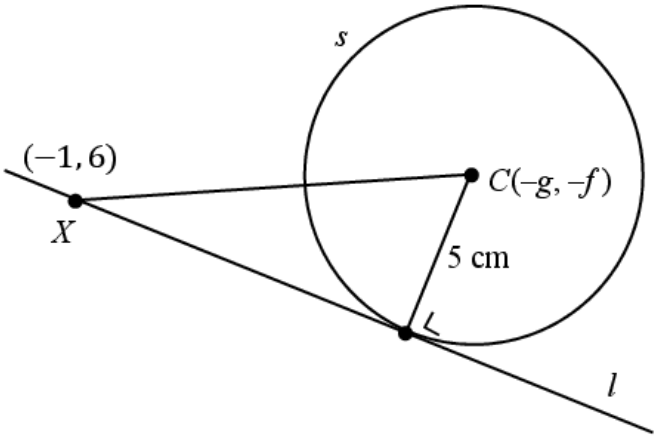
Question 1

A point X has co-ordinates $(-1, 6)$ and the slope of the line XC is $\frac{1}{7}$.

(a) Find the equation of XC. Give your answer in the form $ax + by + c = 0$, where $a, b, c \in \mathbb{Z}$.



(b) C is the centre of a circle s, of radius 5 cm. The line l: $3x + 4y - 21 = 0$ is a tangent to s and passes through X, as shown. Find the equation of one such circle s.

Question 4 **(25 marks)**

The centre of a circle lies on the line $x + 2y - 6 = 0$. The x-axis and the y-axis are tangents to the circle. There are two circles that satisfy these conditions. Find their equations.

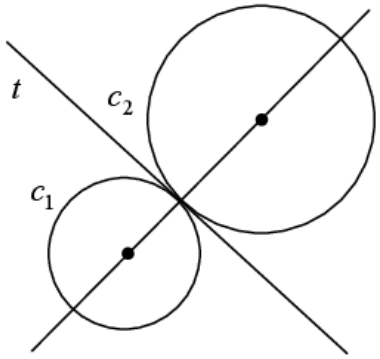
Question 4 **(25 marks)**

(a) Write down the equation of the circle with centre (–3, 2) and radius 4.

(b) A circle has equation $x^2 + y^2 - 2x + 4y - 15 = 0$.
Find the values of m for which the line $mx + 2y - 7 = 0$ is a tangent to this circle.

Question 4 **(25 marks)**

The circles c_1 and c_2 touch externally as shown.



(a) Complete the following table:

Circle	Centre	Radius	Equation
c_1	$(-3, -2)$	2	
c_2			$x^2 + y^2 - 2x - 2y - 7 = 0$

(b) **(i)** Find the co-ordinates of the point of contact of c_1 and c_2.

(ii) Hence, or otherwise, find the equation of the tangent, t, common to c_1 and c_2.