

RAFT IDEAS

Topics: Friction,
Vibrations, Motion

Materials List

- ✓ Stiff foam block, at least 10 cm x 5 cm
- ✓ Large rubber band
- ✓ 2+ toothpicks/
skewers/ pipette tips
- ✓ Chenille stem piece, ~3 cm (1½") long
- ✓ Straw piece, ~3 cm (1½") long
- ✓ Scissors
- ✓ Marker/correction fluid

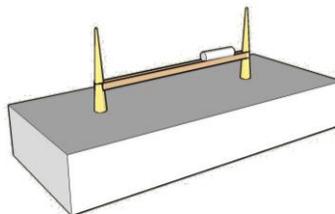
This activity can be used to teach:

- Forces & Motion (Next Generation Science Standards: Grade 3, Physical Science 2-1, 2-2; Middle School, Physical Science 2-2)



Caterpillar Crawl

A very cute friction experiment



A piece of chenille stem creeps along a track, moved by vibrations and friction.

Assembly

1. Insert two toothpicks or similar into the foam, around 8 cm - 10 cm (3"-4") apart, depending on the size of the rubber band to be used.
2. Stretch the rubber band between the toothpicks. Avoid stretching the band too tightly – it should be taut, but not stretched enough to pull the toothpicks from the foam. Ensure the rubber band is not twisted.
3. Mark one end of the piece of chenille stem with a marker or correction fluid. Mark the piece of straw in the same way.

To Do and Notice

1. Place the chenille “caterpillar” on one end of the rubber band track.
2. Using a finger or pencil, tap lightly and repeatedly on the foam.
3. Watch the caterpillar crawl along the track! Turn it around – does it change direction? Why?
4. Try the straw “caterpillar.” Does it move? Why?

The Science Behind the Activity

The tapping causes the foam to vibrate, and the vibrations travel through the toothpicks and into the rubber band. The large number of fine fibers in the chenille stem means the caterpillar has a relatively large surface area in contact with the rubber band. Each fiber pushes against the rubber band, causing friction, which moves the caterpillar along the track.

The chenille stem consists of two wires twisted together, with the fibers spiraling from between them. This shape means the vibrations travel better in one direction than the other, leading to the forward motion of the caterpillar.

The straw caterpillar has a much smaller surface area in comparison, so the vibrations do not transfer as easily.

Taking it Further

Extend the caterpillar’s track. To add rubber bands: slightly overlap the rubber bands and tap slowly and carefully as the caterpillar switches tracks. Vary the angle between the tracks.

Web Resources (Visit www.raft.net/raft-idea?isid=528 for more resources!)

- Videos on friction from the Khan academy - <https://www.khanacademy.org/science/physics/forces-newtons-laws/inclined-planes-friction>