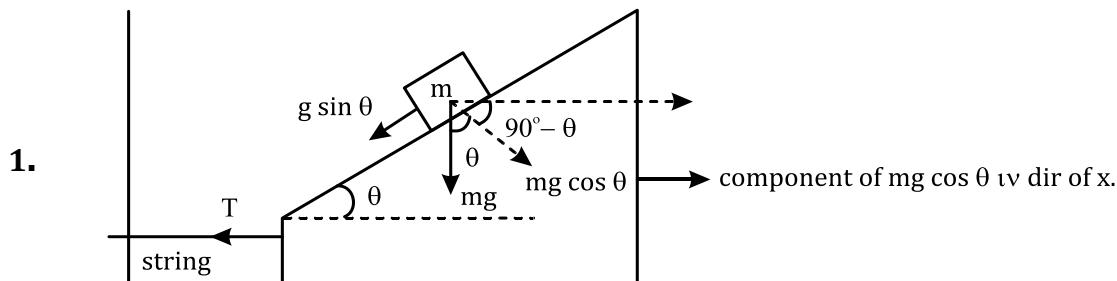


## DPP - 5

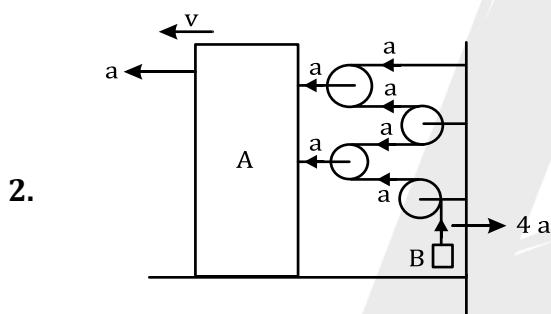
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$$\text{Dir of } x = mg \cos \theta \cdot \cos (90 - \theta)$$

$$= mg \sin \theta \cdot \cos \theta.$$

$$\text{Acceleration of block} \rightarrow g \sin \theta$$



acceleration of B w.r.t A

$$\Rightarrow \vec{a}_{BA} = 4\hat{j} - a\hat{i}$$

$$|a| = a\sqrt{17}$$



Case 1

$$T = 10 + F$$

$$T = 10 + 20 = 30\text{N (initial)}$$

Case 2

When system is free

$$a = \left( \frac{30 - 10}{5} \right) = 4\text{m/s}^2$$

$$T - 10 = 2 \times 4$$

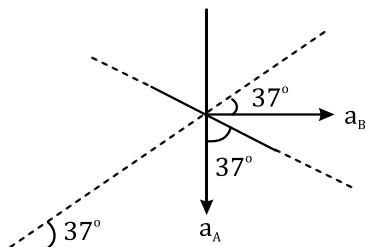
$$T = 18\text{N (final)}$$



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So tension decreased by 12N

4.



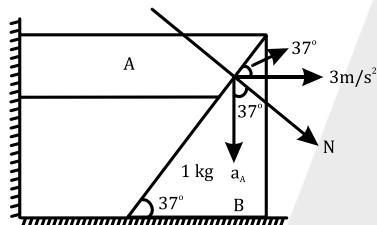
$$a_B \sin 37 = a_A \cos 37$$

$$a_A = a_B \tan 37$$

$$= a_B \times \frac{3}{4}$$

$$a_A = \frac{3}{4} a_B$$

5.



$$N \sin 37 = 1 \times 3$$

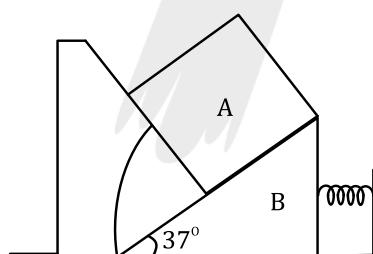
$$N \times \frac{3}{5} = 3$$

$$N = 5 \text{ N}$$

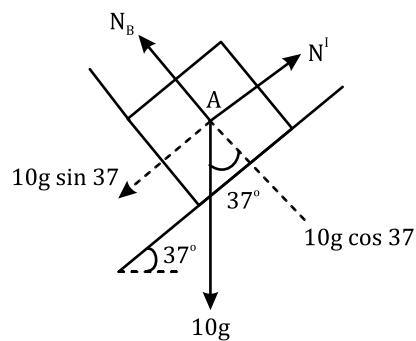
$$a_A = a_B \tan 37$$

$$a_A = 3 \times \frac{3}{4} = \frac{9}{4} \text{ m/s}^2$$

6.



F.B.D of A

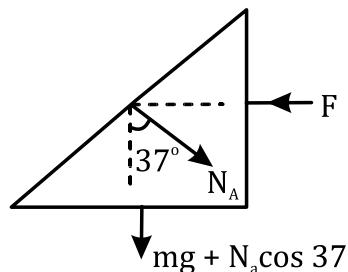




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$$N_B = \log \times \frac{4}{5} = 8g = 80 \text{ g}$$

F.B.D of B



$$N_A \sin 37 = F$$

$$80 \times \frac{3}{5} = F$$

$$F = 48 \text{ N}$$

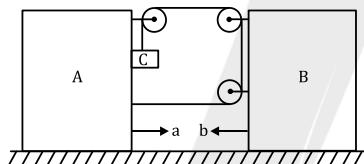
$$\text{Normal reaction of ground} = 20g + N_A \cos 37$$

$$= 200 + 80 \times \frac{4}{5}$$

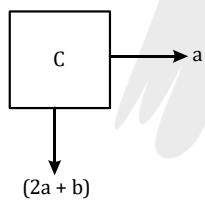
$$= 200 + 64$$

$$= 264 \text{ N}$$

7.



$$\text{Rate of decrease of length} = 2a + 2b$$



$$\vec{a}_c = a\hat{i} - (2a + 2b)\hat{j}$$

$$9. \quad 40g - T_A = 4 \times 2$$

$$T_A = 40g - 80 \quad \dots(i)$$

$$T_B - 60g = 60 \times 0$$

$$T_B = 60g \quad \dots(ii)$$

$$T_C - 50g = 50 \times 1$$

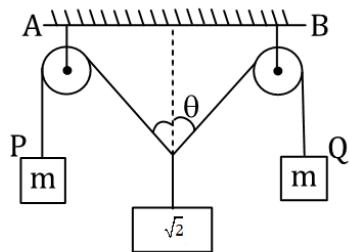
$$T_c = 50g + 50 \quad \dots(iv)$$



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$$\begin{aligned}
 T &= T_A + T_B + T_C \\
 &= 40g - 80 + 60g + 50g + 50 \\
 &= 150g - 30 \quad [\text{taken } g = 9.8] \\
 &= 150 \times 9.8 - 30 \\
 &= 1440 \text{ N}
 \end{aligned}$$

10.



$$2T \cos \theta = \sqrt{2}mg$$

$$2mg \cos \theta = \sqrt{2}mg$$

$$\theta = 45^\circ$$