Coordinate Geometry [Ch. 1]

1 (i) Find the gradient of the straight line l with equation $4y - 3x + 2 = 0$. [1]

(ii) Find an equation of the straight line which passes through the origin and which is perpendicular to l. [2]

2 The coordinates of the points A, B and C are $(-2, 3)$, $(2, 5)$ and $(4, 1)$ respectively.

(i) Find the gradients of the lines AB, BC and CA. [2]

(ii) Hence or otherwise show that triangle ABC is a right-angled triangle. [2]

3 Find the mid-point of the line segment joining $(2, 4)$ and $(-3, 1)$. [2]

4 The point A has coordinates $(1, 7)$ and the point B has coordinates $(3, 1)$. The mid-point of AB is P. Find the equation of the straight line which passes through P and which is perpendicular to the line $5y + x = 7$. Give your answer in the form $y = mx + c$. [5]

5 (i) Find an equation of the line which is parallel to the line with equation $2x + 3y = 7$ and which passes through $M(5, 1)$. [2]

(ii) M is the mid-point of the line segment joining $R(a, -3)$ to $S(7, b)$. Find the constants a and b. [3]

6 The points A, B and C have coordinates $(1, 2)$, $(3, 4)$ and $(9, -2)$ respectively.

(i) Calculate the gradient of AB. [1]

(ii) Show that BC is perpendicular to AB. [2]

(iii) Find an equation of the straight line passing through B and C. [2]

(iv) The length of AB may be written in the form $p\sqrt{2}$. Find the constant p. [2]

(v) Find the area of triangle ABC. [3]

7 (i) Find the equation of the line which is parallel to the line $2x + y = 5$ and which passes through the point $(2, 5)$. [3]

(ii) (a) Find the equation of the line l which is perpendicular to the line $2x + y = 5$ and which passes through the point $(1, k)$, where k is constant. [2]

(b) Hence find the value of k for which the line l passes through the origin. [2]

8 (i) The point A has coordinates (2, 3) and the line l_1 has equation $x + 4y = 31$. The line l_2 passes through A and is perpendicular to l_1. Find the equation of l_2 in the form $y = mx + c$. [3]

(ii) The lines l_1 and l_2 intersect at the point M. Find the coordinates of M. [2]

(iii) The point A is a vertex of the square $ABCD$. The diagonals of the square intersect at M. Find the coordinates of C. [3]

9 (i) Find the gradient of the line l_1 which has equation $4x - 3y + 5 = 0$. [1]

(ii) Find an equation of the line l_2, which passes through the point (1, 2) and which is perpendicular to the line l_1. [3]

(iii) The line l_1 crosses the x-axis at P and the line l_2 crosses the y-axis at Q. Find the coordinates of the mid-point of PQ. [3]

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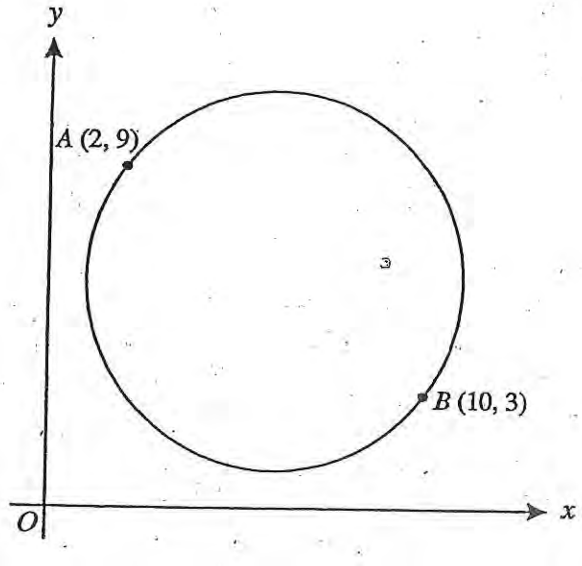

The diagram shows a circle which passes through the points A (2, 9) and B (10, 3). AB is a diameter of the circle.

(i) Calculate the radius of the circle. [3]

(ii) Find an equation of the straight line through A and B. Give your answer in the form $ax + by = c$. [4]

(iii) Show that the tangent to the circle at B has equation $4x - 3y - 31 = 0$. [3]

Coordinate Geometry [Ch. 1]

11 $ABCD$ is a rectangle, where A, B and C are the points (3, 4), (1, k) and (4, −3) respectively.

(i) Find the coordinates of the mid-point of AC. [1]

(ii) Find the gradient of the line AB, giving your answer in terms of k. [1]

(iii) Determine the two possible values of k. [5]

(iv) Find the area of the rectangle $ABCD$ for the case in which k is positive. [3]

12 The points A, B and C have coordinates (−3, 5), (9, −3) and (7, 7) respectively.

(i) Find the equation of the straight line through A and B, giving your answer in the form $ax + by = c$. [4]

D is the mid-point of AB.

(ii) Show that CD is perpendicular to AB. [4]

(iii) The line through A and B is a tangent to a circle with centre C. Find the area of the circle, giving your answer in terms of π. [4]