

Intersection of linear graphs and circles

A LEVEL LINKS

Scheme of work: 2a. Straight-line graphs, parallel/perpendicular, length and area problems

Practice question

- 1 The circle C has equation

$$x^2 + y^2 + 10x - 6y + 18 = 0$$

Find

- (a) the coordinates of the centre of C ,
- (b) the radius of C .

The circle C meets the line with equation $x = -3$ at two points.

- (c) Find the exact values for the y coordinates of these two points, giving your answers as fully simplified surds.

Answer

- 1 a Obtain $(x \pm 5)^2$ and $(y \pm 3)^2$

Centre is $(-5, 3)$.

- b See $(x \pm 5)^2$ + $(y \pm 3)^2$ = 16 (= r^2) or $(r^2 =)$ "25" + "9" - 18
 $r = 4$

- c Use $x = -3$ in either form of equation of circle to obtain simplified quadratic in y

$$\text{e.g. } x = -3 \Rightarrow (-3 + 5)^2 + (y - 3)^2 = 16 \Rightarrow (y - 3)^2 = 12$$

$$\text{or } (-3)^2 + y^2 + 10 \times (-3) - 6y + 18 = 0 \Rightarrow y^2 - 6y - 3 = 0$$

solve resulting quadratic to give $y =$

$$y = 3 \pm 2\sqrt{3}$$