# FORCE & FRICTION TUTORIAL

Pg 113 5 6

Pg 114 12 14 15

Pg 116 Comprehension

Pg 122 31

Pg 123 32

Pg 126 20 ~~24~~

Pg 127 28, 30, 31, 32 —

Pg 128 4, 5, 7

Pg 129 11, 12, 13, 14

Pg 130 17, 20, 22

Pg 132 32, 33, 34

Pg 135 53, 55

Pg 137 62, 66

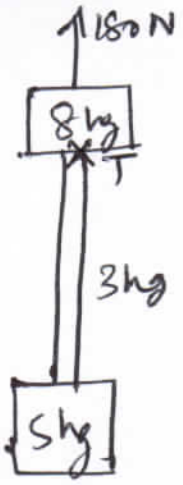
Pg 143 94, 95, 97

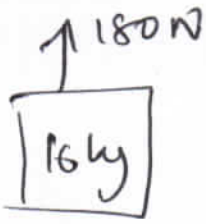
Pg 147 Comp 3, 4

(P1)

Pg 128

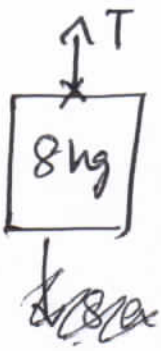
(5)




$180 - 160 = 16a.$

$a = \frac{5}{4}\ m/s^2$

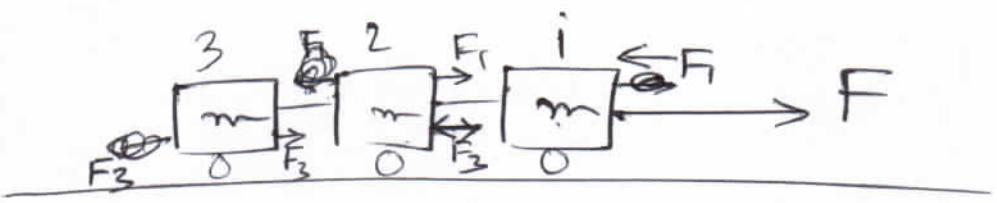



$T - 80 = 8 \times \frac{5}{4}$

$T = 80 + 10$

$= 90\ N$

(7)




$F = 3ma \qquad a = F/3m.$

$F - F_1 = ma.$

$-F_3 + F_1 = ma.$

$+F_3 = ma$

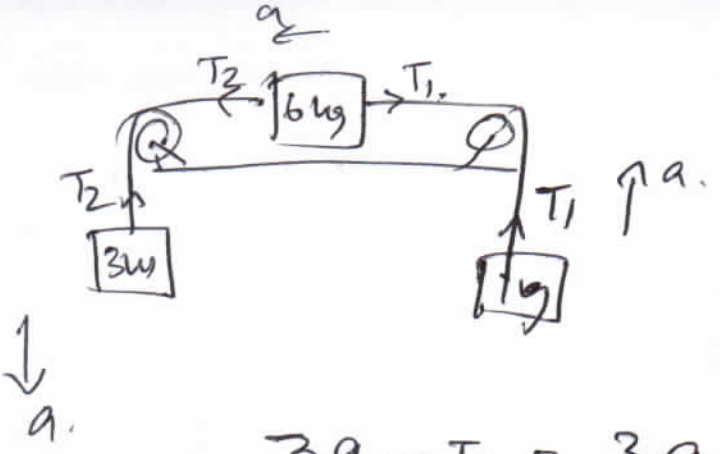
$F_3 = ma.$

$F_1 = F - ma.$ (B)

$= F - m\left(\frac{F}{3m}\right)$

$= 2F/3$

(11)




$3g - T_2 = 3a$

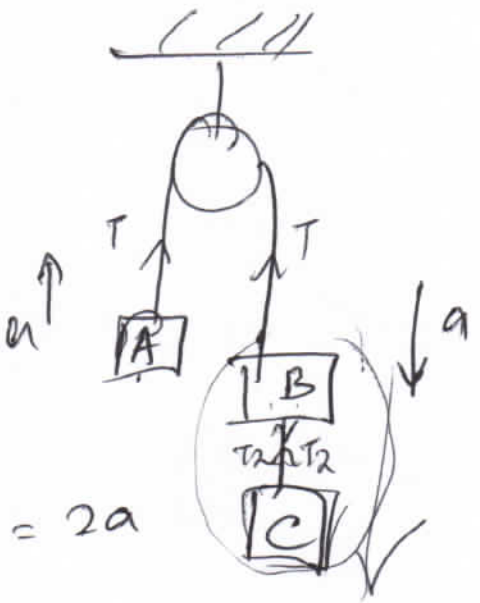
$T_2 - T_1 = 6a$

$T_1 - 1g = 1a$

$2g = 10a$

$a = 2\ m/s^2$ (B)

