Coordinate Geometry

1　　Write down in the form $(y - y_1) = m(x - x_1)$ the equation of a line passing through the given point and with the given gradient, m.

　　a　$(4, 3)$;　　$m = 2$　　　**b**　$(5, 0)$;　　$m = \frac{1}{2}$　　　**c**　$(^-1, 6)$;　　$m = 3$

　　d　$(^-5, 5)$;　　$m = 1$　　**e**　$(8, \frac{5}{2})$;　　$m = ^-4$　　**f**　$(^-7, ^-2)$;　　$m = \frac{3}{4}$

2　　Find in the form $y = mx + c$ the equation of a line passing through the given point and with the given gradient, m.

　　a　$(0, 6)$;　　$m = 3$　　　**b**　$(3, 3)$;　　$m = 1$　　　**c**　$(4, 9)$;　　$m = ^-2$

　　d　$(^-6, 8)$;　　$m = \frac{1}{3}$　　**e**　$(\frac{3}{2}, 4)$;　　$m = 5$　　**f**　$(^-8, 0)$;　　$m = ^-\frac{1}{2}$

3　　Find in the form $ax + by + c = 0$ the equation of a line passing through the given point and with the given gradient, m.

　　a　$(4, 0)$;　　$m = 1$　　　**b**　$(18, 6)$;　　$m = ^-2$　　**c**　$(^-4, 4)$;　　$m = ^-1$

　　d　$(5, 2)$;　　$m = 3$　　　**e**　$(4, \frac{7}{2})$;　　$m = \frac{1}{4}$　　**f**　$(^-9, ^-6)$;　　$m = ^-\frac{3}{5}$

4　　Find in the form $y = mx + c$ the equation of a line passing through the points

　　a　$(2, 6)$ and $(4, 8)$　　　**b**　$(^-10, 0)$ and $(0, 5)$　　**c**　$(3, 1)$ and $(7, 9)$

　　d　$(^-6, ^-2)$ and $(3, 4)$　　**e**　$(0, 8)$ and $(5, ^-2)$　　**f**　$(\frac{3}{4}, ^-1)$ and $(2, ^-\frac{5}{4})$

5　　Find in the form $ax + by + c = 0$ the equation of a line passing through the points

　　a　$(9, 1)$ and $(13, 5)$　　**b**　$(^-2, 0)$ and $(0, ^-2)$　　**c**　$(^-1, 2)$ and $(5, 6)$

　　d　$(7, \frac{1}{2})$ and $(11, 1)$　　**e**　$(^-4, ^-6)$ and $(2, 9)$　　**f**　$(^-6, \frac{3}{5})$ and $(1, ^-5)$

6　　Find the gradient of each line.

　　a　$y = x + 3$　　　　**b**　$y = 2 - 3x$　　　　**c**　$5x - y + 2 = 0$

　　d　$3x + y - 4 = 0$　　**e**　$x - 2y - 7 = 0$　　**f**　$x + y = 0$

　　g　$7x - 2y = 4$　　　**h**　$2x + 10y - 11 = 0$　　**i**　$8x + 5y - 19 = 0$

7　　State any pairs of lines in question **6** that are parallel.

8　　State any pairs of lines in question **6** that are perpendicular.

9　　Find the equation of a line passing through the given point and parallel to the given line. Give your equation in the form $y = mx + c$.

　　a　$(1, 2)$;　　$y = 3x - 4$　　　　　**b**　$(4, 0)$;　　$y = 6 - x$

　　c　$(3, 8)$;　　$2x - 3y + 4 = 0$　　　**d**　$(^-7, 5)$;　　$x + 4y = 5$

10　Find the equation of a line passing through the given point and perpendicular to the given line. Give your equation in the form $ax + by + c = 0$.

　　a　$(9, 1)$;　　$y = 2x - 4$　　　　**b**　$(^-3, ^-2)$;　　$y = ^-3x + 7$

　　c　$(5, 4)$;　　$3x - 2y = 0$　　　　**d**　$(6, ^-3)$;　　$5x + 4y + 8 = 0$

11　Find the coordinates of the mid-point of a line joining each pair of points.

　　a　$(0, 0)$ and $(8, 4)$　　　**b**　$(2, 6)$ and $(10, 4)$　　**c**　$(1, 3)$ and $(4, 17)$

　　d　$(^-4, 12)$ and $(0, 2)$　　**e**　$(^-7, ^-3)$ and $(4, 4)$　　**f**　$(\frac{3}{2}, 6)$ and $(7, ^-7)$

12　Find the equation of the perpendicular bisector of a line joining each pair of points. Give your equation in the form $ax + by + c = 0$.

　　a　$(2, 0)$ and $(4, 2)$　　　**b**　$(^-4, 1)$ and $(4, 5)$　　**c**　$(1, 1)$ and $(3, 5)$

　　d　$(0, 8)$ and $(4, 2)$　　　**e**　$(^-6, 1)$ and $(2, 7)$　　**f**　$(^-1, ^-1)$ and $(4, 5)$

13 A line has gradient 2 and passes through the point (1, 8).

    a Find the equation of the line in the form $y = mx + c$.

    b Find the coordinates of the points where the line intersects the coordinate axes.

