

- 1 Find the gradient of the line segment joining each pair of points.
a (3, 1) and (5, 5) **b** (4, 7) and (10, 9) **c** (6, 1) and (2, 5) **d** (-2, 2) and (2, 8)
e (1, 3) and (7, -1) **f** (4, 5) and (-5, -7) **g** (-2, 0) and (0, -8) **h** (8, 6) and (-7, -2)
- 2 Write down the gradient and y -intercept of each line.
a $y = 4x - 1$ **b** $y = \frac{1}{3}x + 3$ **c** $y = 6 - x$ **d** $y = -2x - \frac{3}{5}$
- 3 Find the gradient and y -intercept of each line.
a $x + y + 3 = 0$ **b** $x - 2y - 6 = 0$ **c** $3x + 3y - 2 = 0$ **d** $4x - 5y + 1 = 0$
- 4 Write down, in the form $y - y_1 = m(x - x_1)$, the equation of the straight line with the given gradient which passes through the given point.
a gradient 2, point (4, 1) **b** gradient 5, point (2, -5)
c gradient -3, point (-1, 1) **d** gradient $\frac{1}{2}$, point (1, 6)
e gradient -2, point $(\frac{3}{4}, -\frac{1}{4})$ **f** gradient $-\frac{1}{5}$, point (-3, -7)
- 5 Find, in the form $y = mx + c$, the equation of the straight line with the given gradient which passes through the given point.
a gradient 3, point (1, 2) **b** gradient -1, point (5, 3)
c gradient 4, point (-2, -3) **d** gradient -2, point (-4, 1)
e gradient $\frac{1}{3}$, point (-3, 1) **f** gradient $-\frac{5}{6}$, point (9, -2)
- 6 Find, in each case, the equation of the straight line with gradient m which passes through the point P . Give your answers in the form $ax + by + c = 0$, where a , b and c are integers.
a $m = 1$, $P(2, -4)$ **b** $m = \frac{1}{2}$, $P(6, 1)$ **c** $m = -4$, $P(-1, 8)$
d $m = \frac{2}{5}$, $P(-3, 5)$ **e** $m = -3$, $P(\frac{3}{2}, -\frac{1}{8})$ **f** $m = -\frac{3}{4}$, $P(\frac{2}{3}, -7)$
- 7 Find, in the form $y = mx + c$, the equation of the straight line passing through each pair of points.
a (0, 1) and (4, 13) **b** (2, 9) and (7, -1) **c** (-4, 3) and (2, 7)
d $(-\frac{1}{2}, -2)$ and (2, 8) **e** (3, -2) and (18, -5) **f** (-3.2, 4) and (-2, 0.4)
- 8 Find, in the form $ax + by + c = 0$, where a , b and c are integers, the equation of the straight line which passes through each pair of points.
a (3, 0) and (5, 2) **b** (-1, 8) and (5, -4) **c** (-5, 3) and (7, 5)
d (-4, -1) and (8, -17) **e** (2, -1.5) and (7, 0) **f** $(-\frac{3}{5}, \frac{1}{10})$ and (3, 1)
- 9 The straight line l passes through the points $A(-6, 8)$ and $B(3, 2)$.
a Find an equation of the line l .
b Show that the point $C(9, -2)$ lies on l .
- 10 The point $M(k, 2k)$ lies on the line with equation $x - 3y + 15 = 0$.
Find the value of the constant k .

