

CRITTER CAPSULE

It moves! Is it alive?

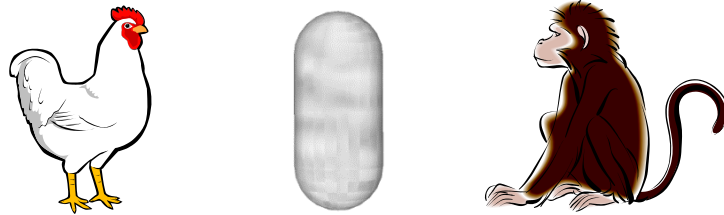
Curriculum topics:

- Balance
- Center of Mass
- Characteristics of Life
- Inertia
- Motion

Subject:

**Physical Science,
Life Science**

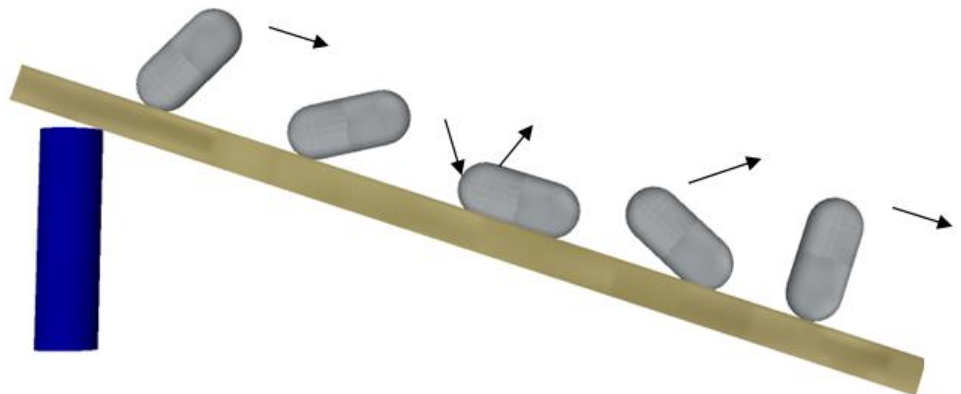
Grade range: K – 8



Build your child's curiosity about motion, center of mass, and inertia with this fun activity! Discuss the characteristics of living organisms. The reason for the capsule's tumbling motion is concealed by the foil which adds to its mysterious nature and provides an opportunity to practice observation and science process skills.

Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience by inspiring joy through hands-on learning.



For more ideas visit
<https://raft.net/resources-2/>

Materials required

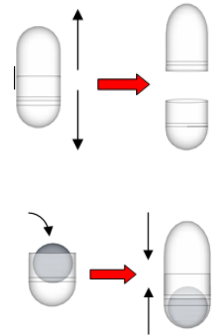
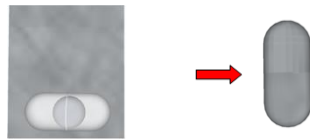
- Capsule, size #11, plastic or equivalent (x1)
- Steel ball or marble, 15-18 mm (x1)
- Foil sheet, 3" x 3" (x1)
- Plate, plastic or paper, rim wider than capsule diameter

WARNING: CHOKING HAZARD
Activity uses small parts. Not for children under 3 yrs.

Set-Up

1 NOTE: Capsules made of gelatin are water-soluble. Keep them away from moisture. Separate the two parts of the capsule and enclose the steel ball or marble in the capsule. Push the capsule parts together securely, as shown.

2 Wrap the foil around the capsule. Pinch the foil over the ends of the capsule, then carefully round the foil over each end (see below).



To do and notice

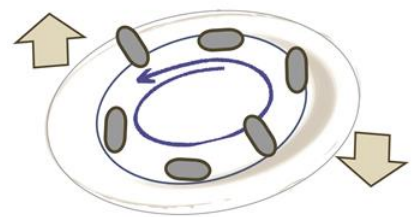
1 Put the critter capsule in the palm of your hand. Tilt your hand back and forth and observe the motion of the capsule.

2 Hold the plate right side up and put the critter capsule onto the plate. Tilt the plate back and forth and observe the capsule's motion. Can the capsule be made to travel in a circle?

3 Turn the plate upside down and put the critter capsule onto the plate's rim (see right). Can you make the capsule travel around the rim without falling out? Keep trying until you are successful!

4 Place the critter capsule on an incline/ramp (see title page). If the capsule does not move give it a slight push or make the incline steeper. Observe the capsule's motion.

5 Brainstorm: Characteristics of living things include metabolism, reproduction, growth and development, response to the environment, and being made of cells. Does the critter capsule meet any of these criteria? How would you determine whether it's a living thing without opening it up? Develop criteria which could be used to decide if the critter capsule is alive. Use the criteria and think about a variety of familiar household objects.



Content Standards:

NGSS

Life cycles:
[3-LS1-1](#)

Forces and Motion:
[K-PS2-1](#)
[K-PS2-2](#)
[3-PS2-1](#)
[3-PS2-2](#)
[MS-PS2-2](#)

Gravity:
[5-PS2-1](#)

The science behind the activity

Every object has a center of mass, which is the object's balance point. The balance point of the capsule changes as the ball moves inside it. The irregular motion of the capsule occurs because the ball has much more mass than the capsule. Small movements of the marble will cause large movements of the capsule as a new balance point is created for the two combined items. Since mass is a measure of an object's inertia (its resistance to change in its motion), a shift in the center of mass causes a change in the moment of inertia, which you observe as the wobbling and jerking motion of the capsule.

Young learners often have difficulty defining life. Living organisms have systems for metabolism, growth, reproduction, and response to stimuli. Although the critter capsule appears to move on its own and respond to stimuli, it does not exhibit any of the other characteristics that would classify it as alive.

A real-world example of an unusual living organism is a virus, which responds to stimuli and moves but cannot reproduce on its own or even with other viruses. Viruses are the exception to the typical criteria used to define living things. As biologists learn more about such anomalies, they refine the criteria to include these unusual organisms.

Learn more

- Predict the capsule's path on various household surfaces.
- Determine the average number of downhill tumbles the capsule makes.
- Toss the capsule into the air and observe whether the motion is like that seen on a flat surface. (Be sure to catch it!)
- Compare the capsule movement with and without the foil. Is it the same or different? Think about how the foil may or may not change its behavior.
- Create a multi-level track for the capsule to follow using pipe insulation, right angle molding, or equivalent.

Visit <https://raft.net/resources-2/> to view the following related activities!

Force Meter
Gravity Defying Frog
Inertia Ball
Where is the Life?
Marble Rollercoaster

Resources

See these websites for more information on the following topics:

- **Video: Balanced and Unbalanced Forces** - <https://bit.ly/3a7bElr>
- **Webpage: Motion-related activities** - <https://bit.ly/2UcMuwp>
- **Webpage: Characteristics of life** - <https://bit.ly/2QGgWqe>