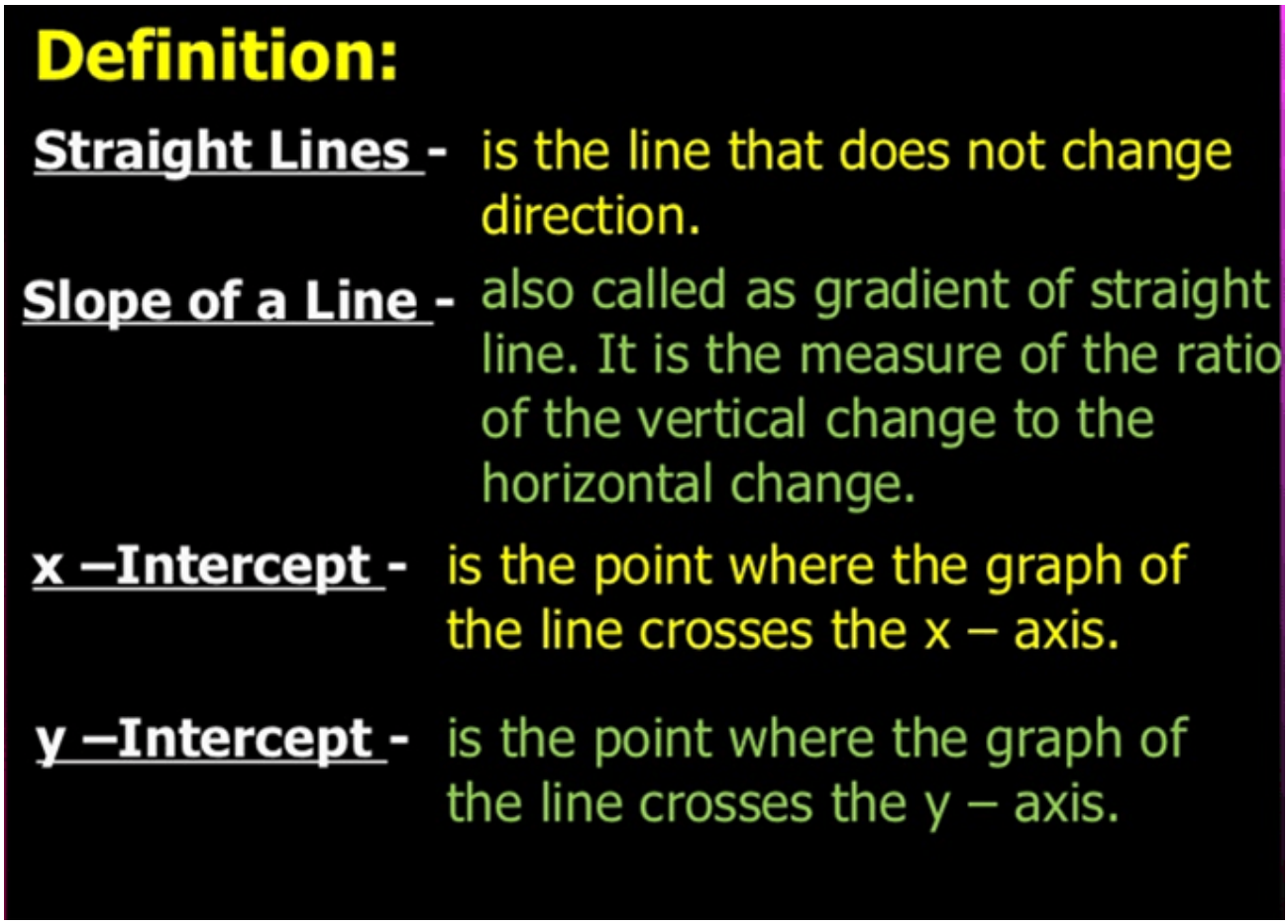
FlexiPrep

NCERT Class 11 Mathematics Solutions: Chapter 10 – Straight Lines Miscellaneous Exercise 10 Part 8 (For CBSE, ICSE, IAS, NET, NRA 2022)



