

6A Mid-Points of Line Segments

1. Find the midpoint of this pair of points:

a) $(2,3)$ and $(6,9)$

b) $(2a, -4b)$ and $(7a, 8b)$

2. AB is a diameter of a circle, where A and B are the coordinates $(-3,8)$ and $(5,4)$ respectively. Find the coordinates of the centre of the circle.

3. PQ is a diameter of a circle, centre $(2,-2)$. Given that P is $(8,-5)$, find the coordinates of Q.

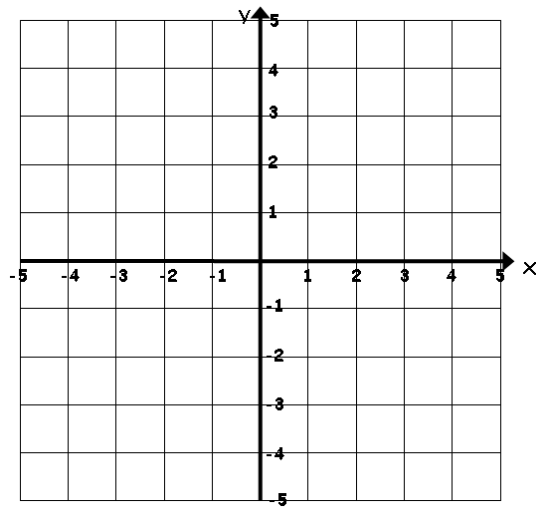
6B Perpendicular Bisectors of Line Segments

1. The line AB is the diameter of the circle with centre C, where A and B are $(-1, 4)$ and $(5, 2)$ respectively. The line l passes through C and is perpendicular to AB. Find the equation of l.

2. The line PQ is the Chord of the circle, centre $(-3,5)$, where P and Q are $(5,4)$ and $(1,12)$ respectively. The line l is perpendicular to PQ and bisects it. Show that it passes through the centre of the circle.

3. The lines AB and CD are chords of a circle. The line $y = 3x - 11$ is the perpendicular bisector of AB. The line $y = -x - 1$ is the perpendicular bisector of CD. Find the coordinates of the circle's centre.

6C Equations of Circles



1. Write down the equation of the circle with centre (5,7) and radius 4

2. Find the coordinates of the centre, and the radius of, the circle with the following equation:

$$(x + 3)^2 + (y - 1)^2 = 4^2$$

3. Find the coordinates of the centre, and the radius of, the circle with the following equation:

$$\left(x - \frac{5}{2}\right)^2 + (y + 4)^2 = 32$$

4. Show that the circle:

$$(x - 3)^2 + (y + 4)^2 = 20$$

Passes through (5,-8)

5. The line AB is the diameter of a circle, where A and B are (4,7) and (-8,3) respectively. Find the equation of the circle.

6. Find the centre and radius of the circle with equation:

$$x^2 + y^2 - 14x + 16y - 12 = 0$$

6D Lines Intersecting Circles

1. Find the coordinates where the line $y = x + 5$ meets the circle $x^2 + (y - 2)^2 = 29$.

2. Show that the line $y = x - 7$ does not touch the circle $(x + 2)^2 + y^2 = 33$.

6E Applying Circle Theorems

1. The line $4x - 3y - 40 = 0$ is a tangent to the circle $(x - 2)^2 + (y - 6)^2 = 100$ at $P = (10,0)$. Show that the radius at P is perpendicular to this line.

2. A circle C has equation:

$$(x - 5)^2 + (y + 3)^2 = 10$$

The line l is a tangent to the circle and has gradient -3 . Find the two possible equations for l , giving your answers in the form $y = mx + c$.

6E Applying Circle Theorems

1. The points $A(-8,1)$, $B(4,5)$ and $C(-4,9)$ lie on the circle, as shown in the diagram.

a) Show that AB is a diameter of the circle.

b) Find an equation of the circle

2. The points $P(3,16)$, $Q(11,12)$ and $R(-7,6)$ lie on the circumference of a circle. The equation of the perpendicular bisector of PQ is $y = 2x$.
- a) Find the equation of the perpendicular bisector of PR

b) Find the coordinates of the centre of the circle

c) Work out the equation of the circle