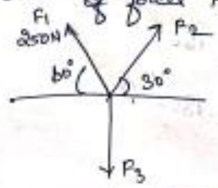
1) The forces shown in figure acting on a particle & keep the particle in equilibrium. The Magnitude of force F_1 is 250 N. Find the Magnitude of forces F_2 & F_3.



Since Three concurrent forces acting outwards, Lami's theorem can be applied.

Angle opp. to $F_1 = 90° + 30° = 120°$

Angle opp. of $F_2 = 60° + 90° = 150°$

Angle opp. of $F_3 = 180° - 60° - 30°$

$= 90°$

By Lami's Theorem,

$$\frac{F_1}{\sin 120} = \frac{F_2}{\sin 150} = \frac{F_3}{\sin 90}$$

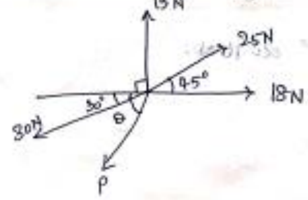
$$\Rightarrow \frac{250}{\sin 120} = \frac{F_2}{\sin 150} = \frac{F_3}{\sin 90}$$

∴ By Solving,

$F_2 = 144.33N$

$F_3 = 288.67N$

2) Forces shown in figure are in equilibrium. Find the magnitude & direction θ of unknown force P.



By equation of equilibrium :

* $\Sigma H = 0$

$$25 \cos 45 + 18 - 30 \cos 30 - P \cos\theta = 0$$

$$17.68 + 18 - 25.98 = P \cos\theta$$

$$\therefore P \cos\theta = 9.7 \quad \text{—} \; (1)$$

* $\Sigma V = 0$

$$15 + 25 \sin 45 - 30 \sin 30 - P \sin\theta = 0$$

$$15 + 17.68 - 15 = P \sin\theta$$

$$P \sin\theta = 17.68 \quad \text{—} \; (2)$$

Dividing (1) & (2),

$$\frac{P \sin\theta}{P \cos\theta} = \frac{17.68}{9.7}$$

$$\tan\theta = 1.822$$

$$\theta = 61.24^\circ$$

Sub θ in (1),

$$P \cos(61.24) = 9.7$$

$$P = \frac{9.7}{\cos(61.24)}$$

$$= 20.16 N.$$