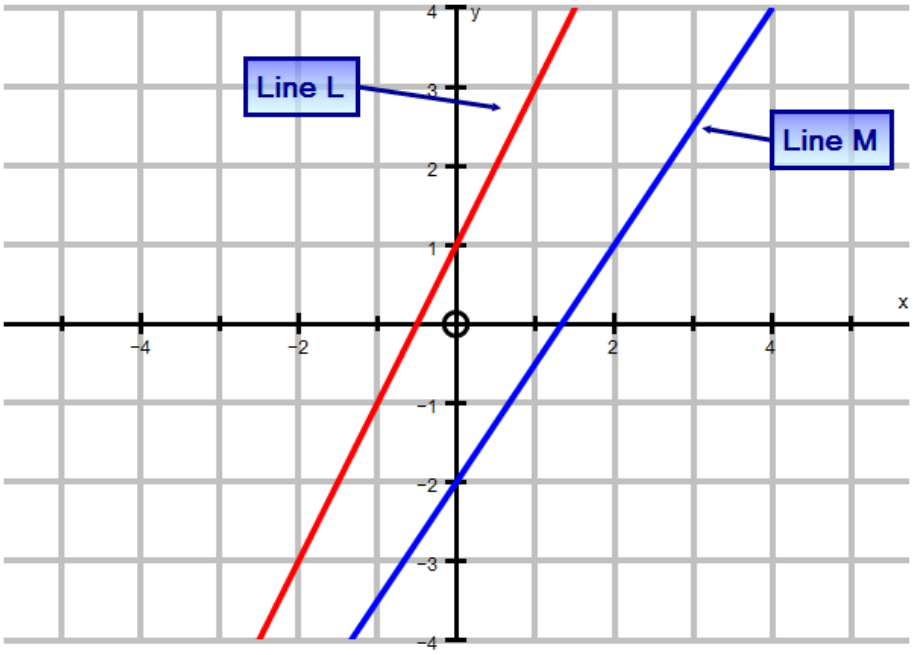
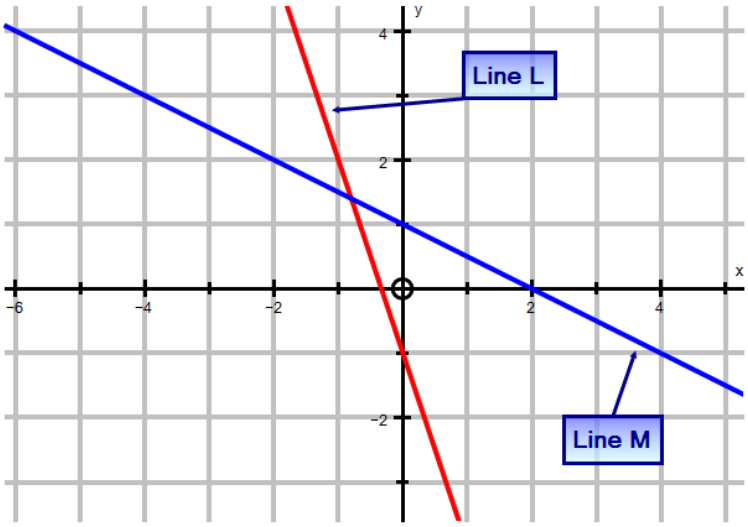
Coordinate Geometry Straight Line Graphs Part 2 KS3 and KS4

1. Work out the gradient of each of the lines L and M.



2. Work out the gradient of each of the lines L and M.



3. (a) Given points A(0,-1), B(1 , 2), C(-2 , -2) and D(-3, 0),
work out the gradient of the line (i) AB (ii) CD.

