Make an Aeolipile (Hero Engine)

See thrust created by water. **Suggested Grades:** K-12

Activity Overview

In this activity, you will explore how thrust is produced by creating a Hero Engine.

Note: You may need help from an adult to make holes in the soda can with a nail.

Time: 30 minutes

Materials

- Empty soda can with tab still attached
- 18 inch–24inch length of string or fishing line
- Medium-sized nail
- Water
- Container to catch water coming from the can

Steps

1. Tie the string onto the tab of the soda can so that when in use, the can is able to rotate freely on the string. See Figure 1.

Figure 1. Tie the string to the tab on the can

2. Using a nail, make two equally spaced holes in the side of the can near the base. Before removing, push the nail to the left in order to slant the hole in that direction. See Figure 2.

   CAUTION: Exercise caution when using the nails. You may need an adult's help. Also, be careful when handling the soda can since the edges of the holes you created may be sharp.

Figure 2. Use the nail to make holes near the bottom of the can

3. Fill the can with water and hold it over the container.

4. Once full, lift the can using the string; count the rotations the can makes. See Figure 3. Record the number of rotations in the "2 Holes" column of the following table:

	2 Holes	3 Holes	4 Holes	5 Holes
Number of Rotations				

5. Add a third hole to the can and repeat the experiment. Record the number of rotations made by the can in the appropriate column of the table from Step 4.

Figure 3. The water coming out of the holes causes the can to move

6. Repeat Step 5 with four holes and then five holes.

Background Information

What is an aeolipile? The aeolipile, or Hero engine, was invented by Hero of Alexandria in 1 B.C. He used a water-filled copper sphere that, when heated, generated steam that could be used to create motion.

Why did the can rotate? As the water escaped from the soda can, it generated a force away from the can. As per Newton's third law of motion, that also created an equal but opposite force that pushed towards the can. Since the can was held in place by the string, it caused the resultant rotational force to turn the can.