Learn about engineering techniques used for lifting heavy objects—even buildings! **Pulleys** are simple machines that can accomplish very complex tasks, while **cribbing** is a lifting and stabilizing process that is used not only in construction, but also in fire and rescue endeavors. Here, you will use ordinary household objects to think creatively and design your own lifting project.

**RECOMMENDED AGE/SKILL LEVEL:**

Recommended for 8+ with adult supervision for hot glue or wire work.

**MATERIALS**

- Cribbing material (ie: jenga, dominos, chopsticks, cardboard, etc.)
- Pulley (ie: thread bobbin, the center tube in a roll of dog waste bags, ribbon spool, etc.)
- Pulley frame (ie: found objects, small dowels, legos, popsicle sticks, or other longer, sturdy material)
- Pulley axle (ie: dowel, metal rod, chopstick, etc.)
- String
- Scissors
- Hot glue or strong tape
- Heavy object to be lifted
ENGINEERING EXPERIMENTS

INSTRUCTIONS

• Construct the sturdy frame for your pulley. This frame will need to withstand force. Brace the frame by attaching it to a sturdy, stable object (wooden cigar box shown).

• A cylinder with a hole in the middle will act as your pulley. If you have a cylinder, but it has no edges to keep the string on, you can create a barrier by using glue or tape applied around the cylinder edges.

• Thread a sturdy dowel or other material through the hole to act as an axle. Use glue or tape to securely attach the axle to either side of the pulley frame.

• Once your pulley is secured, tie one end of your string around a heavy object. Try lifting it without the pulley first.

  TIP: You can also place your heavy object inside of a bag or bucket with handle, making it easier to tie the string to.

• Wind the string around your pulley, and pull downwards. This should make it easier and smoother to lift.

• Next, as you raise the heavy object, insert cribbing below, layer by layer.

  ° How high can you make the cribbing while keeping your object stable?

  ° What sorts of materials do you imagine could be used for real-world cribbing?
This cribbing is made from gift boxes, placed one on top of the other, at 45° angles.

This cribbing uses popsicle sticks to keep the heavy object stable.

**ADDITIONAL RESOURCES**

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