(12)




$T - 2g = 2a$

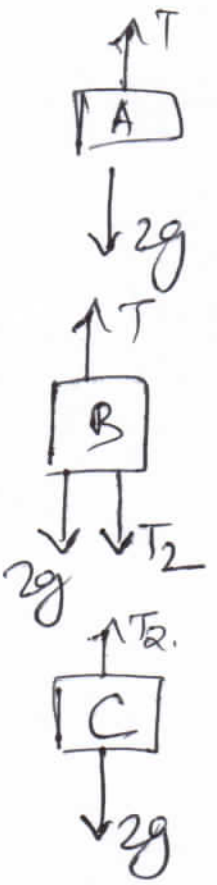
$T_2 + 2g - T = 2a$

$2g - T_2 = 2a$


$a = \frac{(m_2 - m_1)g}{m_1 + m_2}$

$= \frac{(4-2)g}{4+2}$

$= g/3$

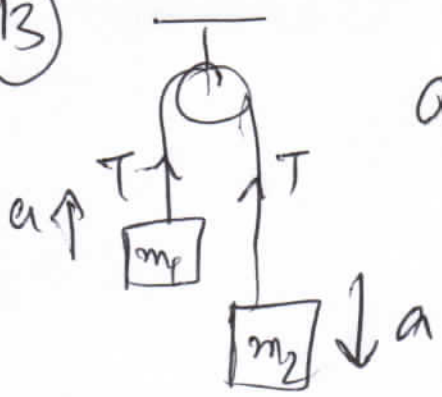



$2g - T_2 = 2g/3$

$T_2 = 2g - 2g/3$

$= 4g/3 = 40/3\ N$

(13)




$$a = \frac{g}{8} = \frac{(m_2 - m_1)g}{m_1 + m_2}$$

$$\frac{1}{8} = \frac{m_2 - m_1}{m_1 + m_2}$$

$$m_2 g - T = m_2 a$$

$$m_1 + m_2 = 8m_2 - 8m_1$$

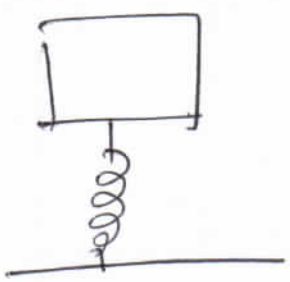
$$T - m_1 g = m_1 a.$$

$$9m_1 = 7m_2$$

$$a = \frac{(m_2 - m_1)g}{m_1 + m_2}$$

$$\frac{m_2}{m_1} = \frac{9}{7}$$ (B)

(14)



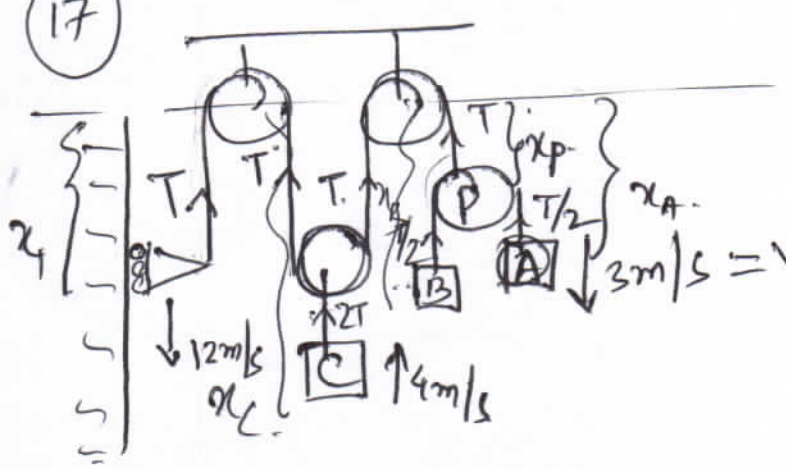
$\uparrow$

$\downarrow ma$ $= 0.5 \times 2$

$= 1N$

$25 + 1 = 26\ N$

(17)




~~$x_1 + x_c = \text{const.}$~~

$x_1 + x_c + x_c + x_p = \text{const.}$

$x_1 + 2x_c + x_p = \text{const.}$

$x_B - x_p + x_A - x_p = \text{const.}$

$x_A + x_B - 2x_p = \text{const.}$

$$V_1 + 2V_c + V_p = 0$$

$$V_A + V_B - 2V_p = 0$$

$$-12 + 2(4) + V_p = 0$$

$$V_p = 4\ m/s$$

~~$V_A = V_{AP} + V$~~

$V_A = +1\ m/s$.

