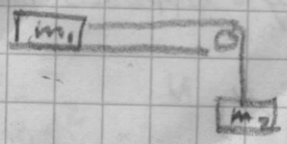
Smart Physics 05 HW: Free body

4) $m_1 = 5.3$ kg $\quad m_2 = 3.2$ kg



1) $a_1 = ?$

$\Sigma F_1 = -T$

$\Sigma F_2 = -m_2 g + T$

$\Sigma F = m_2 g$

$m_2 g = (m_1 + m_2) a$

$a = 3.689\ m/s^2$

2) $T = ?$

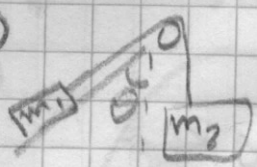
$\Sigma F_2 = -m_2 g + T$

$-m_2 g + T = m_2 \cdot 3.689$

$T = 6.110588\, m_2$

$T = 19.55368\ m/s^2$

3)



$a_1 = ?$ $\quad \theta = 68°$

$\Sigma F_2 = m_2 g - T_4$

$\Sigma F_1 = -m_1 g \cos 68° + T_4$

$\Sigma F = m_2 g - m_1 g \cos 68°$

$3.2(9.8) - 5.3(9.8)\cos 68° = (m_1 + m_2) a$

$11.9029 = 8.5a$

$a = 1.40034\ m/s^2$

4) $a = 0 \quad \theta = ?$

$3.2(9.8) - 5.3(9.8)\cos\theta = 8.5a$

$3.2 - 5.3\cos\theta = 0$

$5.3\cos\theta = 3.2$

$\cos\theta = 0.60377$

$\theta = 52.851°$

5) $\theta = 26° \quad 3.2(9.8) - 5.3(9.8)\cos 26° = 8.5a$

$a = -1.8027\ m/s^2$

6) Tension in each case

$68°$: $\Sigma F_2 = m_2 g - T$ $\quad m_2 g - T = 3.2(1.40)$

$T = 26.87\,N$

$26°$: $\Sigma F_2 = m_2 g - T$ $\quad m_2 g - T = 3.2(-1.8027)$

$T = 37.1267\,N$

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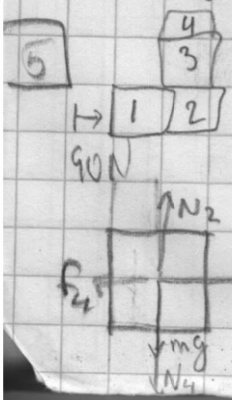

$90 = 40a$

$a = 2.25\ m/s^2$

$f_2 = 2 f_4$

$f_2 = 45\,N$

$N_2 = 9.8 \times 20 = 196\,N$

$\sqrt{196^2 + 45^2} \approx 201.0994\,N$