

*Straight Lines - Lesson 7*

## Intersections of a Line with the Coordinate Axes

### LI

- Find where a straight line crosses the  $x$  - and  $y$  - axes.

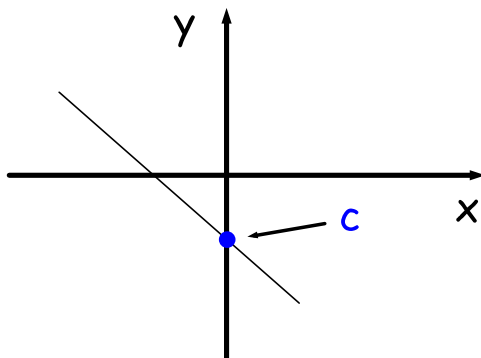
### SC

- Substitution ( $x = 0$  and  $y = 0$ ).

The Equation of a Straight Line is :

$$y = m x + c$$

gradient y - intercept



$c$  is where the line crosses the  $y$  - axis

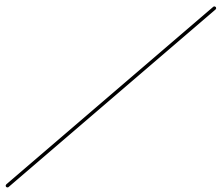
### Types of Line Equations



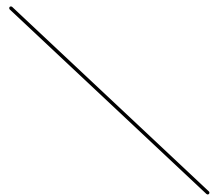
$$y = \text{number}$$



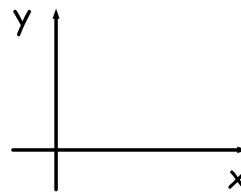
$$x = \text{number}$$



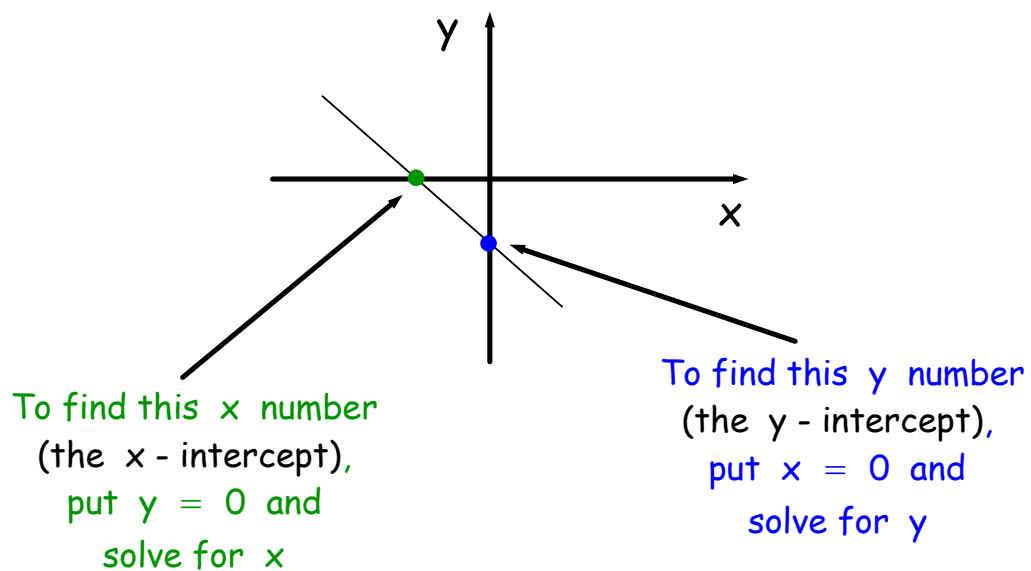
or



$$y = mx + c$$



We want to know where a straight line crosses both axes :



Example 1

Find the coordinates of the points where the straight line  $10x + 5y - 20 = 0$  crosses the  $x$ - and  $y$ - axes.

$$\begin{array}{l} 10x + 5y - 20 = 0 \\ \swarrow \quad \searrow \\ y = 0 \quad \quad \quad x = 0 \\ \swarrow \quad \quad \quad \searrow \\ 10x + 5(0) - 20 = 0 \quad \quad 10(0) + 5y - 20 = 0 \\ 10x - 20 = 0 \quad \quad \quad 5y - 20 = 0 \\ 10x = 20 \quad \quad \quad 5y = 20 \\ \underline{x = 2} \quad \quad \quad \underline{y = 4} \end{array}$$

$x$  - intercept :  $(2, 0)$ ;  $y$  - intercept :  $(0, 4)$

Example 2

Find the coordinates of the points where the straight line  $7x - 4y + 8 = 0$  crosses the  $x$ - and  $y$ - axes.

$$\begin{array}{ccc} & 7x - 4y + 8 = 0 & \\ & \swarrow \quad \searrow & \\ y = 0 & & x = 0 \\ 7x - 4(0) + 8 = 0 & & 7(0) - 4y + 8 = 0 \\ 7x + 8 = 0 & & -4y + 8 = 0 \\ 7x = -8 & & -4y = -8 \\ \underline{x = -8/7} & & \underline{y = 2} \end{array}$$

$x$ - intercept :  $(-8/7, 0)$ ;  $y$ - intercept :  $(0, 2)$

Example 3

Find the coordinates of the points where the straight line  $16x - 8y - 12 = 0$  crosses the  $x$ - and  $y$ -axes.

$$\begin{array}{ccc} & 16x - 8y - 12 = 0 & \\ & \swarrow & \searrow \\ y = 0 & & x = 0 \\ 16x - 8(0) - 12 = 0 & & 16(0) - 8y - 12 = 0 \\ 16x - 12 = 0 & & -8y - 12 = 0 \\ 16x = 12 & & -8y = 12 \\ \underline{x = 3/4} & & \underline{y = -3/2} \end{array}$$

$x$  - intercept :  $(3/4, 0)$ ;  $y$  - intercept :  $(0, -3/2)$

Find where these straight lines cross the  $x$  - and  $y$  - axes :

1)  $6x + 3y - 9 = 0$

2)  $27x - 9y = 18$

3)  $4y + 16x + 2 = 0$

4)  $21 = 14x - 7y$

5)  $20x - 3y + 15 = 0$

6)  $52 = 65x + 13y$

7)  $8x + 6y - 16 = 0$

8)  $11x - 11y = 121$

9)  $9y + 7x - 6 = 0$

10)  $66 = 99x - 33y$

11)  $210x - 7y + 15 = 0$

12)  $650 = 650x + 130y$



Find where these straight lines cross the  $x$  - and  $y$  - axes :

1)  $6x + 3y - 9 = 0$   $(\frac{3}{2}, 0); (0, 3)$

2)  $27x - 9y = 18$   $(\frac{2}{3}, 0); (0, -2)$

3)  $4y + 16x + 2 = 0$   $(-\frac{1}{8}, 0); (0, -\frac{1}{2})$

4)  $21 = 14x - 7y$   $(\frac{3}{2}, 0); (0, -3)$

5)  $20x - 3y + 15 = 0$   $(-\frac{3}{4}, 0); (0, 5)$

6)  $52 = 65x + 13y$   $(\frac{4}{5}, 0); (0, 5)$

7)  $8x + 6y - 16 = 0$   $(2, 0); (0, \frac{8}{3})$

8)  $11x - 11y = 121$   $(11, 0); (0, -11)$

9)  $9y + 7x - 6 = 0$   $(\frac{6}{7}, 0); (0, \frac{2}{3})$

10)  $66 = 99x - 33y$   $(\frac{2}{3}, 0); (0, -2)$

11)  $210x - 7y + 15 = 0$   $(-\frac{5}{70}, 0); (0, \frac{15}{7})$

12)  $650 = 650x + 130y$   $(1, 0); (0, 5)$