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## Cam Toys



Explore cams with your students as they make their own moving toy. This activity also requires students to troubleshoot as they design.

**Time:** 30-60 minutes

**Safety note:** This activity requires the use of hot glue. Students should be supervised when using.

### Materials:

- Blue insulating foam, cut into approximately 4 x 8 inch pieces
- Straws
- 1/4 inch dowels, 4 inches long
- 3/16 or 1/8 inch dowels, 6 inches long
- 1/4 inch craft foam, cut into 3x3 inch pieces
- Index cards
- Colored card stock
- Scissors
- Tape
- Hot glue
- Markers



### Procedure:

1. Poke a hole in the blue foam with a pencil about 2 1/2 inches from the bottom.
2. Cut a length of straw and insert it into the hole, so that the straw sticks out a little bit.
3. Make the cam: cut the foam into a circle or oval by trimming the corners slightly. Have templates available so participants make an appropriately sized and shaped cam.
4. Poke an off-center hole in the cam and insert on the 1/4 inch dowel. Add a dab of hot glue to secure the cam.
5. Insert this dowel through the straw in the blue foam.
6. Make the cam follower: glue a 1x1 inch piece of card stock (the “foot”) to one end of the narrower dowel. Use the hot glue and hold while it dries to keep the dowel straight.
7. Fold an index card in half and fold the up edges slightly, making a little tent that can be taped onto the top of the blue foam. Tape a small piece of straw inside the center crease.
8. Slide the cam follower dowel through this straw so that the cardstock foot rests on the cam.
9. Add something fun to the top of the cam follower dowel and the front to create a scene.

**Troubleshooting:** At this point you should have a fine-looking cam toy, but does it work?

- Check your cam for any weird bumps that cause it not to spin smoothly. Trim those. If you are still having problems, try adding scotch tape to the edge of the foam to reduce friction even more.
- Is the cam staying in the correct spot to hit the foot directly? Add a tab of tape so that this dowel can't slide back and forth.

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- This cam often creates motion up and down and around in circles.  
How can you prevent the circular motion?



**Questions to Ask:**

How does the shape of the cam affect the different motions? If the cam is circular and its dowel is attached right in the center, what sort of motion do you get? What happens if the dowel is attached off-center?

**Science Content:**

A cam rotates on a shaft and is often an off-center circle or oval or an irregular shape. Cams translate rotational motion into linear motion. Cams are found not only in toys but also in the combustion engine and sewing machines.

**Other Resources:**

*The Way Things Work*, by David Macaulay. Houghton Mifflin Company, Boston, 1988.