^2 + 6x - 14y = -38$.

(i) Show that the line and circle meet at one point only.

(ii) Find the coordinates of the point of intersection.

[4 marks]

Question 4

The line $x + 5y + 22 = 0$ intersects the circle $x^2 + y^2 + 4x + 8y - 6 = 0$ at the points A and B. Find the coordinates of A and B.

[4 marks]

Question 5a

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

(a) Find an equation for the circle C.

[4 marks]

Question 5b

(b) Find an equation for the tangent to the circle at P.

[3 marks]

Question 6a

The points $A(-3, 6)$, $B(5, -4)$ and $C(6, 5)$ lie on a circle.

(a) Show that $\angle ACB = 90°$.

[2 marks]

Question 6b

(b) Deduce a geometrical property of the line segment AB.
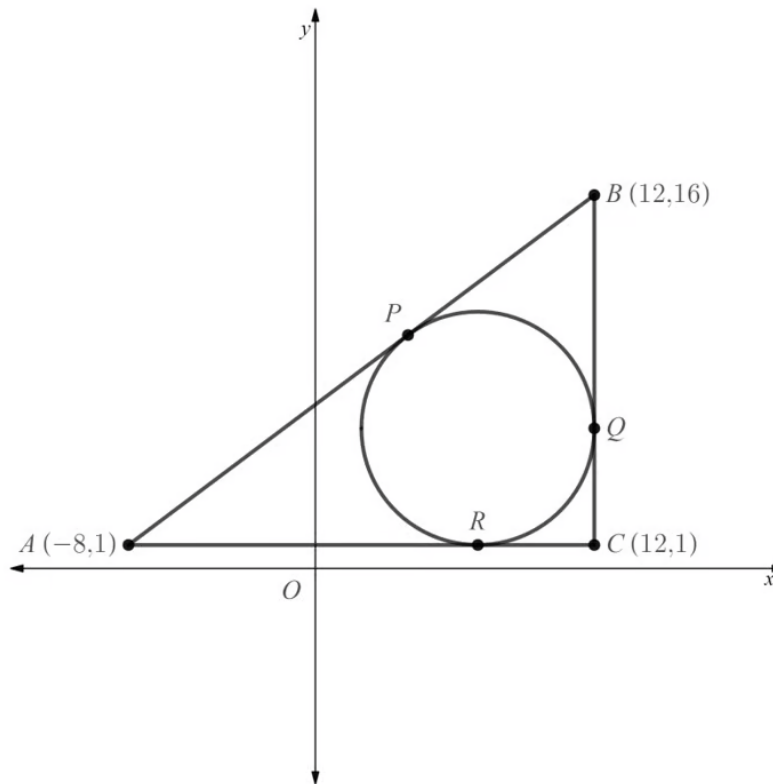
[1 mark]

Question 6c

(c) Hence find the equation of the circle.

[4 marks]

Question 7a

Triangle ABC has vertices $A(-8, 1)$, $B(12, 16)$ and $C(12, 1)$. A circle with equation $(x - 7)^2 + (y - 6)^2 = 25$ touches Triangle ABC at the three points P, Q and R, as shown in the diagram below:

(a) Write down the coordinates of points R and Q.
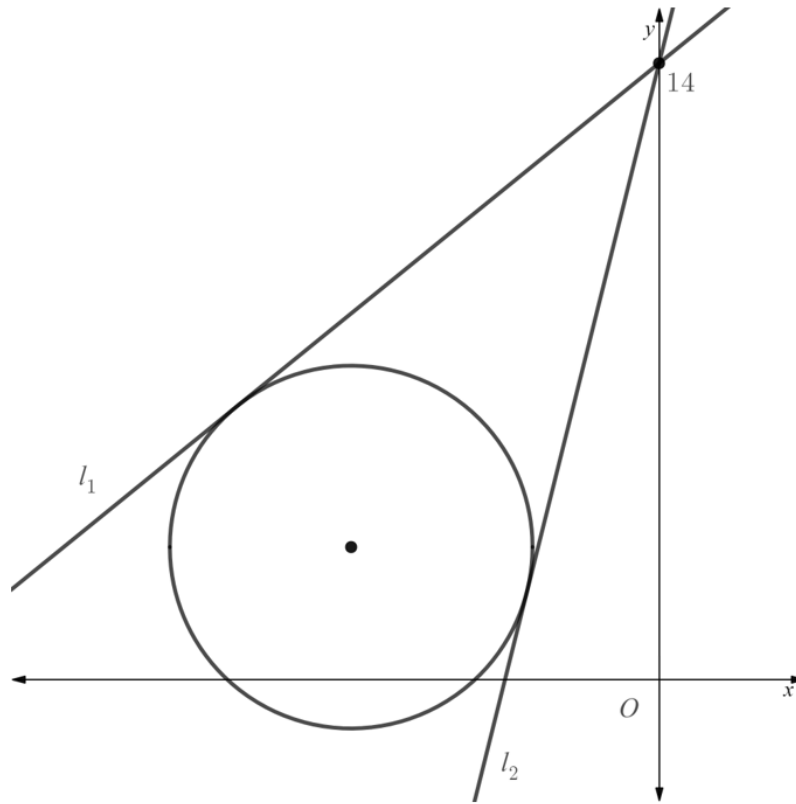
[2 marks]

Question 7b

(b) Find the coordinates of point P.

[5 marks]

Question 8

A circle has equation $x^2 + y^2 + 14x - 6y = -41$.

The lines l_1 and l_2 are both tangents to the circle, and they intersect at the point $(0, 14)$.

Find the equations of l_1 and l_2, giving your answers in the form $y = mx + c$.

[7 marks]