1. In what ratio, the line joining $(-1,1)$ and $(5,7)$ is divided by the line $x + y = 4$?

Answer:

The equation of the line joining the points $(-1,1)$ and$(5,7)$ is given by

$$y-1=\frac{7-1}{5+1}(x+1)$$

$$y-1=\frac{6}{6}\left(x+1\right)$$

$x-y+2=0$ ... eq (1)

The equation of the given line is

$x+y-4=0$ ... eq (2)

The point of intersection of lines equation (1) and (2) is given by

$$x=1 \text{ and } y=3$$

Consider point $(1,3)$ divide the line segment joining $(-1,1)$ and$(5,7)$ in the ratio $1:k$.
Accordingly, by section formula,

$$(1,3)=\left(\frac{k(-1)+1(5)}{1+k},\frac{k(1)+1(7)}{1+k}\right)$$

$$\Rightarrow (1,3)=\left(\frac{-k+5}{1+k},\frac{k+7}{1+k}\right)$$

$$\Rightarrow \frac{-k+5}{1+k}=1,\frac{k+7}{1+k}=3$$

$$\therefore \frac{-k+5}{1+k}=1$$

$$\Rightarrow -k+5=1+k$$

$$\Rightarrow 2k=4$$

$$\Rightarrow k=2$$

So, the line joining the points $(-1,1)$ and $(5,7)$ is divided by line $x+y=4$ in the ratio $1:2$.

2. Find the distance of the line $4x+7y+5=0$ from the point $(1,2)$ along the line $2x-y=0$.

Answer:

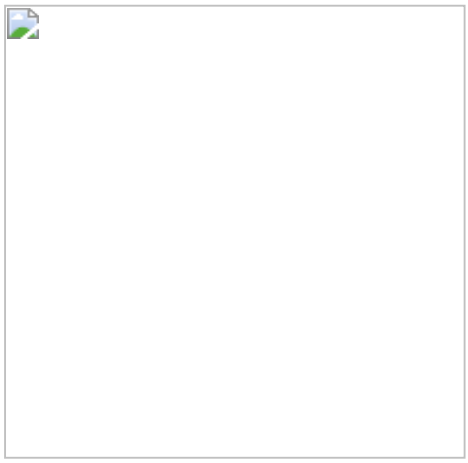
The given lines are

$2x-y=0$ ... eq (1)

$4x+7y+5=0$ ... eq (2)

$A(1,2)$ is a point on line (1).

Consider B be the point of intersection of lines equation (1) and (2).



On solving equations (1) and (2) ,

$x = -\frac{5}{18}$ and $y = -\frac{5}{9}$

Coordinates of point B are $\left(-\frac{5}{18}, -\frac{5}{9}\right)$

By using distance formula, the distance between points A and B can be obtained as

$$\text{AB} = \sqrt{\left(1 + \frac{5}{18}\right)^2 + \left(2 + \frac{5}{9}\right)^2} \text{ units}$$

$$= \sqrt{\left(\frac{23}{18}\right)^2 + \left(\frac{23}{9}\right)^2} \text{ units}$$

$$= \sqrt{\left(\frac{23}{2 \times 9}\right)^2 + \left(\frac{23}{9}\right)^2} \text{ units}$$

$$= \sqrt{\left(\frac{23}{9}\right)^2 \left(\frac{1}{2}\right)^2 + \left(\frac{23}{9}\right)^2} \text{ units}$$

$$= \sqrt{\left(\frac{23}{9}\right)^2 \left(\frac{1}{4} + 1\right)} \text{ units .}$$

$$= \frac{23}{9}\sqrt{\frac{5}{4}} \text{ units}$$

$$= \frac{23}{9} \times \frac{\sqrt{5}}{2} \text{units}$$

$= \frac{23\sqrt{5}}{18}$ units .

So, the required distance is $\frac{23\sqrt{5}}{18}$ units .