3.3 Inclines (part 2)

Last class we dealt with a single mass on an incline. What happens if we look at 2 masses tied together on these incline planes?

Which direction will the system (2 masses) move? Draw your FBDs!!

Calculate which force is stronger, \( F_{gx} \) or \( F_{gy} \)?

\[
F_{gx} = 6g \sin 35^\circ = 33.7 \text{ N}
\]
\[
F_{gy} = 4g = 39.2 \text{ N}
\]

Ex. 1:

a) Calculate the acceleration of the masses.

\[ a = g - 6g \sin 35^\circ = 0.35 \text{ m/s}^2 \text{ to the right} \]

b) Find the tension in the rope.

Ex. 2: What if there is friction? If the coefficient of friction on the ramp is 0.15, calculate:

a) The acceleration of the masses

\[ m_1 a = 4g - 6g \sin 35^\circ - \mu m_1 g \]
\[ a = \frac{4(9.8) - 6(9.8) \sin 35^\circ - 0.07(6)(9.8)}{10.11} = 10.11 \text{ m/s}^2 \text{ to the right} \]

b) The tension in the rope

Ex. 2: What if there is friction? If the coefficient of friction on the ramp is 0.15, calculate:

a) The acceleration of the masses

\[ m_1 a = 4g - 6g \sin 35^\circ - \mu m_1 g \]
\[ a = \frac{4(9.8) - 6(9.8) \sin 35^\circ - 0.07(6)(9.8)}{10.11} = 10.11 \text{ m/s}^2 \text{ to the right} \]

b) The tension in the rope

Key strategies:

1. Find which mass is the “winner” in the tug-o-war.
2. Force of friction acts against the object’s direction of motion.
3. You can analyze the entire system or only analyze one mass at a time to write your \( F_{\text{net}} \) equations.

HW: Worksheet 3.3 ALL