

# OCR Core 1

## Coordinate geometry

### Section 1: Coordinates, points and lines

#### Exercise

Do not use a calculator in this exercise.

- (a) For the points A(3, 1) and B(7, 4) calculate

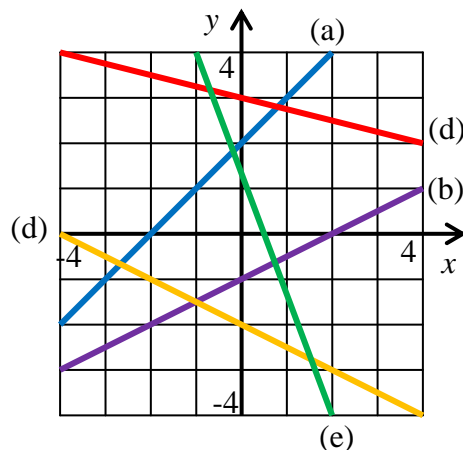
  - the gradient of AB
  - the gradient of a line perpendicular to AB
  - the midpoint of AB
  - the distance AB

(b) Repeat part (a) for the points A(-2, 9) and B(3, -1)
- Given the points A(3, 1), B(6, y) and C(12, -2) find the value(s) of y for which

  - the line AB has gradient 2
  - the distance AB is 5
  - A, B and C are collinear
  - AB is perpendicular to BC
  - the lengths AB and BC are equal
- P is the point (2, 1), Q is (6, 9) and R is (10, 2).

  - Sketch the triangle PQR.
  - Prove that triangle PQR is isosceles.
  - Work out the area of triangle ABC.
- 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.
- Sketch the following lines.

(i) $y = x + 3$	(ii) $y = 2x - 1$	(iii) $x + y = 5$
(iv) $4y = x + 12$	(v) $3y + x + 6 = 0$	(vi) $5y = 15 - 2x$
- Find the equations of the lines (a)-(e) in the diagram below.



## OCR C1 Coord. geom. Section 1 Exercise

7. 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  $(-1, -6)$
8. Find the equation of the line 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)  $A(-3, -5), B(5, 1)$
9. A quadrilateral has vertices  $A(3, 5), B(9, 7), C(10, 4)$  and  $D(4, 2)$ .
- (i) Sketch the quadrilateral.
  - (ii) Find the equation of each of the quadrilateral's sides.
  - (iii) Use your equations to show that ABCD is a rectangle.
10. 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  $(\frac{4}{3}, 1)$  lies on each median.
11. The sides of a triangle are formed by parts of the lines  $y + 3x = 11$ ,  $3y = x + 3$  and  $7y + x = 37$ .
- (i) Find the coordinates of the vertices of the triangle.
  - (ii) Show that the triangle is right-angled.
  - (iii) Work out the area of the triangle.
12. 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.