- 11 The point with coordinates $(4p, p^2)$ lies on the line with equation $2x - 4y + 5 = 0$.
Find the two possible values of the constant p .
- 12 Find the coordinates of the points at which each straight line crosses the coordinate axes.
a $y = 2x + 5$ **b** $x - 3y + 6 = 0$ **c** $2x + 4y - 3 = 0$ **d** $5x - 3y = 10$
- 13 The line l has the equation $5x - 18y - 30 = 0$.
a Find the coordinates of the points A and B where the line l crosses the coordinate axes.
b Find the area of triangle OAB where O is the origin.
- 14 Find the exact length of the line segment joining each pair of points, giving your answers in terms of surds where appropriate.
a $(1, 1)$ and $(4, 5)$ **b** $(0, 0)$ and $(3, 1)$ **c** $(1, -4)$ and $(9, 11)$
d $(7, -8)$ and $(-9, 4)$ **e** $(3, 12)$ and $(1, 7)$ **f** $(-6, -3)$ and $(2, -7)$
- 15 The points $P(22, 15)$, $Q(-13, c)$ and $R(k, 24)$ all lie on a circle, centre $(2, 0)$.
Find the radius of the circle and the possible values of the constants c and k .
- 16 The points $A(-2, 7)$ and $B(6, -3)$ lie at either end of the diameter of a circle.
Find the area of the circle, giving your answer as an exact multiple of π .
- 17 The corners of a triangle are the points $P(4, 7)$, $Q(-2, 5)$ and $R(3, -10)$.
a Find the length of each side of triangle PQR , giving your answers in terms of surds.
b Hence, verify that triangle PQR contains a right-angle.
c Find the area of triangle PQR .
- 18 Find the coordinates of the mid-point of the line segment joining each pair of points.
a $(0, 2)$ and $(8, 4)$ **b** $(1, 9)$ and $(7, 5)$ **c** $(-5, 1)$ and $(3, -7)$
d $(-5, -7)$ and $(7, -5)$ **e** $(1, 0)$ and $(2, 9)$ **f** $(-1, -2)$ and $(4, -5)$
g $(2.4, 3.1)$ and $(0.6, 4.5)$ **h** $(0, 3)$ and $(\frac{1}{2}, \frac{3}{2})$ **i** $(-\frac{5}{4}, 2)$ and $(-1, -\frac{3}{5})$
- 19 The straight line l_1 passes through the points $P(-2, 1)$ and $Q(4, -1)$.
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 passes through the point $R(2, 4)$ and through the mid-point of PQ .
b Find the equation of l_2 in the form $y = mx + c$.
- 20 Find the coordinates of the point of intersection of each pair of straight lines.
a $y = 2x + 1$ **b** $y = x + 7$ **c** $y = 5x - 4$
 $y = 3x - 1$ $y = 4 - 2x$ $y = 3x - 1$
d $x + 2y - 4 = 0$ **e** $2x + y - 2 = 0$ **f** $3x + 2y = 0$
 $3x - 2y + 4 = 0$ $x + 3y + 9 = 0$ $x + 4y - 2 = 0$
- 21 The line l with equation $x - 2y + 2 = 0$ crosses the y -axis at the point P . The line m with equation $3x + y - 15 = 0$ crosses the y -axis at the point Q and intersects l at the point R .
Find the area of triangle PQR .

- 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 $8x + 12y - 45 = 0$.

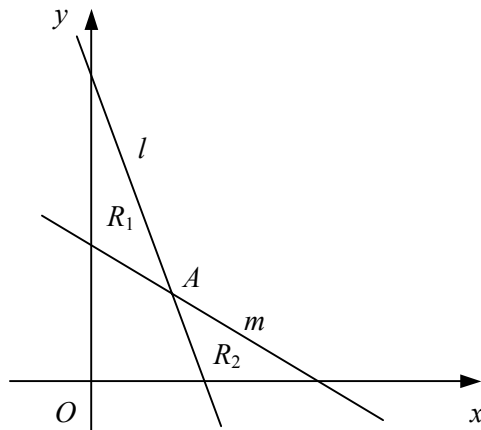
- 3 The vertices of a triangle are the points $A(5, 4)$, $B(-5, 8)$ and $C(1, 11)$.

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 $6x - 5y - 30 = 0$.

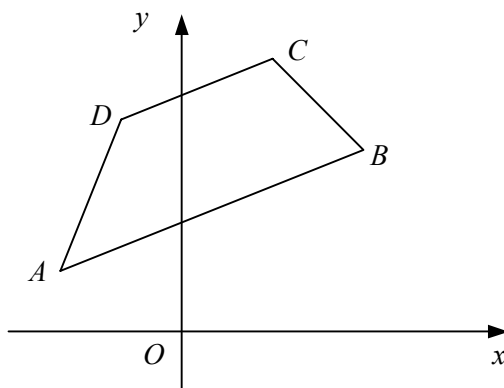
a Sketch the lines l and m on the same set of axes showing the coordinates of any points at which each line crosses the coordinate axes.

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 $(5, 4)$.
- 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 .
 - Find, as an exact fraction, the area of triangle OPQ , where O is the origin.
 - 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 $(-4, -5)$.
- 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.
 - 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 $(-3, 4)$.
- 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 $(q, 7)$.
 - 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 $(6, 6)$.

- 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 ,
- find an equation of the straight line passing through B and C .
Given also that the point D has coordinates $(-2, 7)$,
- find the coordinates of the point C ,
- show that $\angle ACB = 90^\circ$.

- 10 The straight line l passes through the points $A(1, 2\sqrt{3})$ and $B(\sqrt{3}, 6)$.
- Find the gradient of l in its simplest form.
 - Show that l also passes through the origin.
 - Show that the straight line which passes through A and is perpendicular to l has equation $x + 2\sqrt{3}y - 13 = 0$.