

# The Line

## Class 1

**Example 1** Plot the points  $a(3,2)$ ,  $b(0,1)$ ,  $c(-3,-2)$  and  $d(2,-3)$  on the same diagram.

**Example 2**  $a(3,-1)$  and  $b(-5,7)$  are two points find  $|ab|$ .

**Example 3** The distance between  $(5,2)$  and  $(8,k)$  is 5. Find  $k$ .

**Example 4** Find the midpoint of  $(-3,4)$  and  $(9,-8)$

**Example 5** If  $a(3,7)$  is the midpoint of  $[pq]$  where  $p(6,5)$  find  $q$ .

## Class 2

**Example 1** Find slope between  $a(2,-3)$  and  $b(3,-1)$

**Example 2** Find the slope of  $2x + 3y = 7$

**Example 3** Find the slope of  $x - 3y = 9$

**Example 4** Write  $2x + 3y = 7$  in the form  $y = mx + c$  and hence find the slope.

**Example 5** If the line  $L$  has the following slope find the slope of the lines parallel and perpendicular to  $L$ .

**Example 6**  $L$  is the line  $3x - 7y = 13$  and  $M$  is the line  $7x + 3y = 21$  prove that  $L \perp M$ .

**Example 7** If  $(3,2)$  is on  $5x - 6y = k$  find the value of  $k$ .

**Example 8** Draw the line  $x + 2y = 4$ .

**Example 9** Draw the line  $x + 2y = 0$

**Example 10** Draw the lines  $x = -1$  and  $y = 2$

### Class 3

**Example 1** Find the equation of a line containing the point  $(2,-5)$  and with slope  $m = -\frac{3}{7}$

**Example 2**  $a(1,3)$  and  $b(4,-5)$  are two points find the equation of the line  $ab$ .

**Example 3**  $a(5,6)$ ,  $b(-3,-4)$  and  $c(-1,1)$  are three points.

- (i) The line  $L$  is parallel to  $bc$  and passes through  $a$ . Find the equation of  $L$ .
- (ii) The line  $M$  is perpendicular to  $bc$  and passes through  $a$ . Find the equation of  $M$ .

**Example 4**  $L$  is the line  $3x + 4y = 16$ .  $M$  is the line through  $(-2,5)$  which is perpendicular to  $L$ . Find the equation of  $M$ .

**Example 5**  $L$  is the line  $2x + 3y = 8$  and  $M$  is the line  $x - 2y = -3$  find  $p$  where  $L$  and  $M$  intersect.

## Class 4

**Example 1** Find the area of the triangle formed by  $2x + 3y = 6$  and the  $x$  and  $y$  axes.

**Example 2**  $L$  is the line  $2x + 3y = 8$  and  $M$  is the line  $x - 2y = -3$  find

- (i) point  $p$  where  $L$  and  $M$  intersect
- (ii) point  $q$  where  $L$  cuts the  $x$ -axis
- (iii) point  $r$  where  $M$  cuts the  $x$ -axis
- (iv) area of triangle  $pqr$ .

**Example 3**  $a(-1,1)$ ,  $b(1,2)$ ,  $c(2,-1)$ , and  $d(x,y)$  are four vertices in a parallelogram  $abcd$ . Find  $d$ .

**Example 4** Find image of  $(5,-2)$  under central symmetry in  $(3,-1)$

**Example 5** Find image of  $(1,2)$  under axial symmetry in  $x = 3$

**Example 6** The equation of the line  $L$  is  $x + 3y = 12$ . The equation of the line  $M$  is  $3x - y = k$ .

- (i) If  $p(-2,8)$  is on  $M$  find the value of  $k$ .
- (ii) Find the point  $q$  the point of intersection of  $L$  and  $M$ .
- (iii) Prove  $L \perp M$ .
- (iv) Find the point  $r$ , which is the image of  $p$  under axial symmetry in  $L$ .