

## Javelin Throw

### OBJECTIVE

Students will design and test an aerodynamic javelin.

### MATERIALS

- PVC material
- plastic for constructing fins (such as vertical blinds)
- connectors for joining lengths of javelin (if necessary)
- cover for blunted tip of javelin
- PVC glue
- PVC cutter

### BACKGROUND

Since ancient times, humans have been fascinated with flight. By studying birds, scientists have learned that a streamlined body shape reduces drag in the air, and properly shaped wings provide lift (and propulsion) for flight. As air moves over the upper surface of the wing it has further to travel, and therefore flows faster than air passing underneath. Because pressure falls as speed rises, air pressure above the wing is reduced and air pressure below is increased. This pressure difference gives rise to lift. The amount of lift created depends on the speed of flight and the shape of the wing.

Aquatic animals moving through water are also subject to the principles of aerodynamics. An animal's body shape reveals whether it's a fast or slow swimmer. Fast swimming sharks and whales have a streamlined build, wing-shaped pectoral fins or flippers, a dorsal fin for stability, and a strong caudal fin or flukes for propulsion.

Aerodynamic principles are also applied in Olympic events such as the javelin throw. The men's javelin weighs 800 g (1.8 lb.) and is a minimum of 2.6 m (8.5 ft.) long. The women's javelin is 600 g (1.3 lb) in weight and is 2.2 m (7.2 ft.) long. The javelins are designed to be thrown the farthest possible distance after a run-up of about 30 m (98 ft.).

1. Divide class into teams of three. Have each team draw a design of how they will create their javelin.
2. Cut PVC so that it meets the Olympic javelin length requirements. The javelin may consist of more than one piece with joiners holding the pieces together. An example is two pieces of PVC pipe with a straight coupling joiner.
3. Form one end of the javelin into a blunt point.
4. Fit the opposite end with fins so that the javelin is aerodynamically balanced. This may require three or more fins for stability.
5. The minimum weight should be the Olympic javelin weight. The maximum weight should be 1.4 kg (3 lb.).
6. Set a javelin throwing day. Have students throw their javelins from a 30 m (98 ft.) run-up. Measure the distance thrown.