SATPREP

Assignment : Co-ordinate 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.

Answer

1 **a** $= \dfrac{5-1}{5-3} = 2$ **b** $= \dfrac{9-7}{10-4} = \frac{1}{3}$ **c** $= \dfrac{5-1}{2-6} = -1$ **d** $= \dfrac{8-2}{2+2} = \frac{3}{2}$

   e $= \dfrac{-1-3}{7-1} = -\frac{2}{3}$ **f** $= \dfrac{-7-5}{-5-4} = \frac{4}{3}$ **g** $= \dfrac{-8-0}{0+2} = -4$ **h** $= \dfrac{-2-6}{-7-8} = \frac{8}{15}$

2 **a** grad $= 4$ **b** grad $= \frac{1}{3}$ **c** grad $= -1$ **d** grad $= -2$
   y-int $= -1$ y-int $= 3$ y-int $= 6$ y-int $= -\frac{3}{5}$

3 **a** $y = -x - 3$ **b** $2y = x - 6$ **c** $3y = -3x + 2$ **d** $5y = 4x + 1$
   grad $= -1$ $y = \frac{1}{2}x - 3$ $y = -x + \frac{2}{3}$ $y = \frac{4}{5}x + \frac{1}{5}$
   y-int $= -3$ grad $= \frac{1}{2}$ grad $= -1$ grad $= \frac{4}{5}$
                  y-int $= -3$ y-int $= \frac{2}{3}$ y-int $= \frac{1}{5}$

4 **a** $y - 1 = 2(x - 4)$ **b** $y + 5 = 5(x - 2)$

   c $y - 1 = -3(x + 1)$ **d** $y - 6 = \frac{1}{2}(x - 1)$

   e $y + \frac{1}{4} = -2(x - \frac{3}{4})$ **f** $y + 7 = -\frac{1}{5}(x + 3)$

5 **a** $y - 2 = 3(x - 1)$ **b** $y - 3 = -(x - 5)$
   $y = 3x - 1$ $y = -x + 8$

   c $y + 3 = 4(x + 2)$ **d** $y - 1 = -2(x + 4)$
   $y = 4x + 5$ $y = -2x - 7$

   e $y - 1 = \frac{1}{3}(x + 3)$ **f** $y + 2 = -\frac{5}{6}(x - 9)$
   $y = \frac{1}{3}x + 2$ $y = -\frac{5}{6}x + \frac{11}{2}$

6 **a** $y + 4 = x - 2$ **b** $y - 1 = \frac{1}{2}(x - 6)$ **c** $y - 8 = -4(x + 1)$
   $x - y - 6 = 0$ $2y - 2 = x - 6$ $y - 8 = -4x - 4$
                  $x - 2y - 4 = 0$ $4x + y - 4 = 0$

   d $y - 5 = \frac{2}{5}(x + 3)$ **e** $y + \frac{1}{8} = -3(x - \frac{3}{2})$ **f** $y + 7 = -\frac{3}{4}(x - \frac{2}{3})$
   $5y - 25 = 2x + 6$ $8y + 1 = -24x + 36$ $4y + 28 = -3x + 2$
   $2x - 5y + 31 = 0$ $24x + 8y - 35 = 0$ $3x + 4y + 26 = 0$

7 **a** grad $= \dfrac{13-1}{4-0} = 3$ **b** grad $= \dfrac{-1-9}{7-2} = -2$ **c** grad $= \dfrac{7-3}{2+4} = \frac{2}{3}$
   $y = 3x + 1$ $y - 9 = -2(x - 2)$ $y - 3 = \frac{2}{3}(x + 4)$
                  $y = -2x + 13$ $y = \frac{2}{3}x + \frac{17}{3}$

   d grad $= \dfrac{8+2}{2+\frac{1}{2}} = 4$ **e** grad $= \dfrac{-5+2}{18-3} = -\frac{1}{5}$ **f** grad $= \dfrac{0.4-4}{-2+3.2} = -3$
   $y - 8 = 4(x - 2)$ $y + 2 = -\frac{1}{5}(x - 3)$ $y - 4 = -3(x + 3.2)$
   $y = 4x$ $y = -\frac{1}{5}x - \frac{7}{5}$ $y = -3x - 5.6$