

Upside-down Water Jar

Demonstration Worksheet

Discussion Questions

1. Predict what will happen when the jar filled with water and covered with the card is turned upside-down.
2. Draw a sketch of the inverted jar filled with water and covered with the card. Use arrows to show the direction of the following forces acting on the water: gravity, external air pressure, and pressure of air inside the jar.
3. When the jar is inverted with the card in place, a small amount of water leaks out of the jar. Assuming that the card prevents air from entering the jar, how does the air pressure inside the jar change when water leaks out?
4. Predict what will happen when the card is removed from the jar. Give a reason for your prediction.
5. Draw the structure of a water molecule and show by means of a diagram the hydrogen bonds between water molecules. How many water molecules can be hydrogen-bonded to a central water molecule?

Shish Keballoon

Demonstration Worksheet

Discussion Questions

1. Describe in detail what happened in this demonstration.
2. Latex balloons are composed of rubber, a natural polymer. Using your textbook, define polymer.
3. When a balloon is inflated, where are the polymer chains stretched the most? Where are they stretched the least?
4. Give a possible explanation for how the skewer was able to pierce the balloon without popping it.

Discrepant Balloons

Demonstration Worksheet

Discussion Questions and Analysis

1. Predict what will happen when the air is allowed to flow between the two balloons.

2. Describe what happened.

Use Table 1 to answer the following questions. *Note:* V = volume, r = radius, SA = surface area.

<u>V (cm³)</u>	<u>r (cm)</u>	<u>SA (cm²)</u>
0	0	0
1000	6.20	483
2000	7.82	768
3000	8.95	1006
4000	9.85	1219

Table 1. Balloon Dimensions

3. Suppose the smaller balloon had been inflated to a volume of 1000 cm³ and the larger balloon to 3000 cm³. What would be the total surface area of the two balloons?

4. Which combination of two volumes totaling the same as the original two volumes in question 3 would result in the largest surface area? The smallest?

5. Use the answer from question 4 to write a possible explanation for what happened when the air was allowed to flow freely between the two balloons.