DPP – 4

SOLUTION

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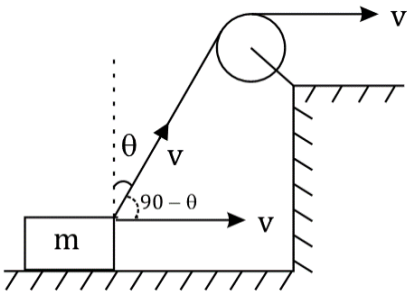
1. Let block move with speed of 4

speed of rop at every point along the string is same

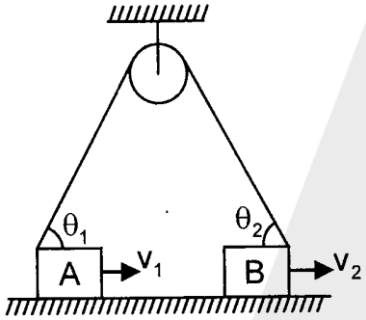
$u\cos(90-\theta) = v$

$u\sin\theta = v$

$u = \frac{v}{\sin\theta}$



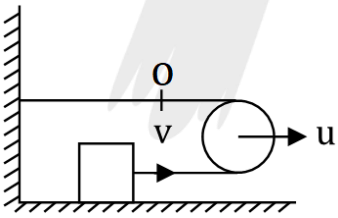
2. Speed along the string at every point is same.



$v_1\cos\theta_1 = v_2\cos\theta_2$

$\frac{v_1}{v_2} = \frac{\cos\theta_2}{\cos\theta_1}$

3.



$\frac{v+0}{2} = 4$

$V = 24$

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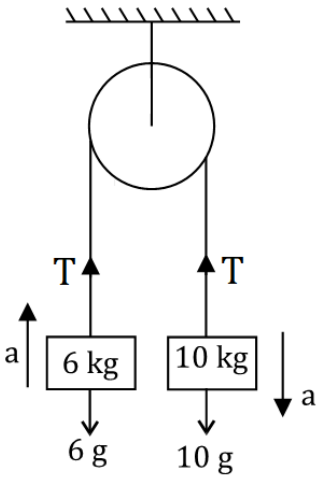
4.



log – T = 10a ....(i)

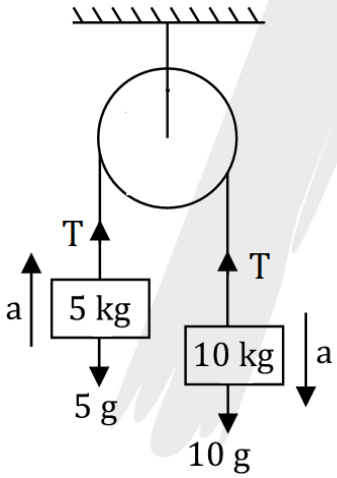
T – 6g = 6a ....(ii)

from equⁿ (i) & (ii)

4g = 16a

a = g/4

5. Equation for 10 kg block



10g – T = 10a .....(i)

Equation for 5 kg block

T – 5g = 5a .....(ii)

From equⁿ (i) & (ii)

10g – 5g = 15a = a = g/3

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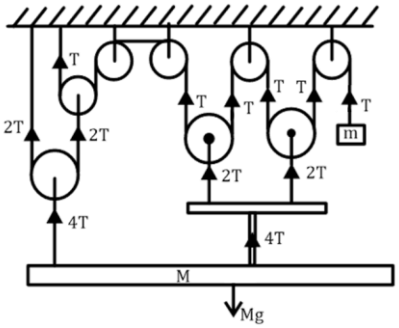
6.



For just move

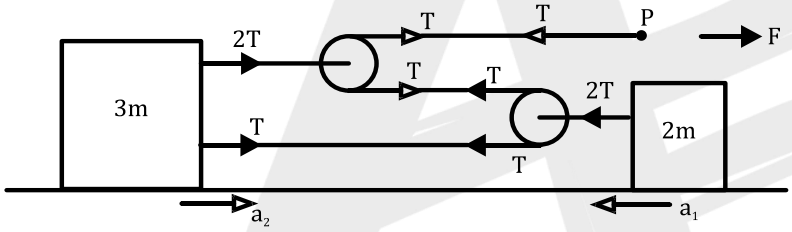
$8T \geq Mg$

$8mg \geq Mg$

$m \geq \frac{M}{8}$

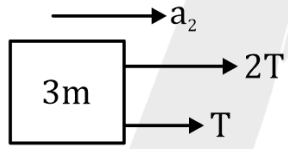
$m_{min} = \frac{M}{8}$

7.



