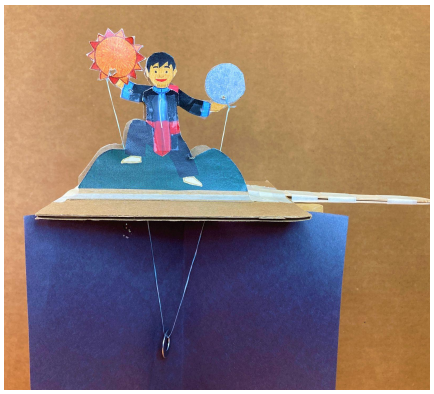
YOU'RE AN ENGINEER!

ENGINEER A STORYTELLING DEVICE

When you are listening to a story, or reading one to yourself, do you see pictures of what is happening in your head? Maybe you drew or painted those pictures and wished they would come to life.

People in cultures from all parts of the world have used devices to do exactly that! These devices can be used to tell stories in memorable and entertaining ways.

This guide gives pictures and diagrams for engineering three different storytelling devices. Each kind of device moves a different way. You'll learn the physics behind the devices and see how they work as you design and create your device.



You can use your device to show scenes from two traditional Hmong folktales, "Why Farmers Carry Their Crops" and "Sun and Moon". Science Museum employees worked with Hmong writers and artists to develop videos and artwork for this project.

THINKING LIKE AN ENGINEER

Learn: Look at the drawings in this guide to understand how the parts of the devices work together. Watch the online videos to learn how the different devices move and to find out some helpful tips.

Design: Decide the type of motion you want your device to have and which story scene to show. Develop your own illustrations or choose pieces from the provided artwork.

Create: Build it!

Test it: Try it! Ask someone else to try it too.

Your device may not do exactly what you wanted. Keep thinking like an engineer and make improvements. If it works the way you imagined, what can you do to upgrade it?

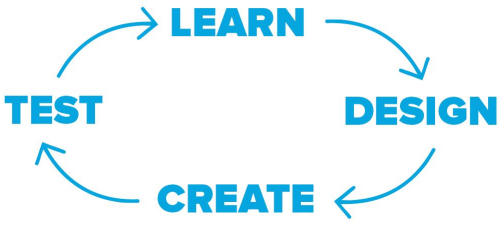
Learn: If you want part of the device to work differently, you don't have to start over. Maybe only one part needs changing. Study it and figure out what's going on.

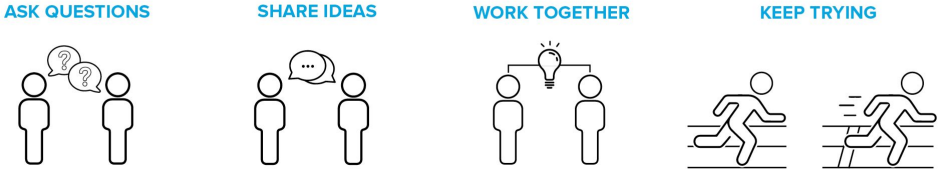
Design: Look at your materials and decide how to use them to change that part.

Create: Now make your changes. You may have to do this a few times - and that's engineering!

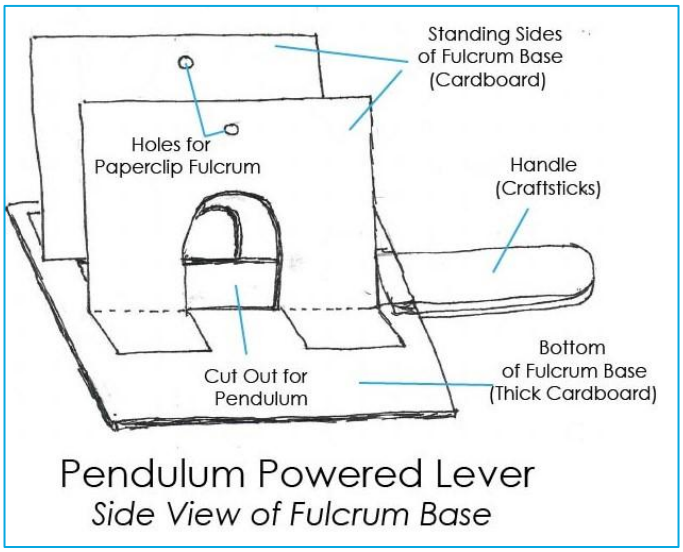
Test it: Observe what's happening, or not happening.

