yphandi - Assignment 4
(12004002 5)

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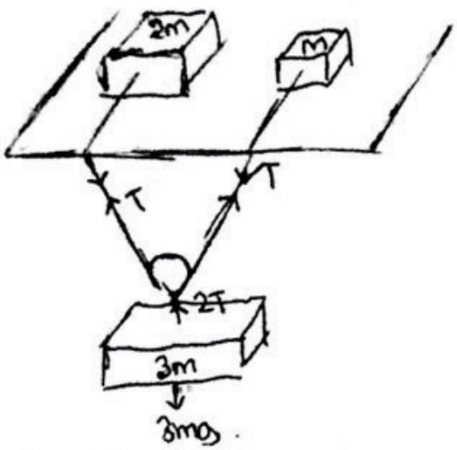


$\Rightarrow \Sigma F = m.a$

$3mg - 2T = 3m.a_3$ ...(1)

$\Rightarrow \Sigma F = m.a$

$T = 2m.a_2$ ...(2)

$\Rightarrow \Sigma F = m.a$

$T = m.a_1$ ...(3)

$\Rightarrow a_1 + a_2 = 2a_3$ ...(4)

from (2) & (3) we obtain that $a_1 = 2a_2$

substitute to (4):

$2a_2 + a_2 = 2a_3$

$a_2 = \frac{2}{3}a_3$

$a_1 = \frac{4}{3}a_3$

substitute a_1 & a_2 to (1)

$3m_1 g - 2m_1 . \frac{2}{3}a_3 - m_1 . \frac{4}{3}a_3 = 3m_1 a_3$

$3g = \frac{17}{3}a_3$

$\boxed{a_3 = \frac{9}{17}g}$

42.

x axis

$\Rightarrow \Sigma F = m.a$

$Fn \cos\theta - Fw_x = m.a$

$8600 . \cos 18° + Fw_x = 8500 . 0,12$

$Fw_x = -7000\ N$

y axis

$\Rightarrow \Sigma F = 0$

$Fn \sin\theta + Fw_y = 0$

$Fw_y = 8600 . \sin(18°) = -2600\ N$

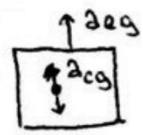
$Fw = \sqrt{Fw_x^2 + Fw_y^2} = \sqrt{7040^2 + 2660^2}\ N = \boxed{7500\ N}$

$\theta = \tan^{-1}\left(\frac{Fw_y}{Fw_x}\right) = \tan^{-1}\left(\frac{-2660}{-7040}\right)$

$= 21°$ (to the negative x-axis)

$= \boxed{201°}$ (to the positive x-axis)

46.



$\Rightarrow a_{cg} - a_{eg} = a_{ce}$

$a_{eg} = a_{cg} - a_{ce}$

$= -9,8 - (-8,3)\ m/s$

$= -1,5\ m/s^2$

$\Rightarrow \Sigma F = m.a$

$T - mg = m.a$

$T = 2000(9,8 - 1,5)\ N$

$= \boxed{16600\ N}$

24. $\Rightarrow \Sigma F = m.a$

$F_1 + F_2 = m.a$

$F_2 = m.a - F_1$

$F_2 = (2a - 30)\ N$

a. when $a = 10\ m/s^2$, $F_2 = (2.10 - 30) = \boxed{-10\ N}$ (negative x-axis)

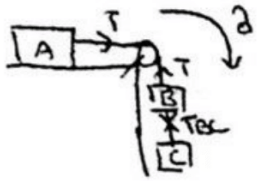
b. when $a = 20\ m/s^2$, $F_2 = (2.20 - 30) = \boxed{10N}$ (positive x-axis)

c. when $a = 0$, $F_2 = (2.0 - 30) = \boxed{-30N}$ (negative x-axis)

d. when $a = -10\ m/s^2$, $F_2 = (2.-10 - 30) = \boxed{-50N}$ (negative x-axis)

e. when $a = -20\ m/s^2$, $F_2 = (2.-20 - 30) = \boxed{-70N}$ (negative x-axis)

50.



$\Sigma F = m.a$

$m_c.g - T_{BC} = m_c.a$ ... (1)

$\Sigma F = m.a$

$T_{BC} + m_b.g - T = m_b.a$ ... (2)

$\Sigma F = m.a$

$T = m_a.a$ ... (3)

(1)+(2)+(3):

$m_c.g + m_b.g = (m_c + m_b + m_a)a$

$a = \frac{(m_b + m_c).g}{(m_a + m_b + m_c)}$

$= \frac{4}{7}.g$

$= 5,6\ m/s^2\ (\downarrow)$

2. $T_{BC} = m_c.g - m_c.a = 10(9,8 - 5,6)\ N = 42\ N\ (\uparrow)$

b. $\Delta x = v.t + \frac{1}{2}at^2$

$= 0 + \frac{1}{2}.5,6\left(\frac{1}{4}\right)^2$

$= 0,175\ m$

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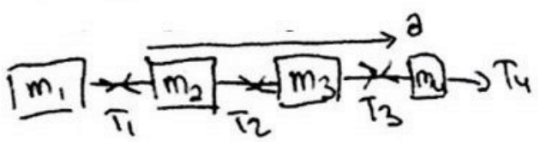


$\Sigma F = m.a$

$222 - T_3 = 20a$ ... (1)

$\Sigma F = m.a$

$T_3 - 111 = 15.a$ ... (2)

$\Sigma F = m.a$

$111 - T_1 = m_2.a$ ... (3)

$\Sigma F = m.a$

$T_{81} = 12.a$ ... (4)

(1)+(2)

$111 = 35a$

$a = \frac{111}{35}\ m/s^2 = 3,17\ m/s^2$

substitue a to (4):

$T_1 = 12.\frac{111}{35} = 38\ N$

substitute T_1 to (3):

$111 - 38 = m_2.3,17$

$m_2 = 23\ kg$

57.

$\Sigma F = m.a$

$m_2.g - T = m_2.a$ ... (1)

$\Sigma F = m.a$

$T - m_1.g.\sin\theta = m_1.a$ ... (2)

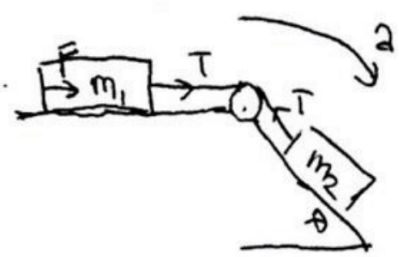
(1)+(2):

$g(m_2 - m_1.\sin\theta) = a(m_1 + m_2)$

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

$a = 0$ (since $m_2 = m_1 \sin\theta$, $4 = 8.\sin 30°$)

64.



$\Sigma F = m.a$

$T + F = m_1.a$ ... (1)

$\Sigma F = m.a$

$m_2.g.\sin\theta - T = m_2.a$ ... (2)

a. (1)+(2):

$m_2.g.\sin\theta + F = a(m_1 + m_2)$

$1.9,8.\sin 30° + 2,3 = a(1,0 + 2,5)$

$a = 2,1\ m/s^2$

$T = m_2(g.\sin\theta - a)$

$= 1(4,9 - 2,1)$

$= 2,8\ N$

b. when T = 0

$\rightarrow F = m_1.a$ ... (1)

$\rightarrow m_2.g.\sin\theta = m_2.a$ ... (2)

from (1) & (2):

$F = m_1.g.\sin\theta$

$= 2,5.9,8\ \sin(30°)$

$= 12\ N$