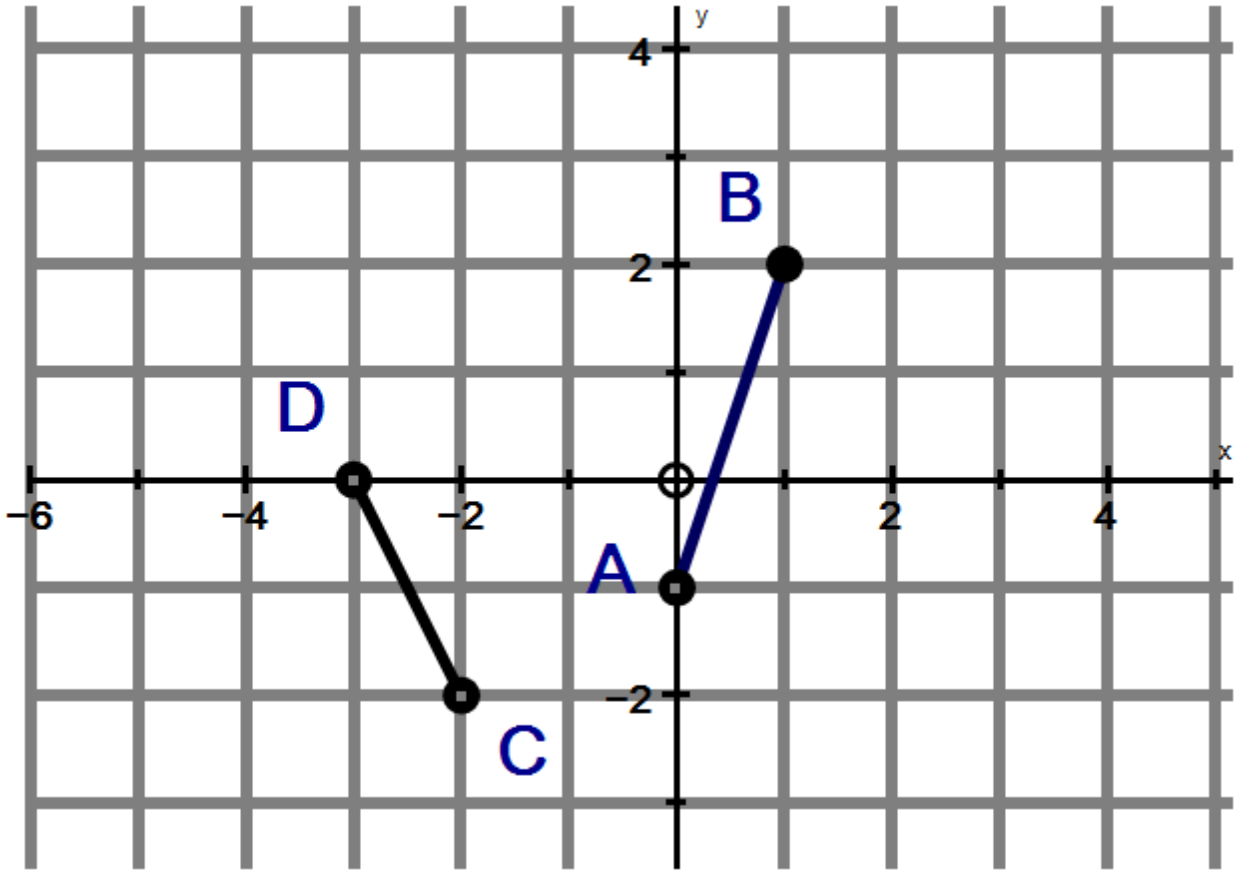
(b) Hence, write down the equation of the line AB.

(c) Write down the equation of a line that is parallel to the line CD.

*(d) Write down the gradient of a line perpendicular to the line AB.

* (e) Write down the equation of a line perpendicular to line AB and going through the point A.

* (f) Find the equation of the line that passes through the points (-4, -2), (0, 2) and (2, 4)



4. A straight line has equation $y = 2x - 4$.
   A point M that lies on the line and has *x*-coordinate -3.
   (a) Find the *y*-coordinate of the point M.

   Another point N lies on the line and has *y*-coordinate 3.

   (b) Find the *x*-coordinate of point N.

   (c) Find the equation of the line that is parallel to $y = 2x - 4$ and passes through the point (i) (0, 3) (ii) (-3, 0) (ii) (5, 2)

   (d) Which of the lines in the table below is parallel to $y = 2x - 4$?

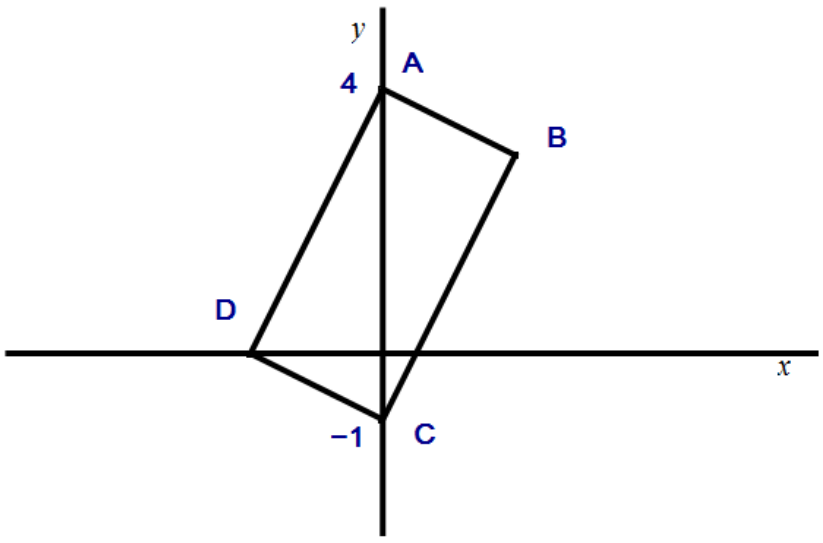
   (e) Which of the lines in the table below is perpendicular to $y = 2x - 4$?

