$F_1 = 200N \quad \theta_1 = \tan^{-1}\left[\frac{3}{4}\right] = 36.87$

$F_2 = P$ angle is θ

$F_3 = 260N \quad \theta_3 = \tan^{-1}\left[\frac{12}{5}\right] = 67.38°$

$F_4 = 360N \Rightarrow \theta_4 = \tan^{-1}\left[\frac{3}{2}\right] = 56.31°$

$\Sigma H = 200\cos 36.87 + P\cos\theta - 260\cos 67.38 - 360\cos 56.31$

$P\cos\theta = 139.69N \rightarrow (1)$

$\Sigma V = 200\sin 36.87 - P\sin\theta - 260\sin 67.38 + 360\sin 56.31$

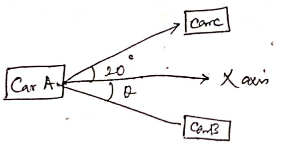
$P\sin\theta = 699.53 \rightarrow (2)$

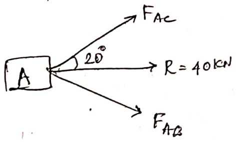
$\frac{P\sin\theta}{P\cos\theta} = \frac{699.53}{139.69} \Rightarrow \tan\theta = 5.007 \quad \boxed{\theta = 78.7}$

$P\cos 78.7 = 139.69$

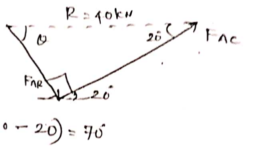
$P = 712.9N \quad \theta = 78.7$

(P) A car is pulled by means of 2 cars as shown. If the resultant of 2 forces acting on the car A is 40kN, being directed along the +ve direction of X axis, det the θ of the cable attached to the car B, such that the force in cable AB is minimum. What is the magnitude of force in each cable when it occurs?





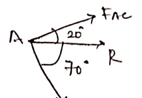
By Δle law of forces.



$\theta = (180 - 90 - 20) = 70°$

Force on cable

$\frac{40}{\sin 90°} = \frac{F_{AB}}{\sin 90°} = \frac{F_{AC}}{\sin 70°} \quad F_{AB} = 13.68kN \quad F_{AC} = 37.587kN.$



$\Sigma H = F_{AC}\cos 20° + F_{AB}\cos 70°$

$\Sigma H = 0.939 F_{AC} + 0.342 F_{AB} \rightarrow (1)$

$\Sigma V = F_{AC}\sin 20° - F_{AB}\sin 70°$

$= 0.342 F_{AC} - 0.939 F_{AB} \rightarrow (2)$

$\Sigma H = R = 40kN \quad \Sigma V = 0$

$40 = 0.939 F_{AC} + 0.342 F_{AB}$

$0 = 0.342 F_{AC} - 0.939 F_{AB}$

$F_{AB} = 13.68 kN \quad F_{AC} = 37.87kN$

~~180~~ - 90 + 90 - θ

Equilibrium

The effect of resultant force on the particle is that, the particle starts moving in direction of resultant force. But, with the action of force, if the particle does not start moving or particles moves with uniform motion then the particles is in equilibrium.

particle

* The Equilib

R → 90 of R. But and d line of will be equilibrium. The fo to equilib

Conditi

Path