

13. A circle passes through the points $(3, 5)$ and $(-1, 3)$.
 Its centre is on the line $x + 2y - 6 = 0$.
 Using the equation $x^2 + y^2 + 2gx + 2fy + c = 0$ to represent the circle, write down three equations in g, f and c to represent the given information.
 Hence write down the equation of the circle.

Let S be circle

Sub in pts \Rightarrow

$$(3, 5) \in S \Rightarrow (3)^2 + (5)^2 + 2g(3) + 2f(5) + c = 0$$

$$9 + 25 + 6g + 10f + c = 0$$

$$6g + 10f + c = -34$$

$$(-1, 3) \in S \Rightarrow (-1)^2 + (3)^2 + 2g(-1) + 2f(3) + c = 0$$

$$1 + 9 - 2g + 6f + c = 0$$

$$-2g + 6f + c = -10$$

Let L be the line

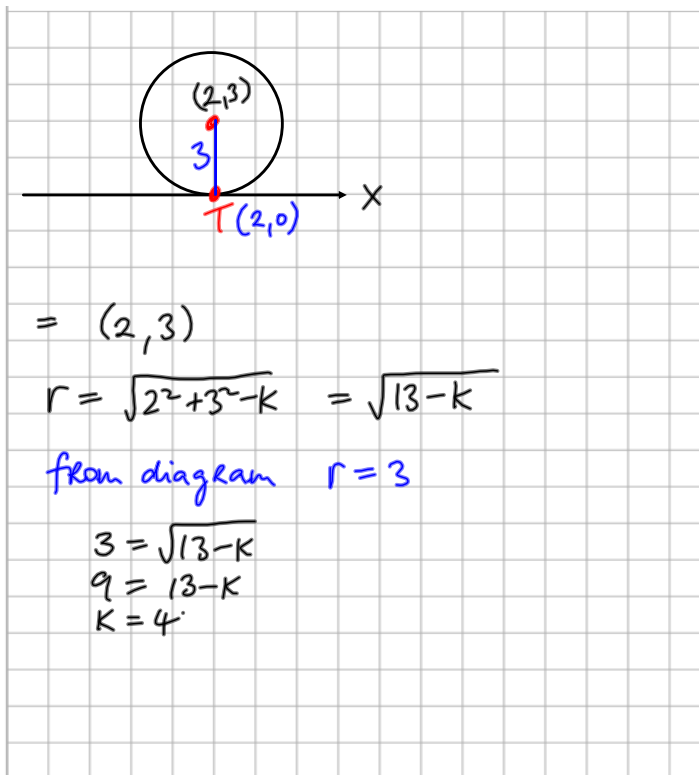
$C(-g, -f) \in L \Rightarrow$

$$(-g) + 2(-f) - 6 = 0$$

$$-g - 2f = 6$$

and solve ...

15. The circle $x^2 + y^2 - 4x - 6y + k = 0$ touches the x -axis at the point T .
 (i) Write down the length of the radius of the circle.
 (ii) Hence find the value of k and the coordinates of T .



Centre $(-g, -f) = (2, 3)$

$$r = \sqrt{g^2 + f^2 - c}$$

$$r = \sqrt{2^2 + 3^2 - k} = \sqrt{13 - k}$$

from diagram $r = 3$

$$\Rightarrow 3 = \sqrt{13 - k}$$

$$9 = 13 - k$$

$$k = 4$$