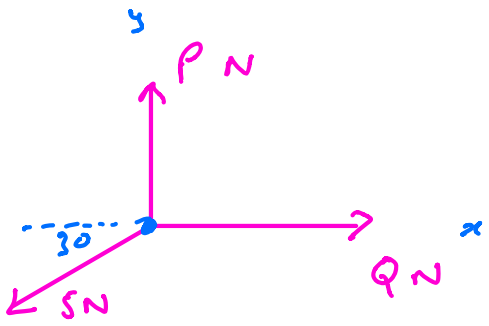
Exercise 7A

1) a)



x - direction

$5\cos 30^\circ = Q$

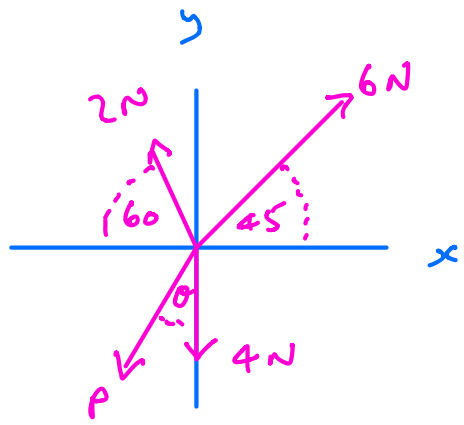
$Q = \frac{5\sqrt{3}}{2}$ N

y - direction

$5\sin 30 = P$

$P = \frac{5}{2}$ N

1 e)



x - direction

$P\sin\theta + 2\cos 60 = 6\cos 45$

$P\sin\theta = 6 \times \frac{1}{\sqrt{2}} - 1$

y - direction

$P\cos\theta = 2\sin 60 + 6\sin 45$

$P\cos\theta = \sqrt{3} + 6 \times \frac{1}{\sqrt{2}}$

$\frac{P\sin\theta}{P\cos\theta} = \frac{\left(\frac{6}{\sqrt{2}} - 1\right)}{\left(\sqrt{3} + \frac{6}{\sqrt{2}}\right)}$

$\tan\theta = \frac{\left(\frac{6}{\sqrt{2}} - 1\right)}{\left(\sqrt{3} + \frac{6}{\sqrt{2}}\right)}$

$\theta = 28.48998483$

$\theta = 28.5^\circ$

$$P = \frac{\sqrt{3} + 6 \times \frac{1}{\sqrt{2}}}{\cos 28.4848483^\circ}$$

$$\underline{P = 6.8 \text{ N}}$$

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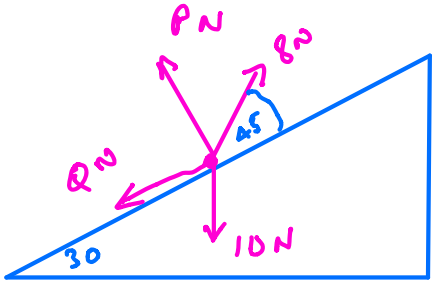
3 d)