The important things about engineering is to Keep At It. Every time you go through this engineering design process, you'll practice skills and create something amazing!

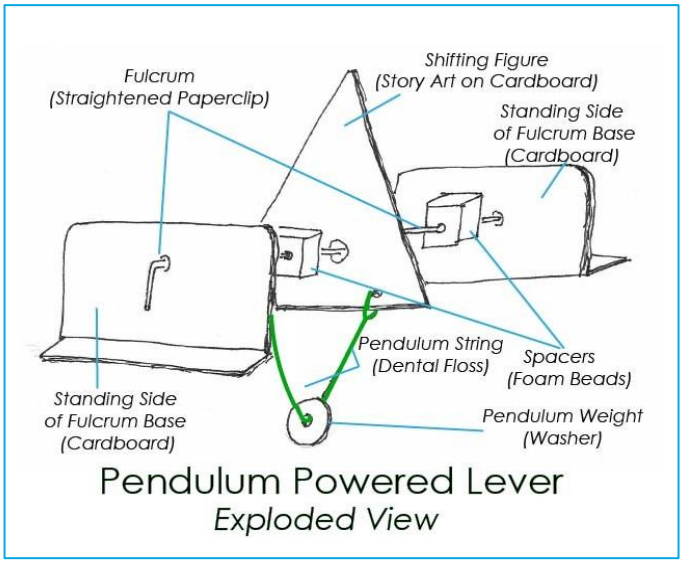




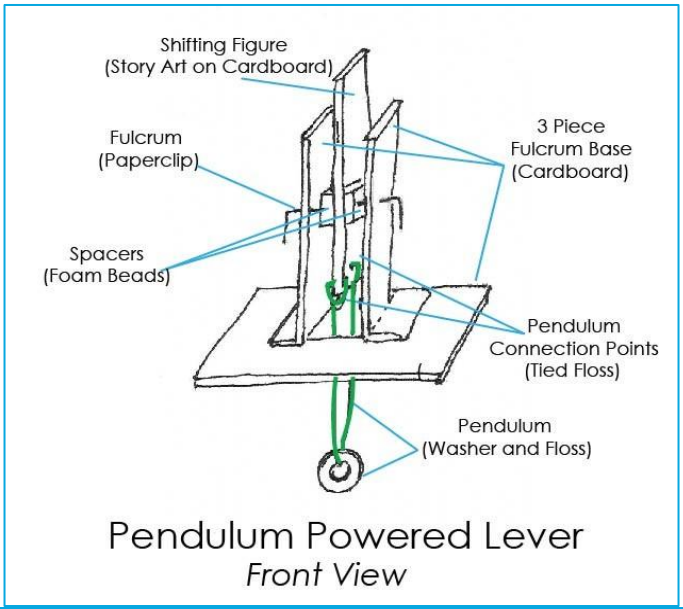
PENDULUM POWERED LEVER DEVICE



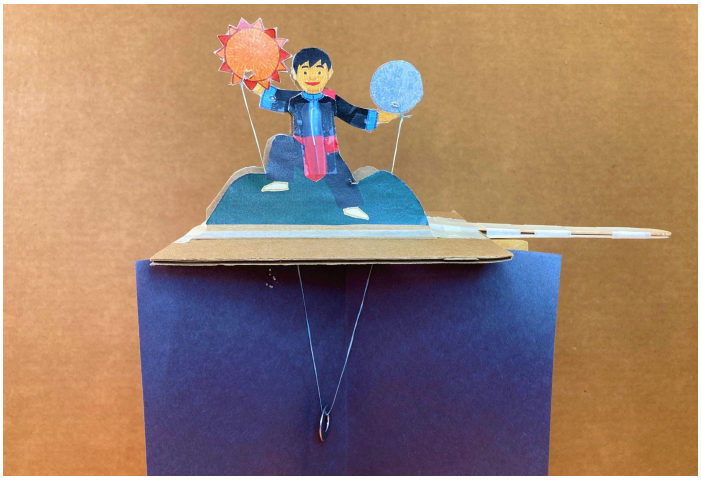
Pendulum Powered Lever
Side View of Fulcrum Base