A: $y = 3 - 2x$	B: $y - 2x = 0$	C: $y = \frac{1}{2}x + 3$	D: $y = 3 - \frac{1}{2}x$

5. ABCD is a rectangle with A(0, 4) and C(0, -1)

   The equation of the line through B and C is $y = 2x - 1$.

   (a) Find the equation of the line through A and D.
   (b) Find the equation of the line through A and B.
   (c) Find the equation of the line through C and D.



6. ABCD is a rectangle with A(0, 6) and C(1, 0)

The equation of the line through C and D is $y = -\frac{1}{3}x + \frac{1}{3}$.

(a) Find the equation of the line through A and B.

(b) Find the equation of the line through A and D.

(c) Find the equation of the diagonal AC of the rectangle.

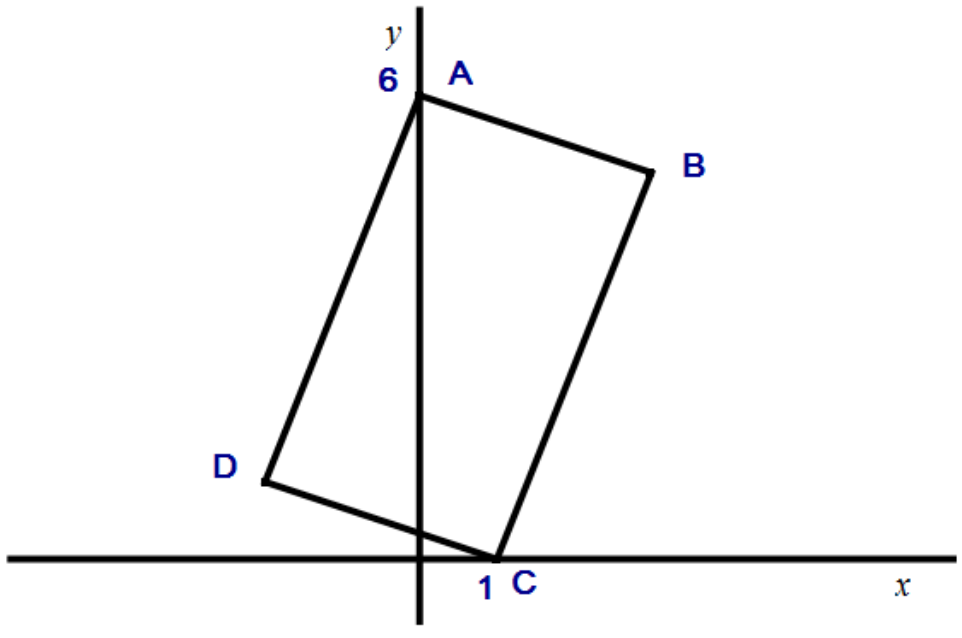
* (d) Find the equation of the line through B and C

(e) Find the coordinates of the midpoint of the line AC.

(f) Find the coordinates of the midpoint of the line BD.

*(g) Find the coordinates of the point D.

* (h) find the coordinates of the point B.



7. The equations of seven lines are given below:

Line A: $x + y = 5$

Line B: $x - y = 5$

Line C: $y = 4x - 3$

Line D: $y = \frac{1}{4}x$

Line E: $y = -\frac{1}{4}x - 3$

Line F: $y = 4x + 1$

Line G: $4y - x = 8$

(a) Which pairs of lines are parallel?

(b) Which pairs of lines are perpendicular?

(c) Which two lines meet at the *y*-axis?

(d) Which two lines meet at the *x*-axis?

*(e) Which two lines meet at the point (-6, 0)

* (f) Which two lines go through the point (-2, -7)

8. The line L has equation $3x + 4y = 12$.

(a) Find the coordinates of the point of intersection of line L with:

(i) the *y*-axis (ii) *x*-axis

(b) The point P on line L has *x*-coordinate 2. Find the *y*-coordinate of point P.

(c) The point P has *y*-coordinate - 3. Find the *x*-coordinate of point P.

(d) Find the gradient of the line L, leaving your answer as a fraction.

(e) Find the equation of a line parallel to line L and passing through the

point (i) (0, 0) (ii) (0, 5) (iii) (4, 1) * (iv) (2, -2)

*(f) Find the equation of a line perpendicular to line L and passing through the

point (i) (0, 0) (ii) (0, -1) (iii) $(1\frac{1}{2}, 0)$

* (g) Is the line $3x + 4y = d$ always parallel to line L, where *d* is a constant?

