The Heart as a Pump

Key Question

- What happens during the pumping action of the heart?

Materials

For every 2 students

- wide mouth jar (plastic)
- balloons
- skewer
- two flexible straws
- scissors
- tub or pail to collect water spills
- sponge

Objective

Students will explore the working of the heart by making comparisons with the actions of a pump.
Procedure

1. Fill the jar half full of water. Cut the neck off of the balloon and stretch the balloon over the mouth of the jar so it fits tightly. Save the neck of the balloon for use in step three, below. With the skewer, poke two small holes into the stretched balloon, about 2 cm apart.

2. Carefully insert a straw through each hole in the balloon. The straws should fit snugly. If there are gaps between the straws and the balloon, start over with a new balloon.
3. Use the neck from the balloon to make a valve. The valve goes on the end of one straw as a flap. Secure lightly with tape. Bend down the straw with the balloon valve (see diagram). Place the jar in a tub or pail.

4. Push and release the balloon several times. Can you get water to move through the straws? In what direction does the water move?

Extensions

1. Study illustrations of the heart. What are the similarities between the heart and the pump you assembled?

2. Remove the balloon flap (valve) from the apparatus. What happened?

3. Does the valve affect how well the water flows?

4. Can you think of other examples of valves and pumps?
Notes to the teacher: Lub Dub

The heart contains valves which direct the flow of blood in one direction. Blood is forced through the flexible membranes which form the valves. Once the blood passes through the membranes, the valves collapse into a barrier, preventing the blood from flowing backwards.

Students can find examples of pumps and valves in facets, aerosol sprays, automobile fuel pumps, and many household items in daily use. Some beverage containers use a valve that resembles the valves in the heart.

Point out to the students that the heart is a muscle and not a mechanical pump. It can also be pointed out that comparisons of this kind are known as reasoning by analogy and are an important part of scientific reasoning.