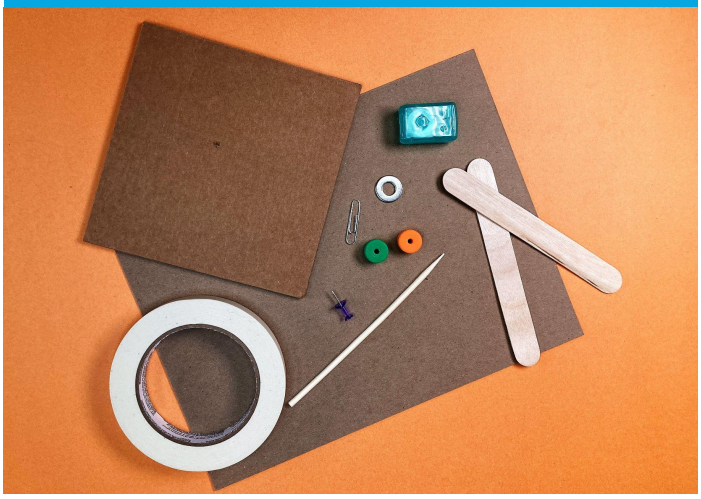
Pendulum Powered Lever
Exploded View



Pendulum Powered Lever
Front View



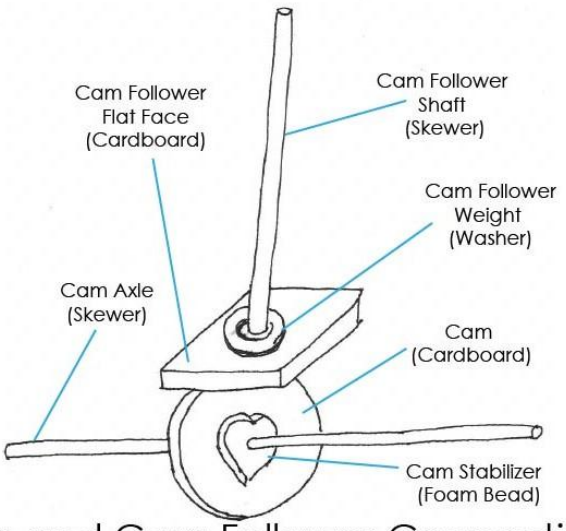
Possible Material & Tools



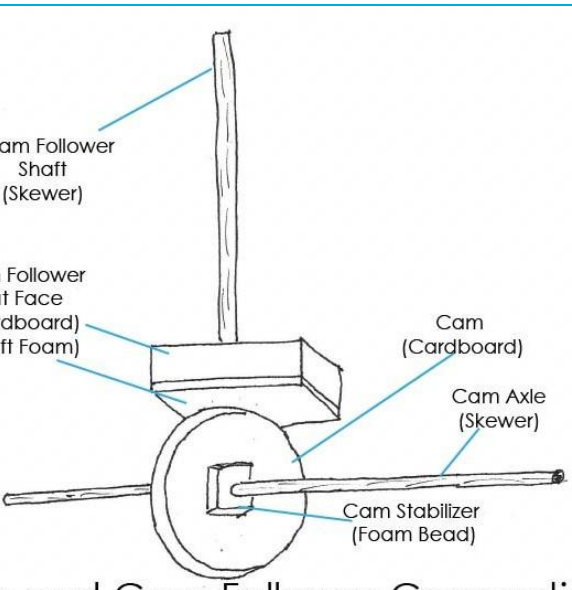
Device Physics

- The lever (moving figure) rotates around a paperclip fulcrum.
- The paperclip fulcrum is held in place by a 3-piece fulcrum base with two sides standing up on a flat base.
- The pendulum is attached to the front and the back of the lever.
- The movement of the pendulum shifts the weight of the lever, causing it to rock back and forth.