Parallel to Slope

$$Q + 10 \sin 30 = 8 \cos 45$$

$$Q = 8 \cos 45 - 10 \sin 30$$

$$\underline{Q = 0.66 \text{ N}}$$

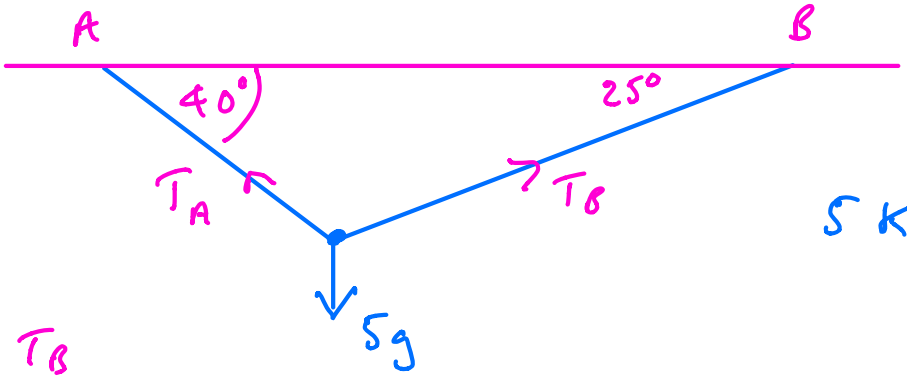
Perpendicular to Slope

$$P + 8 \sin 45 = 10 \cos 30$$

$$P = 10 \cos 30 - 8 \sin 45$$

$$\underline{P = 3.0 \text{ N}}$$

Suspended Particles



5 Kg particle

Find T_A and T_B

Resolve $\updownarrow$ $\quad T_A \sin 40^\circ + T_B \sin 25^\circ = 5g$ $\quad$ (1)

Resolve $\leftrightarrow$ $\quad T_A \cos 40^\circ = T_B \cos 25^\circ$

$$T_A = \frac{T_B \cos 25}{\cos 40}$$

Sub in ①

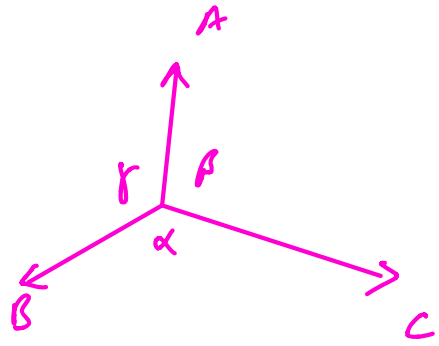
$$T_B \frac{\cos 25}{\cos 40} \sin 40 + T_B \sin 25 = 5g$$

$$T_B \left(\tan 40 \cos 25 + \sin 25 \right) = 5 \times 9.8$$

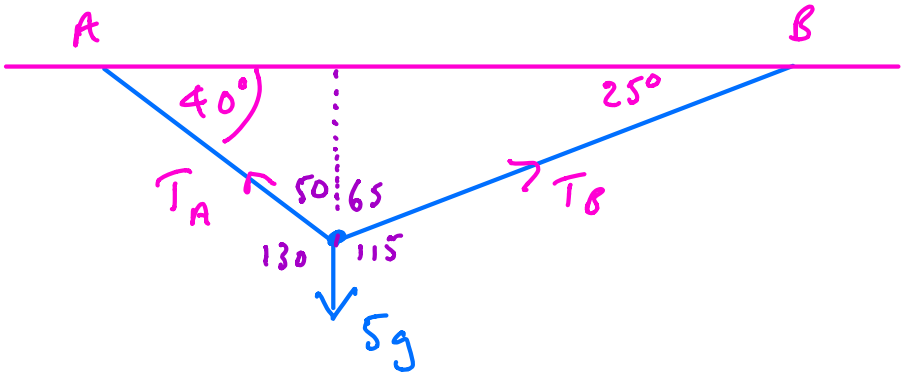
$$T_B = \frac{5 \times 9.8}{\left(\tan 40 \cos 25 + \sin 25 \right)} = 41.4 \text{ N}$$

$$T_A = 41.4166 \times \frac{\cos 25}{\cos 40} \simeq 49 \text{ N}$$

Lami's Theorem



$$\frac{A}{\sin \alpha} = \frac{B}{\sin \beta} = \frac{C}{\sin \gamma}$$



5 Kg

Lami's Theorem

$$\frac{T_A}{\sin 115^\circ} = \frac{T_B}{\sin 130} = \frac{5g}{\sin 115^\circ}$$

$$\frac{T_A}{\sin 115} = \frac{5 \times 9.8}{\sin 115} = \quad T_A = 5 \times 9.8 = 49N$$

$$\frac{T_B}{\sin 130} = \frac{5g}{\sin 115} \Rightarrow T_B = \frac{5 \times 9.8}{\sin 115} \times \sin 130$$

$$T_B = 41.4N$$

Hwk Exercise 7A

Q1b, 1f

Q 2a, 2c, 2d