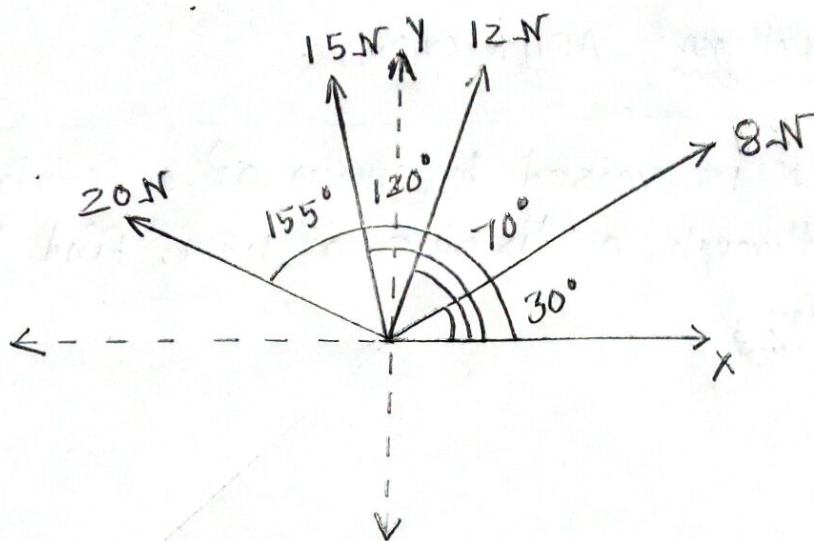


Q.4) Find the magnitude and direction of the resultant of the concurrent forces of 8N, 12N, 15N and 20N making angles of 30° , 70° , 120° and 155° respectively with a fixed line.

Soln:-



magnitude of the resultant force
Resolving all the forces horizontally

$$\Sigma H = 8 \cos 30^\circ + 12 \cos 70^\circ + 15 \cos 120^\circ + 20 \cos 155^\circ$$

$$= -14.593 \text{ N}$$

and now resolving all the forces vertically

$$\Sigma V = 8 \sin 30^\circ + 12 \sin 70^\circ + 15 \sin 120^\circ + 20 \sin 155^\circ$$

$$= 36.719 \text{ N}$$

$\therefore$ The magnitude of the resultant force

$$R = \sqrt{(\Sigma H)^2 + (\Sigma V)^2} = \sqrt{(-14.593)^2 + (36.719)^2}$$

$$= 39.5 \text{ N}$$

Direction of the resultant force

Let, θ = Angle, which the resultant force makes with the horizontal

$$\therefore \tan \theta = \frac{\Sigma V}{\Sigma H} = \frac{36.719}{-14.593} = -2.516$$

$$\text{or, } \theta = \tan^{-1}(-2.516) = \pi - \tan^{-1}(2.516) = 180^\circ - 68.32^\circ = 111.68^\circ$$

$$= 111.7^\circ$$