VECTORS

11^{th} Maths - EXERCISE-10.4

Find the equations of the lines, which cutoff intercepts on the axes whose sum and product are 1 and -6 respectively.
Solution: Let the intercepts of x and y are a and b

Inputs	**value**	**Description**
a+b	1	Sum of intercepts
ab	-6	Product of intercepts

Table 1

Given

$$a + b = 1 \tag{1}$$
$$ab = -6 \tag{2}$$

on solving (1) and (2) we get

$$\implies a = 3, b = -2 \text{ or } a = -2, b = 3 \tag{3}$$

Thus,the possible intercepts are

$$\begin{pmatrix}3\\0\end{pmatrix}, \begin{pmatrix}0\\-2\end{pmatrix}, \begin{pmatrix}-2\\0\end{pmatrix}, \begin{pmatrix}0\\3\end{pmatrix} \tag{4}$$

$$\mathbf{m} = \mathbf{a} - \mathbf{b} \tag{5}$$
$$= \begin{pmatrix}3\\0\end{pmatrix} - \begin{pmatrix}0\\-2\end{pmatrix} \tag{6}$$
$$= \begin{pmatrix}3\\2\end{pmatrix} \tag{7}$$
$$= \begin{pmatrix}3\\2\end{pmatrix} \text{ or } \begin{pmatrix}-2\\-3\end{pmatrix} \tag{8}$$
$$\tag{9}$$

1. For

$$\mathbf{n} = \begin{pmatrix} 2 \\ -3 \end{pmatrix} \tag{10}$$

$$\tag{11}$$

the equation of the line will be

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{A}) = 0 \tag{12}$$

$$\begin{pmatrix} 2 & -3 \end{pmatrix} \mathbf{x} = -6 \tag{13}$$

2. For

$$\mathbf{n} = \begin{pmatrix} -3 \\ 2 \end{pmatrix} \tag{14}$$

$$\tag{15}$$

the equation of the line will be

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{B}) = 0 \tag{16}$$

$$\begin{pmatrix} -3 & 2 \end{pmatrix} \mathbf{x} = -6 \tag{17}$$

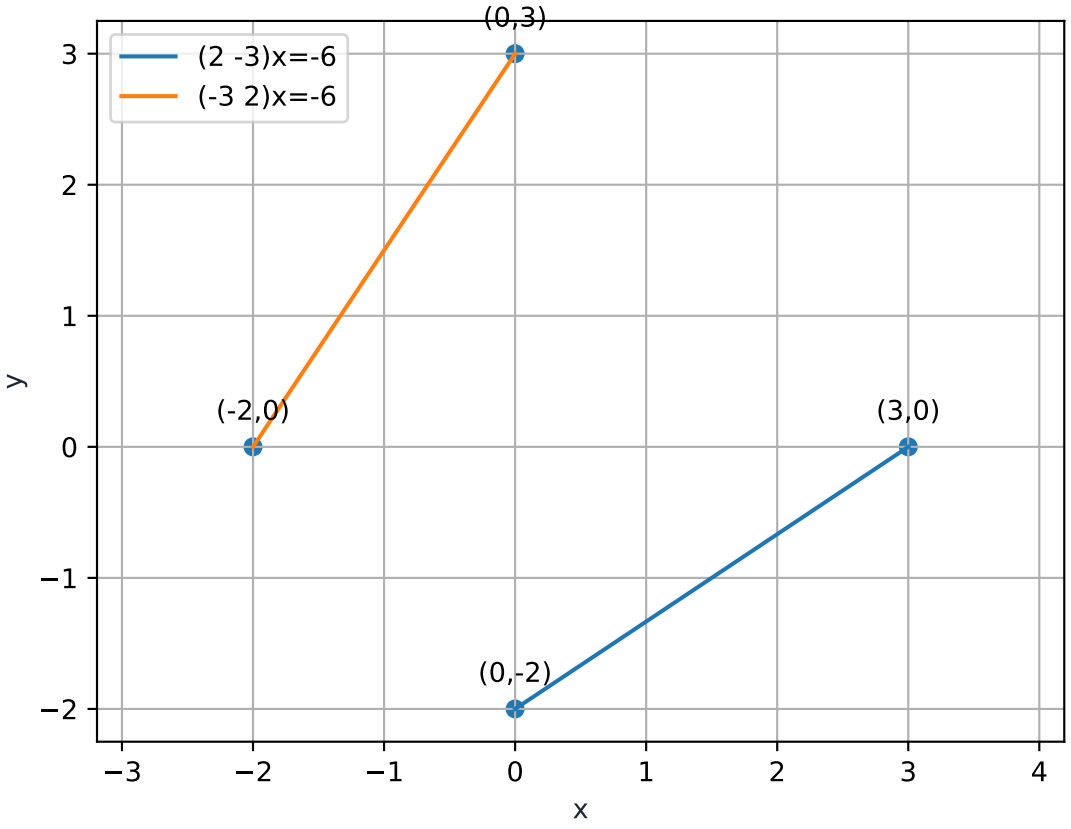

Figure 1