

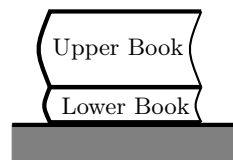
Studio 5: Interacting Systems

Announcements

- Homework will now be turned in on Gradescope.
 - Feedback will be viewable directly on Gradescope.
 - Feedback PDFs generated by Gradescope will be attached to the assignment in Canvas (so you will still be able to get feedback the way you did before, if you prefer).
 - Starting **next week**, Get-Ready assignments will also be submitted on Gradescope.
-
-
-

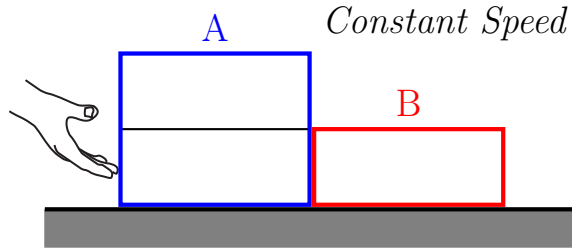
S5-1: Book Stack

- The stack of books below is sitting in an elevator. Consider the following situations:
 - (A) The elevator is at rest.
 - (B) The elevator is moving downward at a constant velocity.
 - (C) The elevator is accelerating upward.
- For each situation:
 - Draw a free-body diagram for each book.
 - Identify all third-law pairs.
 - Determine if any forces are equal in magnitude.



S5-2: Moving Bricks I

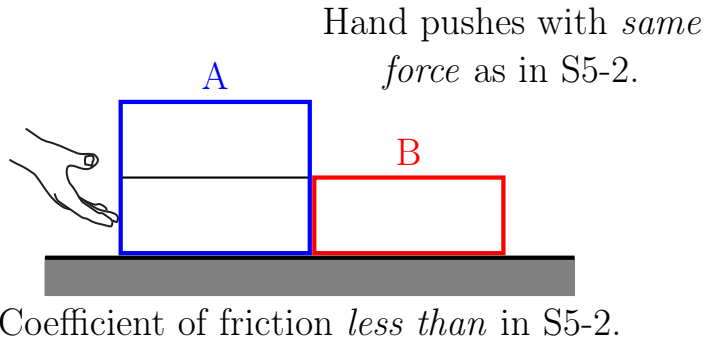
- Three identical bricks are pushed across a table at *constant speed* as shown. The hand pushes horizontally. There is friction.



- System A is the left (stacked) bricks, and system B is the right brick.
 - Compare the *net force* on system A to that on system B.
 - Draw separate free-body diagrams for system A and system B.
 - Identify all of the Newton's third law (action-reaction) force pairs.
 - Rank the *horizontal* forces by magnitude, from largest to smallest.
 - Explain how you used Newton's laws.

S5-3: Moving Bricks II

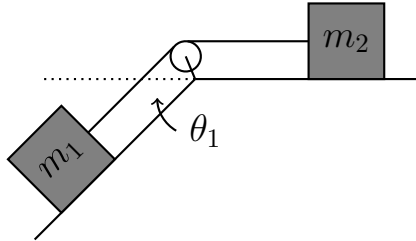
- The hand still pushes horizontally, but the coefficient of friction is less than it was in S5-2.



- How does the motion of the blocks change, if at all?
- Compare the *net force* on system A to that on system B. –
- Draw separate free-body diagrams for system A and system B.
- Rank the *horizontal* forces by magnitude, from largest to smallest. (Is it possible to rank the horizontal forces *completely*?)
- Explain how you used Newton's laws. –

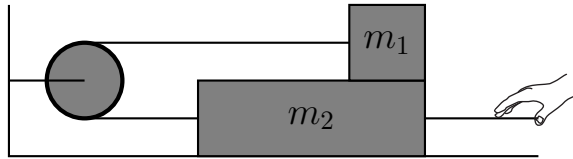
S5-4: Angled Ramp

- Draw separate free-body diagrams for both objects in the situation below.
 - Assume there is friction between all blocks and surfaces.
 - Assume each system accelerates from rest.
- Identify all of the Newton's third law (action-reaction) force pairs.



S5-5: Horizontal Pulley

- Draw separate free-body diagrams for both objects in the situation below.
 - Assume there is friction between all blocks and surfaces.
 - Assume the strings and the pulley are ideal.
 - Assume each system accelerates from rest.
- Identify all of the Newton's third law (action-reaction) force pairs.



Main Ideas

- Newton's 3rd law of motion can be used to relate the forces acting on *different* objects or systems.