

Safe Landing - Engineers Week

OBJECTIVE

Students devise ways to ensure a cup with a ball inside it lands upright, without the ball falling out, when dropped from a height of at least 3 feet.

ENGINEERING & SCIENCE CONNECTIONS

1. When people need food, medicine, and life-saving supplies that must be airdropped because of natural disasters or war, engineers have to make sure that the supplies land safely no matter what height they fall from
2. A canopy is the part of a parachute that fills with air. Air trapped in the canopy slows the fall of a parachute because of air resistance, or the force of the air pushing against the canopy
3. Shock absorbers lessen the impact upon landing. Demonstrate one type of shock absorber by folding an index card (use an accordion fold), compressing it, and allowing it to decompress. Note that their own bodies act similarly when they jump off a step: they bend their back and knees to absorb some of the energy and break the fall. Ask students to jump up and down and notice how their body acts like a spring

MATERIALS NEEDED

For each team:

- 1 paper cup
- 2 straws
- 1 plastic bag
- 1 4"x6" index card

Per Presentation Packet:

- 1 ball of string
- 2 ping-pong balls
- 2 tape dispensers
- Scissors (volunteer needs to supply)



PROCEDURE

1. Split the class into teams of three.
2. Introduce the challenge and note that students cannot cover the cup to keep the ball inside.
3. Distribute the supplies to each team.
4. Have each team select one student to be the "runner" to retrieve materials such as string and tape from the volunteers.
5. Allow each team to plan their design for about 5 minutes.
6. Allow the students to build their design for about 20 minutes.
7. Test each design by dropping it, starting at 3 feet. If the device fails, tell the team to redesign and try again. If the device succeeds, try dropping it from greater heights.

GUIDING QUESTIONS

1. Which materials could help to soften the cup's landing?
2. How might you create a parachute to slow the container's fall?
3. How can you make sure the cup doesn't tip over as it is falling?