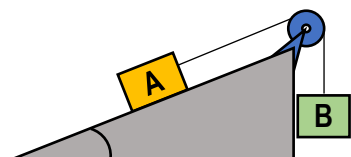


CONCEPT: CONNECTED OBJECTS ON INCLINED PLANES WITH FRICTION

- Some problems will combine **multiple** objects on ramps with friction! Usually, you'll know which kind of friction is acting.
 - To solve, use all the problem-solving steps for systems of objects, inclined planes, and friction.

EXAMPLE: Two blocks are connected by a cable & massless pulley. Block B pulls Block A, which moves up the 30° incline. Block B weighs 100N ($m_B = 10.2\text{kg}$), block A weighs 40N ($m_A = 4.1\text{kg}$). If $\mu_k = 0.15$, find the acceleration of the system.

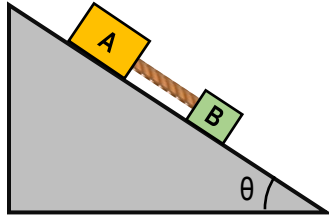


CONNECTED OBJECTS + INCLINED PLANES + FRICTION

- 1) Draw FBD for all obj's, choose direction of +
- 2) Determine if $f = f_s$ or f_k from text or:
If ΣF_s on axis of motion $> f_{s,\text{max}}$, $f = f_k$
- 3) Write $\Sigma F = ma$, start with simplest (fewest F_s)
- 4) Solve a (EQ Addition / Substitution)
- 5) Plug a into eq's, solve other targets if needed

PROBLEM: Two blocks made of different materials, connected by a string, slide down a 30° inclined plane. Block A has mass 8kg, and the coefficient of kinetic friction between Block A and the incline is 0.35. Block B has mass 4kg, and the coefficient of friction between block B and the plane is 0.25. After the blocks are released, find the tension in the cord.

- A) 1.23 N
- B) 2.21 N
- C) 1.67 N
- D) 2.28 N

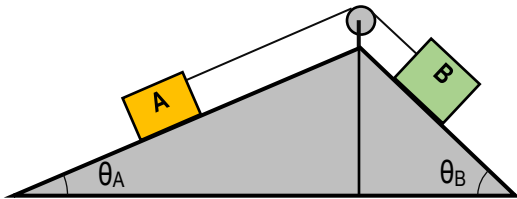


CONNECTED OBJECTS + INCLINED PLANES + FRICTION

- 1) Draw FBD for all obj's, choose direction of +
- 2) Determine if $f = f_s$ or f_k from text or:
If ΣF_s on axis of motion $> f_{s,max}$, $f = f_k$
- 3) Write $\Sigma F = ma$, start with simplest (fewest Fs)
- 4) Solve **a** (EQ Addition / Substitution)
- 5) Plug **a** into eq's, solve other targets if needed

PROBLEM: Two blocks, A and B, sit on back-to-back rough inclined planes and are connected to each other by a cable. The angles of the planes are $\theta_A = 15^\circ$ and $\theta_B = 30^\circ$. The masses of the blocks are $m_A = 2\text{kg}$ and $m_B = 5\text{kg}$, and $\mu_k = 0.2$. When the blocks are released from rest and begin moving, what is the magnitude of their acceleration?

- A) 2.47 m/s^2
- B) 1.02 m/s^2
- C) 3.45 m/s^2
- D) 10.5 m/s^2



CONNECTED OBJECTS + INCLINED PLANES + FRICTION

- 1) Draw FBD for all obj's, choose direction of +
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If ΣF_s on axis of motion $> f_{s,\text{max}}$, $f = f_k$
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