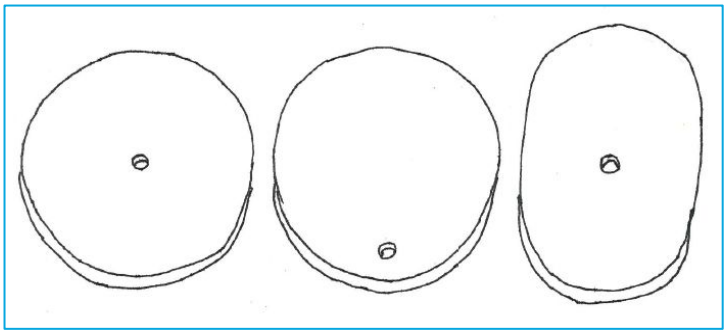
CAM AND CAM FOLLOWER DEVICE, page 1

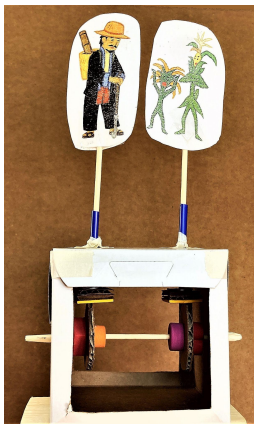


Cam and Cam Follower Connection
Top View

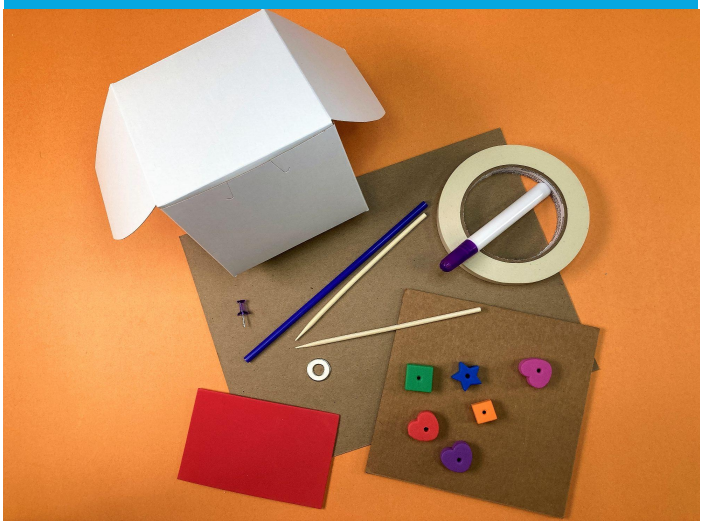


Cam and Cam Follower Connection
Bottom View





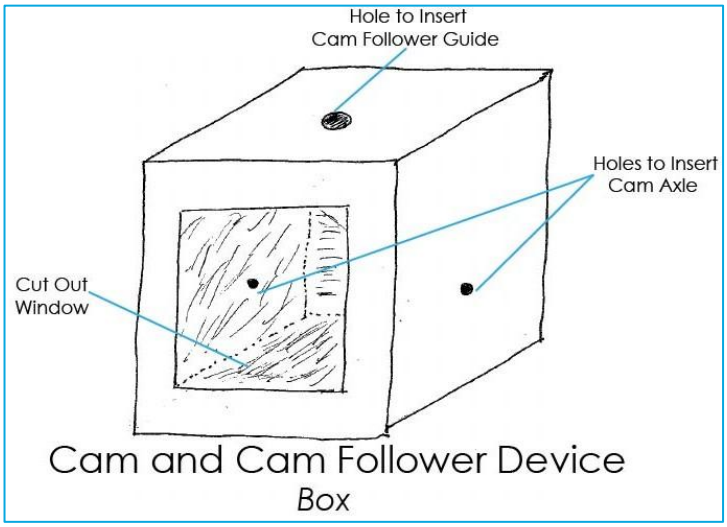
Possible Material & Tools



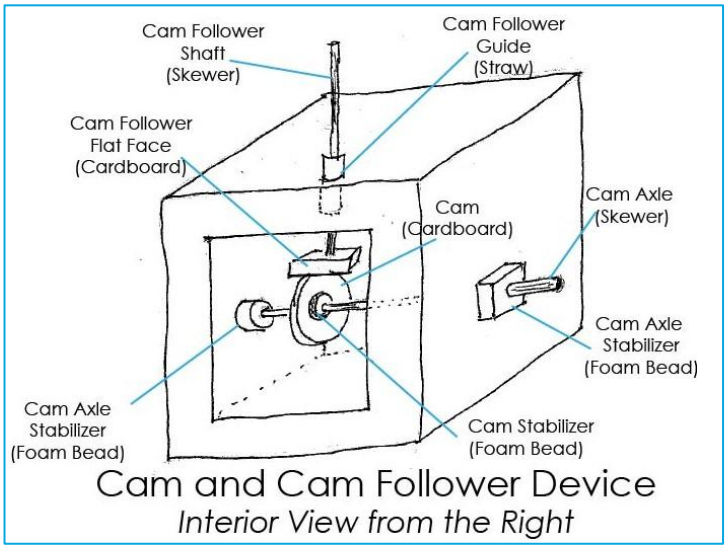
Device Physics

- The cam follower sits on the cam. When the cam moves, it moves the cam follower. This arrangement produces different motions. Your cam follower can spin, go up and down, or do both at the same time.
- Round cams with a center axle touching the cam follower off to the side will spin the cam follower.
- Round cams with an off-to-the- side axle, or oval cams with a center axle, make the cam follower go up and down.

