

# Equation of Line

## 1 11<sup>th</sup> Maths - Chapter 10

This is Problem-5 from Exercise 10.2

1. Intersecting the x-axis at a distance of 3 units to the left of origin with slope of -2.

**Solution:**

where  $\mathbf{A}$  and  $\mathbf{m}$  is

$$\mathbf{m} = -2 \quad (1)$$

$$\mathbf{A} = \begin{pmatrix} -3 \\ 0 \end{pmatrix} \quad (2)$$

$\Rightarrow$  The normal vector  $\mathbf{n}$  to the line is given as

$$\mathbf{n} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (3)$$

$$\mathbf{n} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \quad (4)$$

The equation of a line with normal vector  $\mathbf{n}$  and passing through a point  $\mathbf{A}$  is given by

$$\mathbf{n}^T (\mathbf{x} - \mathbf{A}) = 0 \quad (5)$$

$$\begin{pmatrix} 2 & 1 \end{pmatrix} \left( \mathbf{x} - \begin{pmatrix} -3 \\ 0 \end{pmatrix} \right) = 0 \quad (6)$$

$$\begin{pmatrix} 2 & 1 \end{pmatrix} \mathbf{x} + 6 = 0 \quad (7)$$

$$\begin{pmatrix} 2 & 1 \end{pmatrix} \mathbf{x} = -6 \quad (8)$$

The line segment is as shown in Figure 1.

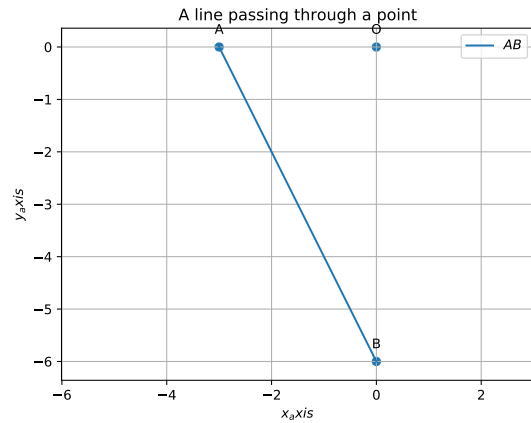


Figure 1