

Section 2: Circles

Crucial points

1. Draw a diagram

In most questions involving coordinate geometry, it is helpful to draw a sketch diagram. It does not need to be accurate, but it will help to give you a rough idea of the answer you might expect.

2. Make sure you know the standard circle equations

The general equation of a circle, centre $(0, 0)$ and radius r is:

$$x^2 + y^2 = r^2$$

The general equation of a circle, centre (a, b) and radius r is:

$$(x - a)^2 + (y - b)^2 = r^2$$

3. Finding the intersection of a line and a curve

To find the coordinates of the point(s) where a line meets a curve, you solve the equations simultaneously. The condition for the line to be a tangent to the curve is that there is a repeated root. (For a line and a quadratic curve this means that the discriminant of the resulting quadratic equation is 0, i.e. $b^2 - 4ac = 0$).

To find the coordinates of the point(s) where two curves meet you solve their equations simultaneously.

4. You are expected to know these circle properties:

- (i) the angle in a semicircle is a right angle
- (ii) the perpendicular from the centre of a circle to a chord bisects the chord
- (iii) the tangent to a circle at a point is perpendicular to the radius through that point

These circle properties are often useful in examination questions. Keep them in mind when answering questions involving circles.