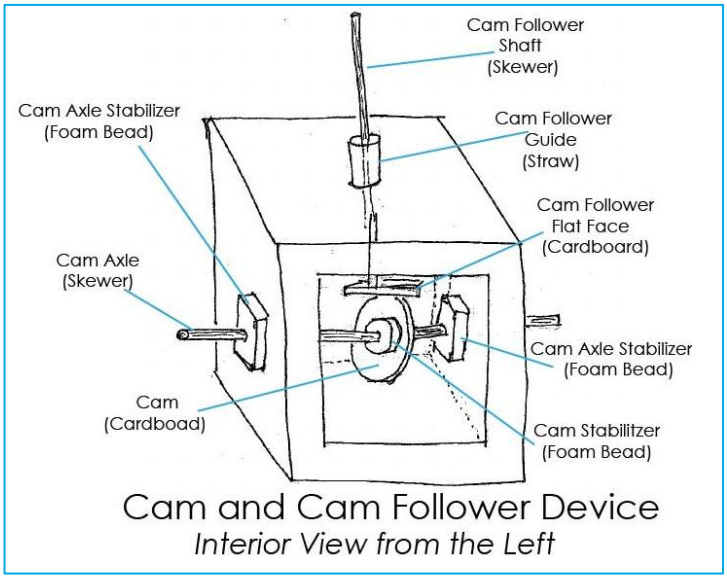
CAM AND CAM FOLLOWER DEVICE, page 2



Cam and Cam Follower Device
Box



Cam and Cam Follower Device
Interior View from the Right

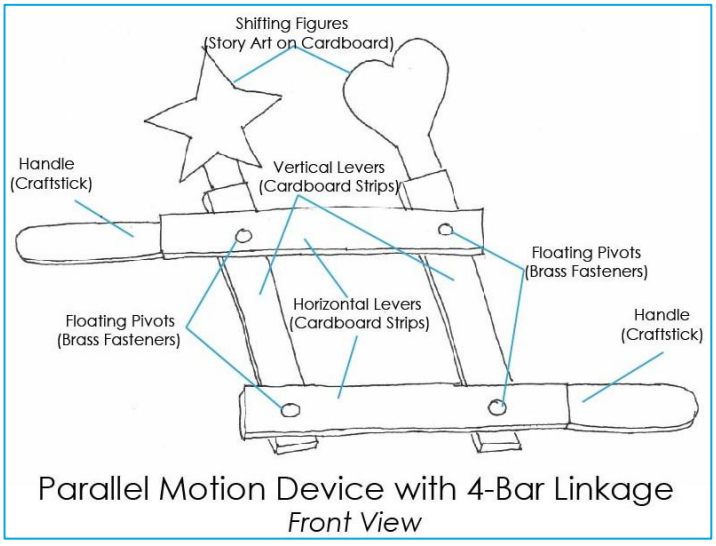


Cam and Cam Follower Device
Interior View from the Left

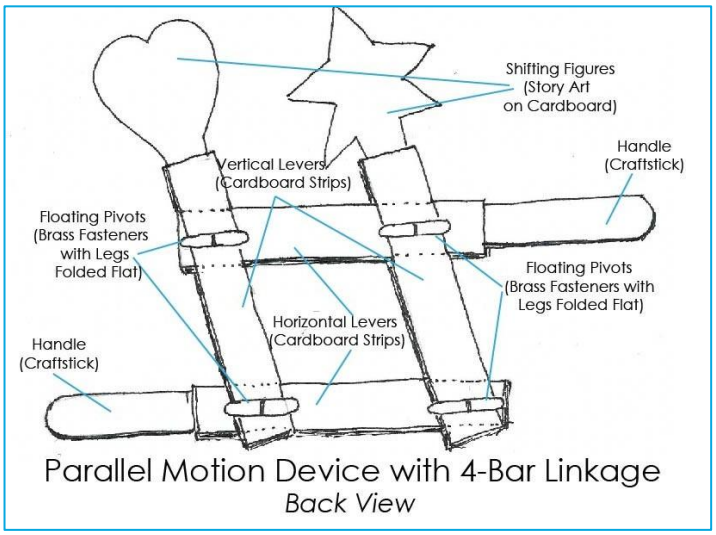
Building Tips

- A guide made from a short piece of drinking straw can keep the cam follower from wobbling or falling off the cam.
- The cam follower might need more weight to keep it in place.
- Foam beads can be used to hold the axle, cam and cam follower steady.
- As the engineer, you are designing what motion the cam and cam follower will produce.