14 The line l_1 passes through the points A (1, 9) and B (4, ⁻3).

    a Find the equation of the line l_1 in the form $y = mx + c$.

    The line l_2 is parallel to the line l_1 and passes through the point C (⁻5, ⁻1)

    b Find the equation of the line l_2 in the form $y = mx + c$.

15 The line l passes through the points A (⁻8, 0) and B (0, 4).

    a Find the equation of the line l in the form $ax + by + c = 0$.

    b Find the coordinates of the point C, the mid-point of AB.

    c Find in surd form the length OC where O is the origin.

16 The line l has a gradient of ⁻2 and passes through the point A (3, 4).

    a Find an equation of the line l.

    b Find the coordinates of the points B and C where the line intersects the coordinate axes.

    c Find the area of triangle OBC where O is the origin.

17 The line l passes through the points P (⁻2, 3) and Q (4, 7).

    a Find the equation of the line l in the form $ax + by + c = 0$.

    The line m is perpendicular to the line l and passes through the point R (3, 2).

    b Find an equation of the line m.

    c Find the coordinates of the point S where l and m intersect.

Exercise 15S	Skills Practice

1   **a** $(y-3)=2(x-4)$ **b** $y=\frac{1}{2}(x-5)$
    c $(y-6)=3(x+1)$ **d** $(y-5)=(x+5)$
    e $(y-\frac{5}{2})=-4(x-8)$ **f** $(y+2)=\frac{3}{4}(x+7)$

2   **a** $y=3x+6$ **b** $y=x$ **c** $y=-2x+17$
    d $y=\frac{1}{3}x+10$ **e** $y=5x-\frac{7}{2}$ **f** $y=-\frac{1}{2}x-4$

3   **a** $x-y-4=0$ **b** $2x+y-42=0$
    c $x+y=0$ **d** $3x-y-13=0$
    e $x-4y+10=0$ **f** $3x+5y+57=0$

4   **a** $y=x+4$ **b** $y=\frac{1}{2}x+5$ **c** $y=2x-5$
    d $y=\frac{2}{3}x+2$ **e** $y=-2x+8$ **f** $y=-\frac{1}{5}x-\frac{17}{20}$

5   **a** $x-y-8=0$ **b** $x+y+2=0$
    c $2x-3y+8=0$ **d** $x-8y-3=0$
    e $5x-2y+8=0$ **f** $4x+5y+21=0$

6   **a** 1 **b** -3 **c** 5 **d** -3 **e** $\frac{1}{2}$
    f -1 **g** $\frac{7}{2}$ **h** $-\frac{1}{5}$ **i** $-\frac{8}{5}$

7   **b** and **d**

8   **a** and **f**; **c** and **h**

9   **a** $y=3x-1$ **b** $y=-x+4$
    c $y=\frac{2}{3}x+6$ **d** $y=-\frac{1}{4}x+\frac{13}{4}$

10   **a** $x+2y-11=0$ **b** $x-3y-3=0$
     c $2x+3y-22=0$ **d** $4x-5y-39=0$

11   **a** (4, 2) **b** (6, 5) **c** $(\frac{5}{2}, 10)$
     d (-2, 7) **e** $(-\frac{3}{2}, \frac{1}{2})$ **f** $(\frac{17}{4}, -\frac{1}{2})$

12   **a** $x+y-4=0$ **b** $2x+y-3=0$
     c $x+2y-8=0$ **d** $2x-3y+11=0$
     e $4x+3y-4=0$ **f** $10x+12y-39=0$

13   **a** $y=2x+6$ **b** (0,6), (-3, 0)

14   **a** $y=-4x+13$ **b** $y=-4x-21$

15   **a** $x-2y+8=0$ **b** (-4, 2) **c** $2\sqrt{5}$

16   **a** $y=-2x+10$ **b** (0, 10), (5, 0) **c** 25

17   **a** $2x-3y+13=0$ **b** $3x+2y-13=0$ **c** (1, 5)