COORDINATE GEOMETRY

1 The straight line l has gradient -3 and passes through the point with coordinates $(3, -5)$.

a Find an equation of the line l.

The straight line m passes through the points with coordinates $(-1, -2)$ and $(4, 1)$.

b Find the equation of m in the form $ax + by + c = 0$, where a, b and c are integers.

The lines l and m intersect at the point P.

c Find the coordinates of P.

2 Given that the straight line passing through the points A $(2, -3)$ and B $(7, k)$ has gradient $\frac{3}{2}$,

a find the value of k,

b show that the perpendicular bisector of AB has the equation $8x + 12y - 45 = 0$.

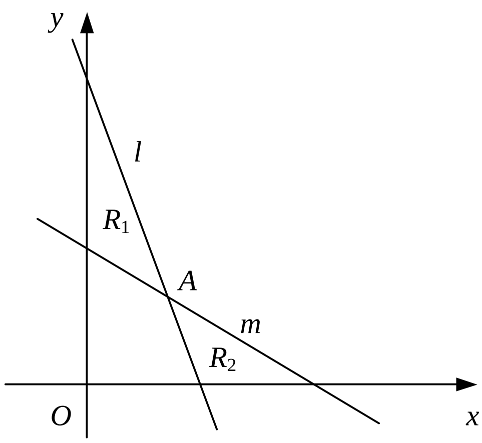
3 The vertices of a triangle are the points A $(5, 4)$, B $(-5, 8)$ and C $(1, 11)$.

a Find the equation of the straight line passing through A and B, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

b Find the coordinates of the point M, the mid-point of AC.

c Show that OM is perpendicular to AB, where O is the origin.

4



The line l with equation $3x + y - 9 = 0$ intersects the line m with equation $2x + 3y - 12 = 0$ at the point A as shown in the diagram above.

a Find, as exact fractions, the coordinates of the point A.

The region R_1 is bounded by l, m and the y-axis.

The region R_2 is bounded by l, m and the x-axis.

b Show that the ratio of the area of R_1 to the area of R_2 is $25 : 18$

5 The straight line l has the equation $2x + 5y + 10 = 0$.

The straight line m has the equation $6x - 5y - 30 = 0$.

a Sketch the lines l and m on the same set of axes showing the coordinates of any points at which each line crosses the coordinate axes.

The points where line m crosses the coordinate axes are denoted by A and B.

b Show that l passes through the mid-point of AB.

6 The straight line l passes through the points with coordinates $(-10, -4)$ and $(5, 4)$.

a Find the equation of l in the form $ax + by + c = 0$, where a, b and c are integers.

The line l crosses the coordinate axes at the points P and Q.

b Find, as an exact fraction, the area of triangle OPQ, where O is the origin.

c Show that the length of PQ is $2\frac{5}{6}$.

7 The point A has coordinates $(-8, 1)$ and the point B has coordinates $(-4, -5)$.

a Find the equation of the straight line passing through A and B, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

b Show that the distance of the mid-point of AB from the origin is $k\sqrt{10}$ where k is an integer to be found.

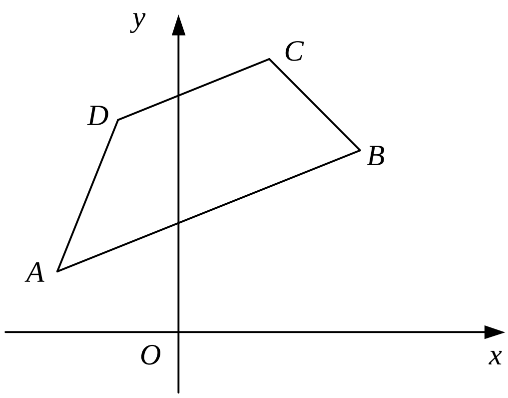
8 The straight line l_1 has gradient $\frac{1}{3}$ and passes through the point with coordinates $(-3, 4)$.

a Find the equation of l_1 in the form $ax + by + c = 0$, where a, b and c are integers.

The straight line l_2 has the equation $5x + py - 2 = 0$ and intersects l_1 at the point with coordinates $(q, 7)$.

b Find the values of the constants p and q.

9



The diagram shows trapezium $ABCD$ in which sides AB and DC are parallel. The point A has coordinates $(-4, 2)$ and the point B has coordinates $(6, 6)$.

a Find the equation of the straight line passing through A and B, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

Given that the gradient of BC is -1,

b find an equation of the straight line passing through B and C.

Given also that the point D has coordinates $(-2, 7)$,

c find the coordinates of the point C,

d show that $\angle ACB = 90°$.

10 The straight line l passes through the points $A\ (1,\ 2\sqrt{3})$ and $B\ (\sqrt{3},\ 6)$.

a Find the gradient of l in its simplest form.

b Show that l also passes through the origin.

c Show that the straight line which passes through A and is perpendicular to l has equation

$$x + 2\sqrt{3}\,y - 13 = 0.$$