PARALLEL MOTION DEVICE WITH 4-BAR LINKAGE

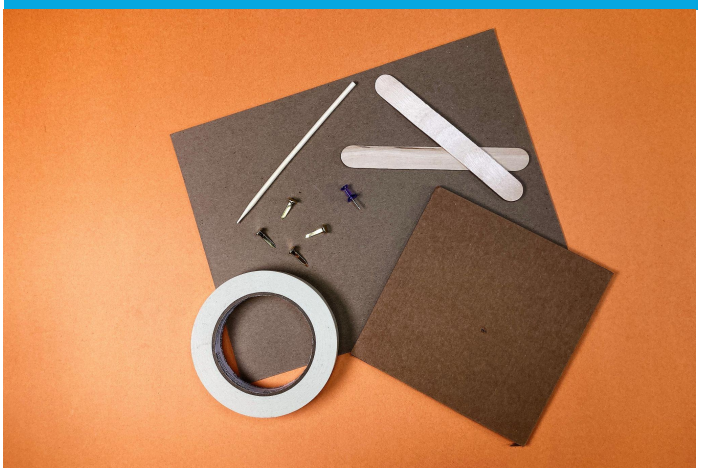


Parallel Motion Device with 4-Bar Linkage
Front View



Parallel Motion Device with 4-Bar Linkage
Back View

Possible Material & Tools



Device Physics

- Cardboard strips placed in a rectangle shape act as levers. Two of these cardboard strips will be placed horizontally. The other two will be placed vertically.
- The brass fasteners connect the cardboard strips and act as floating pivots that these levers rotate around.
- Push and pull forces on the horizontal levers transfer force to the vertical levers to move the story figures.