Answer on Question #71729-Physics-Other

Two blocks are connected by a string over a frictionless, massless pulley such that one is resting on an inclined plane and the other is hanging over the top edge of the plane, the hanging block has a mass of 16 kg, and the one on the plane has a mass of 8 kg. the coefficient of kinetic friction between the block and the inclined plane is 0.23. the block are released from rest. What is the acceleration of the blocks?

Solution
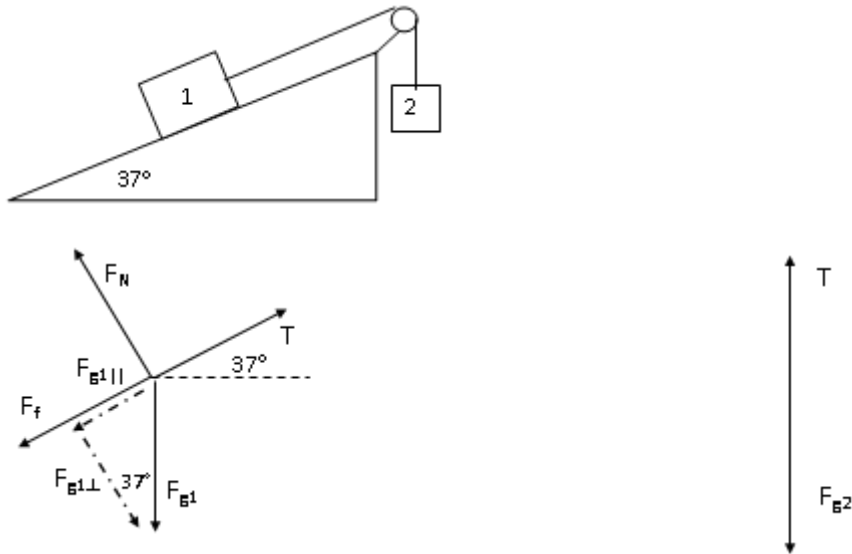
For mass 1:

$$T - F_f - F_{g1\parallel} = m_1 a$$

$$F_N - F_{g1\perp} = 0$$

$$T - \mu m_1 g \cos\theta - m_1 g \sin\theta = m_1 a$$

For mass 2:

$$F_{g2} - T = m_2 a$$

$$m_2 g - T = m_2 a$$

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

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

$$a = \frac{m_2 g - \mu m_1 g \cos\theta - m_1 g \sin\theta}{m_1 + m_2} = \frac{(16)(9.8) - .23(8)(9.8)\cos 37 - 8(9.8)\sin 37}{(8 + 16)} = 4\frac{m}{s^2}$$

Answer: $4\frac{m}{s^2}$

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