F.B.D of 3m block

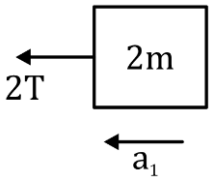
T = F



$3T = 3m\, a_2$

$a_2 = \frac{T}{m} = \frac{F}{m}$

F.B.D. of 2m block



$2T = 2\, ma_1$

$a_1 = \frac{T}{m} = \frac{F}{m}$

Net acceleration of Point P = $\frac{5F}{m}$

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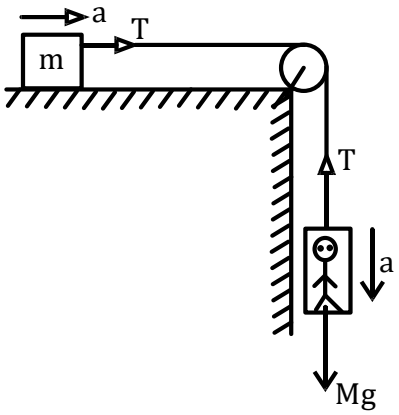
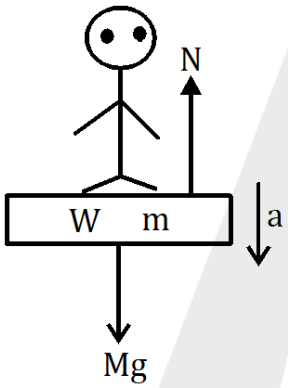
8.



$$\begin{array}{r} Mg - T = Ma \\ T = ma \\ \hline Mg = (M+m)a \end{array}$$

$$a = \frac{Mg}{(M+m)}$$

F.B.D. of man



$Mg - N = Ma$

$N = Mg - Ma$

$$N = Mg - M\frac{Mg}{(M+m)}$$

Reading of weighing machine

$$\frac{N}{g} = \left(M - \frac{M^2}{M+m}\right) = \frac{M^2 + mM - M^2}{M+m}$$

$$\text{Reading} = \frac{mM}{M+m}$$

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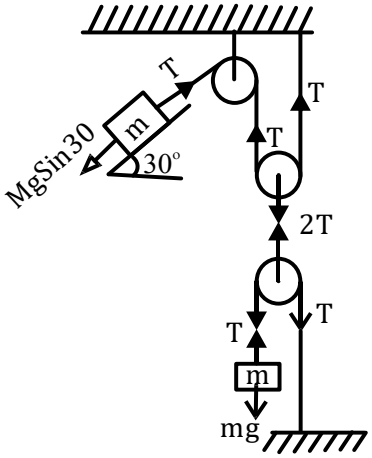
9. For equilibrium



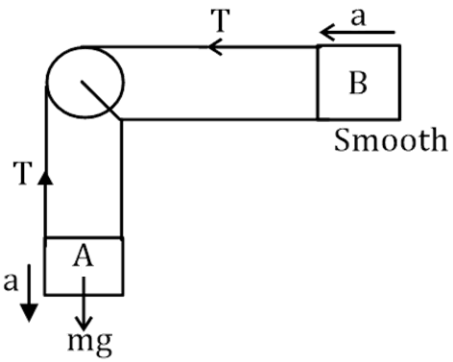
$T = mg$ ... (i)

$T = Mg\sin 30$ ... (ii)

$mg = Mg \times \frac{1}{2}$

$m = \frac{M}{2}$

10. Let moss of A is m then moss of B equal to (1-m)



Case I - when A is hanging acceleration of blocks is a

$mg - T = ma$

$T = (1 - m)\, a$

$mg = ma + a - ma$

$a = mg$ ...(i)

Case 2 - When B is hanging acceleration $\frac{a}{2}$

$T = m\,{}^{a}/_{2}$ ...(ii)

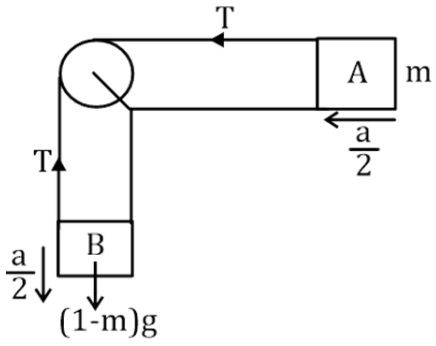
$(1 - m)g - T = (1 - m)\,{}^{a}/_{2}$

$g - mg - T = \frac{a - ma}{2}$ ...(iii)

(ii) + (iii) $g - mg = \frac{a}{2}$

$a = 2g - 2mg$

$2g - 2mg = mg \Rightarrow 3m = 2 \Rightarrow m = \frac{2}{3}$ kg



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11. F.B.D of M F.B.D of m