C1 COORDINATE GEOMETRY *Worksheet A*

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** $m = -3$, $P\left(\frac{3}{2}, -\frac{1}{8}\right)$ **f** $m = -\frac{3}{4}$, $P\left(\frac{2}{3}, -7\right)$

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 $y = 2x + 1$
$y = 3x - 1$

b $y = x + 7$
$y = 4 - 2x$

c $y = 5x - 4$
$y = 3x - 1$

d $x + 2y - 4 = 0$
$3x - 2y + 4 = 0$

e $2x + y - 2 = 0$
$x + 3y + 9 = 0$

f $3x + 2y = 0$
$x + 4y - 2 = 0$

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.