Give a reason.

** (h) Is the line $4x - 3y = d$ always perpendicular to line L, where *d* is a constant?

Give a reason.

(i) Sketch the graph of Line L, showing the points where it crosses both axes. (Do not use graph paper).

ANSWERS:

1. Line L: m = 2, Line M: m = $\frac{3}{2}$ or 1.5

2. Line L: m = -3, Line M: m = $-\frac{1}{2}$ or – 0.5

3. (a) (i) AB: m = 3 (ii) CD: m = -2
   (b) $y = 3x - 1$
   (c) $y = -2x + c \ \ (c \neq -1)$
   (d) m = $-\frac{1}{3}$
   (e) $y = -\frac{1}{3}x - 1$
   (f) $y = x + 2$

4. (a) $y = -10$ (b) $x = 3\ \frac{1}{2}$ or 1.5

   (c)(i) $y = 2x + 3$ $(ii)\ y = 2x + 6$ $(iii)\ y = 2x - 8$

   (d) B (e) D

5. (a) $y = 2x + 4$ $(b)\ y = -\frac{1}{2}x + 4$ $(c)\ y = -\frac{1}{2}x - 1$

6. (a) $y = -\frac{1}{3}x + 6$ $(b)\ y = 3x + 6$ $(c) y = -6x + 6$
   (d) $y = 3x - 3$ $(e)\ \left(\frac{1}{2}, 3\right)$ $(f)\left(\frac{1}{2}, 3\right)$ $(g)(-2, 1)$ $(h)(3, 5)$

7. (a) C and F, D and G. (b) A and B, C and E. (c) C and E

   (d) A and B (e) D and E (f) B and F

8. (a) (i) $y = 3$ $(0, 3)$ $(ii) x = 4$ $(4, 0)$ (b) $y = 1.5$ (c) $x = 8$

(d) m = $-\frac{3}{4}$ $(4y = -3x + 12, \quad y = -\frac{3}{4}x + 3)$

(e) (i) $y = -\frac{3}{4}x$ $(ii)\ y = -\frac{3}{4}x + 5$ $(iii)\ y = -\frac{3}{4}x + 4$ $(iv)\ y = -\frac{3}{4}x - \frac{1}{2}$

(f) (i) $y = \frac{4}{3}x$ $(ii)\ y = \frac{4}{3}x - 1$ $(iii) y = \frac{4}{3}x - 2$

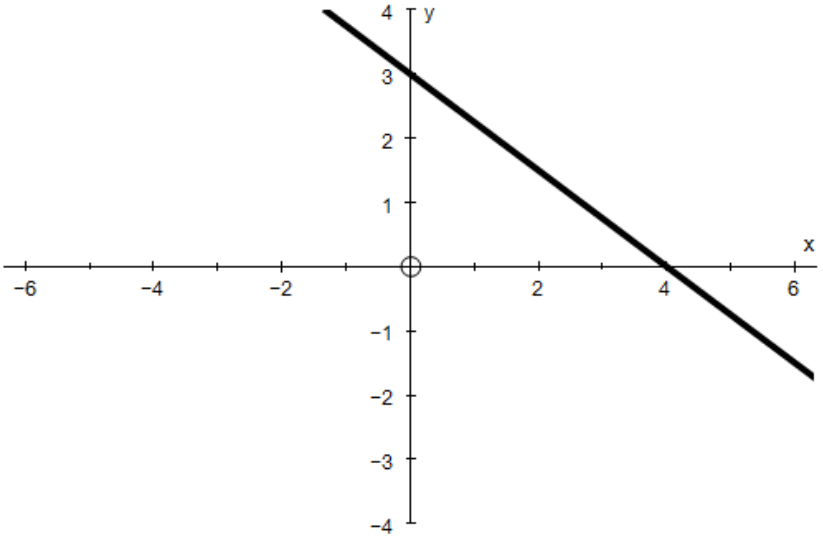
(g) Yes. $(4y = -3x + d, \quad y = -\frac{3}{4}x + \frac{d}{4}, \quad gradient = \text{m} = -\frac{3}{4})$

(h) Yes. $(4x - d = 3y, \quad y = \frac{4}{3}x - \frac{d}{3}, \quad gradient = \text{m} = \frac{4}{3})$

Gradient of L = $-\frac{3}{4}$ $\frac{4}{3} \times -\frac{3}{4} = -1$.

Hence, $4x - 3y = d$ is always perpendicular to line L

(i)



I hope you find this worksheet useful. Please let me know if you find any errors.