

Explorer Education Programme



Explorers Science Experiments - Expanding Marshmallows

Class: All classes

Strand: Energy and Forces / Materials

Strand Unit: Forces / Properties and characteristics of materials / Materials and change

Group size: Individual. Demonstrate making a vacuum, allow students to use the experiment after it has been set up.

Aim

To examine how the physical properties of a vacuum affect materials. Students completing the worksheets will also develop writing and literacy skills.

Experiment suitable for teacher demonstration and/or supervised group experiment for 5th and 6th Class students.

Materials

- Dozen small marshmallows
- Empty bottle
- Airtight bottle lid and pump or syringe that can pump air in and out

Methods

1. Add about a dozen small marshmallows to an empty bottle (vinegar bottles work very well).
2. Using a sealed cap or plasticine ensure that the top of the bottle is sealed so that air can be pumped out creating a vacuum (see links to videos below for further explanation).
3. Use the pump to pump out the air of the bottle.
4. The marshmallows will expand to about twice their size.
5. Once fully expanded remove the pump and allow air back into the bottle.

What Happens

- You will be able to see the marshmallows shrink to their normal size again as the pressure inside the bottle returns to normal.

Discussion Points

- Before the experiment discuss with the class what they think will happen to the marshmallows.
- Once everyone has carried out the experiments discuss what did happen and why it happened.
- Discuss different situations where pressure is affected e.g. space travel / deep sea exploration etc.

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- How do space shuttles and submarines cope with the changes in pressure? How do the people inside them cope?
- Discuss animals that can survive at the bottom of the ocean and animals that can survive in space such as the tardigrade (water bear) – small (<1.5mm), water-dwelling, segmented animals with eight legs.
- Get students to use the web and/or their school library to research these discussion points and the worksheet questions.

Outcome

The children in the class will have developed skills in the following:

- Questioning
- Observing
- Predicting
- Investigating and experimenting
- Analysing
- Recording and communicating
- Exploring
- Planning
- Making
- Evaluating

In addition the following skills in English will be developed:

- Reading for pleasure and information
- Developing competence, confidence and the ability to write independently
- Developing interests, attitudes, information retrieval skills and the ability to think

Useful Links

- <http://www.physics.org/tricks/amazing-marshmallows/> ;
<http://www.physics.org/interact/physics-to-go/amazing-marshmallows/index.html> ;
<http://phun.physics.virginia.edu/demos/marshmallow.html> - Videos and additional information about the expanding marshmallow experiment
- <http://www.newton.dep.anl.gov/askasci/eng99/eng99394.htm> - Effects of pressure
- <http://tardigradesinspace.blogspot.com/> - Tardigrade space project
- <http://www.seasky.org/deep-sea/deep-sea-menu.html> - Deep sea animals



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Worksheet

What do you think will happen to the marshmallows when the **air is pumped out of the bottle**?

My prediction	What happened and the reason why it happened?
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What do you think will happen to the marshmallows when the **air is allowed back into the bottle**?

My prediction	What happened and the reason why it happened?
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Can you name any types of transport / vehicle that need to be able to cope with changes in pressure?

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