AQA Level 2 Further mathematics Coordinate geometry

Section 1: Points and straight lines

Exercise

1. (a) For the points A(3, 1) and B(7, 4) calculate
   (i) the gradient of AB
   (ii) the gradient of a line perpendicular to AB
   (iii) the midpoint of AB
   (iv) the distance AB
   (v) the coordinates of the point C which divides AB in the ratio 3:2.
   (b) Repeat part (a) for the points A(-2, 9) and B(3, -1).

2. For the points P(2, -1) and Q(-4, 8), find
   (i) the midpoint M of PQ
   (ii) the coordinates of the point R such that PR:QR is 1:3
   (iii) the coordinates of the point S such that PS:QS is 7:3.

3. Given the points A(3, 1), B(6, y) and C(12, -2) find the value(s) of y for which
   (i) the line AB has gradient 2
   (ii) the distance AB is 5
   (iii) A, B and C are collinear
   (iv) AB is perpendicular to BC
   (v) the lengths AB and BC are equal

4. P is the point (2, 1), Q is (6, 9) and R is (10, 2).
   (i) Sketch the triangle PQR.
   (ii) Prove that triangle PQR is isosceles.
   (iii) Work out the area of triangle ABC.

5. The point E is (2, -1), F is (1, 3), G is (3, 5) and H is (4, 1).
   Show, by calculation, that EFGH is a parallelogram.

6. Find the equations of the following lines.
   (i) parallel to $y = 4x - 1$ and passing through (2, 3)
   (ii) perpendicular to $y = 2x + 7$ and passing through (1, 2)
   (iii) parallel to $3y + x = 10$ and passing through (4, -1)
   (iv) perpendicular to $3x + 4y = 12$ and passing through (-3, 0)
   (v) parallel to $x + 5y + 8 = 0$ and passing through (-1, -6)

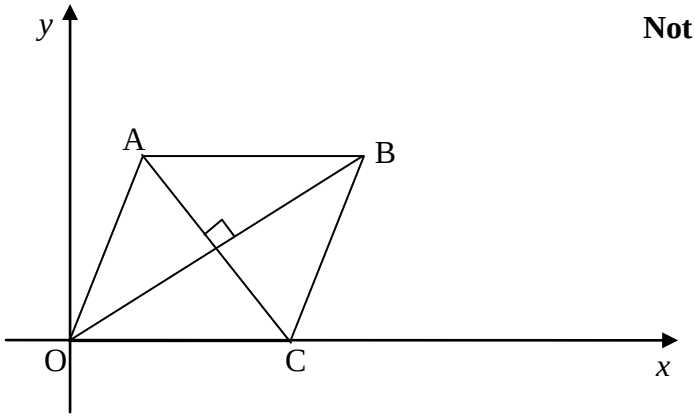
7. Find the equation of the perpendicular bisector of AB in each of the following cases.
   (i) A(1, 6), B(3, 2) (ii) A(8, -1), B(-2, 3)
   (iii) A(-5, 2), B(7, -4) (iv) A(-3, -5), B(5, 1)

8. A triangle has vertices E(2, 5), F(4, 1) and G(-2, -3).
   (i) Find the midpoint of each side and hence find the equations of the three medians. (Medians are the lines from the midpoint of each side to the opposite vertex).
   (ii) Show that the point $\left(\frac{4}{3}, 1\right)$ lies on each median.

AQA FM Coordinate geometry 1 Exercise

9. ABCD is a parallelogram. The equation of AB is $y = 4x - 3$ and the equation of BC is $y = 2x + 1$.
   (i) Find the coordinates of B.
   (ii) The coordinates of A are (3, 9). Find the equation of AD.
   (iii) The coordinates of C are (7, 15). Find the equation of CD.
   (iv) Find the coordinates of D.

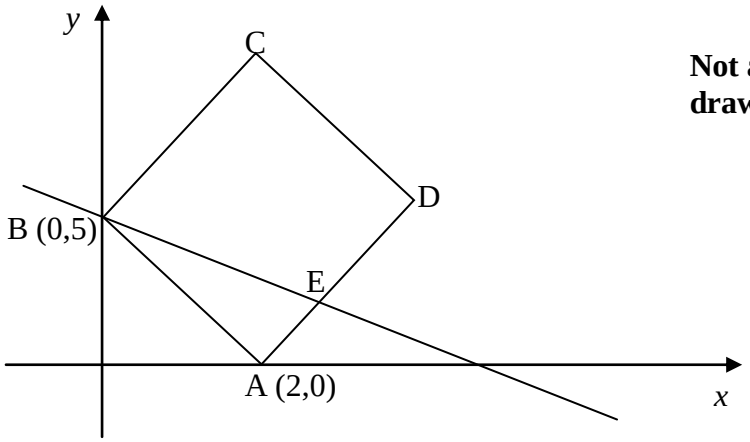
10. The diagram shows a rhombus OABD. O is the origin.
    B is the point with coordinates (6, 4). D lies on the *x*-axis.



Not to scale

Find the coordinates of point A.

11. ABCD is a square. Point E cuts AD in the ratio 1:2.



Not accurately drawn

Find the coordinates of the point where line BE crosses the *x*-axis.