~~$V_A = 3 + 4 = 7\ m/s$~~

$$1 + V_B - 2(4) = 0$$

$$V_B = 8 - 1$$

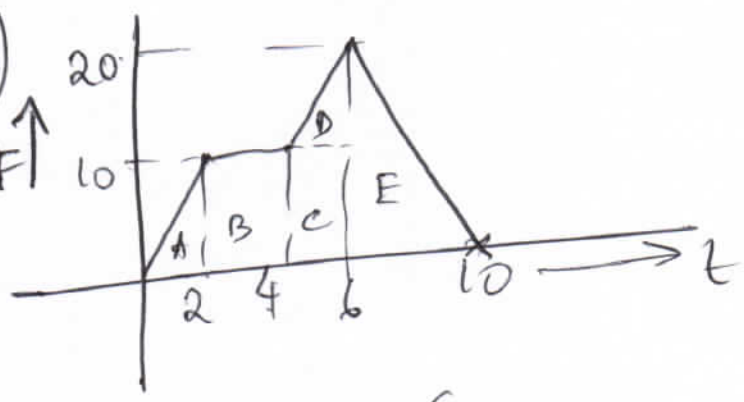
$$= 7\ m/s. \uparrow$$

~~$-7 + V_B - 2(4) = 0$~~

~~$V_B = 15\ m/s$~~

(D)

(22)




$m = 2kg$

$v_0 = 0$

$$\text{Ft Area} = \underbrace{\frac{1}{2} \times 2 \times 10}_{A} + \underbrace{2 \times 10}_{B} + \underbrace{2 \times 10}_{C} + \underbrace{\frac{1}{2} \times 2 \times 10}_{D} + \underbrace{\frac{1}{2} \times 4 \times 20}_{E}$$

$$= 100 = mv_f - mv_0$$

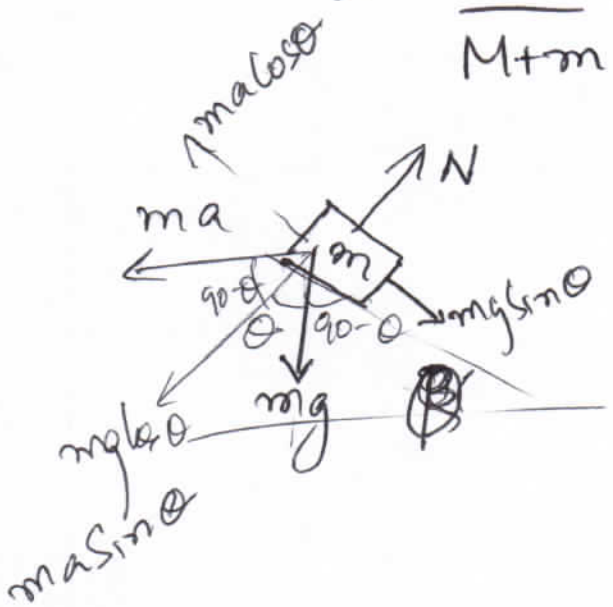
$$100 = 2 \times v_f - 2 \times 0$$

$$v_f = 50\ m/s$$

(32)

$P = (M+m)a$ ⟶

$a = \frac{P}{M+m}$




$N = mg\cos\theta + ma\sin\theta$

$ma\cos\theta = mg\sin\theta$

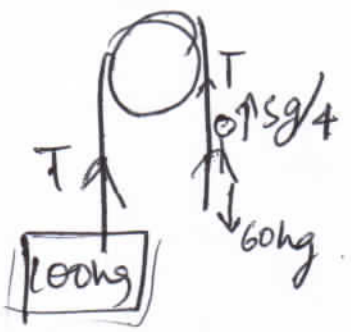
$\tan\theta = \frac{a}{g}$

$\theta = \tan^{-1}\frac{a}{g}$.

$P = (M+m)a$.

$= \underline{(M+m)g\tan\beta}$ (A)

(34)

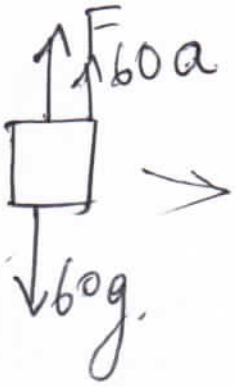



$F - 60g = 60 \times 5g/4$

$+60a$.

$F = 60(g + \frac{5g}{4})$

$= 60 \times \frac{9g}{4} = 135g$


$F - 60g + 60a = 60 \times 5g$

$F + 60a = 135g$ ①

$F - 100g = 100a$. ②

$F = 135g - 60a$

(B). $100a + 100g = 135g - 60a$

$$35g = 160a$$

$$a = \frac{35g}{160}$$

$$F = 100(a+g)$$

$$= 100\left(\frac{35}{160}+1\right)g$$

$$= 100 \times \frac{39g}{32} = \frac{3900}{32} = 1218\ N$$

(2)