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# Linkages



*Build a mechanism to create a whimsical, repetitive motion. Different linkages can create different motions.*

**Related exhibits:** Linkage exhibits

**Time:** 20-30 minutes

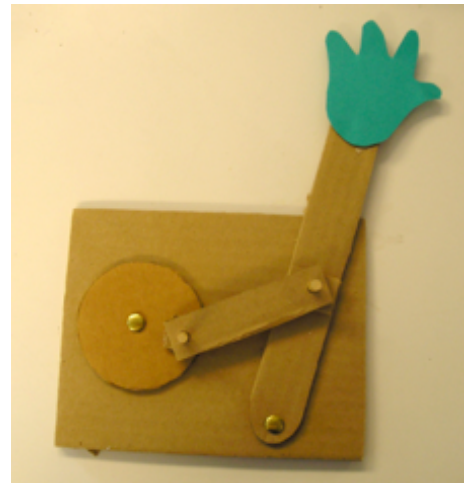
**Ages:** ages 8 and up

**Staffing:** Museum Educator

**Safety:** no issues

**Materials:**

- Cardboard rectangles (roughly 5" x 7"), one per person
- Cardboard circles (2" - 4" diameter), one per person
- Cardboard strips (1" x 12"), two per person
- Brad fasteners, 2+ per person
- 1/4 inch dowels (1 1/2" long), 2 per person
- Index cards
- Markers
- Masking tape
- White glue
- Hole punch
- Scissors
- Small cardboard pieces



**Procedure:**

1. A spinning motion can be turned into a variety of actions. Decide which mechanism you would like to make and assemble the needed pieces. (See the attached diagrams.)
2. Punch a hole in the circle near the edge and place a piece of tape over the bottom of the hole (this will help hold the wooden dowel in place that is used to spin the circle and prevent it from poking out the backside).
3. Glue dowel into the hole in circle. Punch a hole into one or two small (1"x1") pieces of cardboard and glue over dowel onto the circle (this will provide extra support and allow for clearance of the linkages over the brad).
4. Attach the circle to the large cardboard piece with a brad fastener.
5. Cut linkage(s) to size, punch hole in one end, and place over dowel (unless making a quick return model, see attached diagrams). Brads or dowels can connect linkages together.
6. Some mechanisms require pieces of cardboard to be glued to the main board to act as guides for the linkage.
7. Use the index cards and markers to create a whimsical object to attach to the top of your linkage. For example, the crank and slider could be a jumping frog, the crank a waving hand, the piston a jack-in-the-box, etc.

**Questions to Ask:**

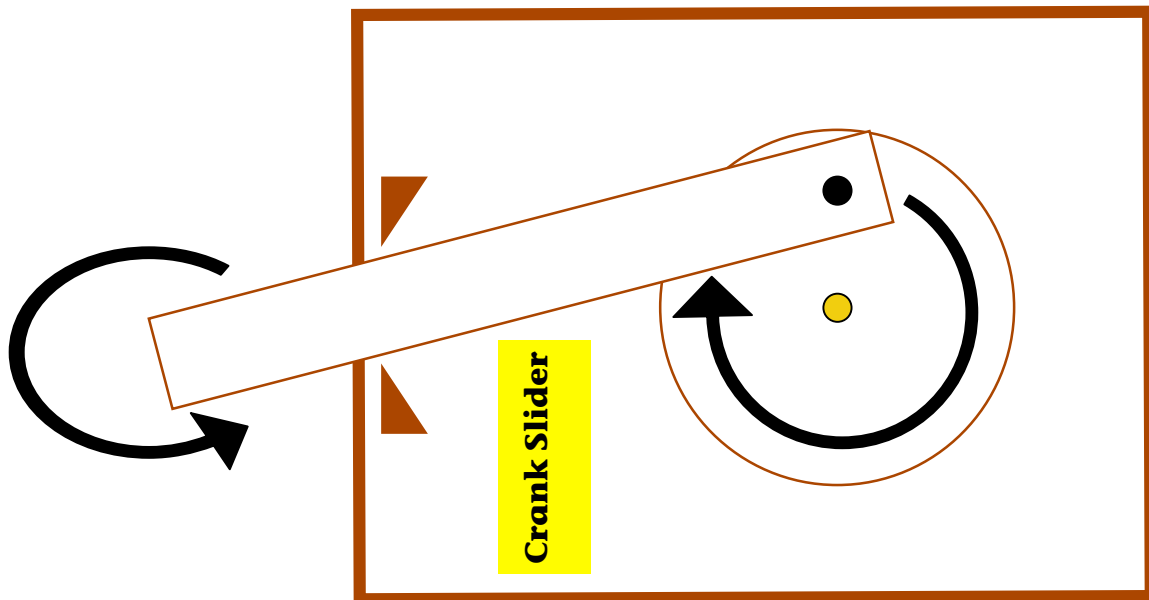
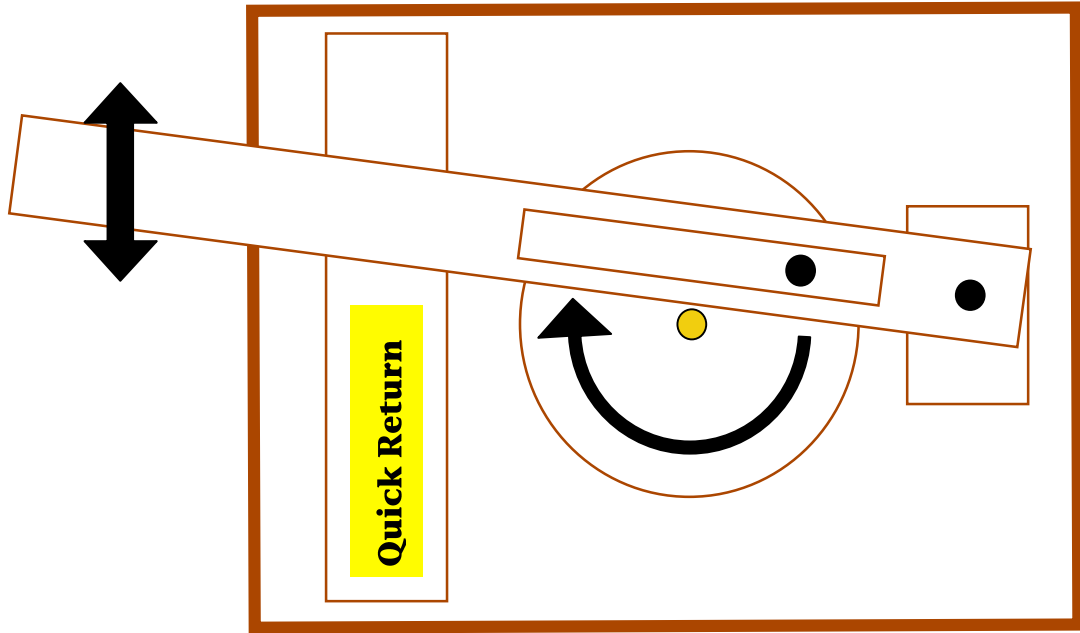
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Would it make a difference if you attached your linkage to a different part of the crank? How would the movement change?



**Science Content:**

Linkages, found in a variety of toys and mechanical items, are helpful in changing the direction of motion.



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## TOYS: The Inside Story

Montshire Museum of Science  
Norwich, Vermont

