

COORDINATE GEOMETRY

- 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 .