

NOTES

Materials*Included in the kit:*

hand generator
 bulb holder
 8 plastic tanks
 8 funnels
 8 6-inch lengths of tubing
 12 tube clamps
 8 foam cups
 16 plastic lids
 100 small spoons
 100 large spoons
 48 medicine cups
 200 feet of string
 8 pipets
 8 rolls of adhesive tape
 Parafilm®
 24 straws
 8 paperclips
 Teacher's Manual and reproducible Student Guide

Needed, but not supplied:

8 ring stands with clamps
 8 100-mL graduated cylinders
 8 large plastic beakers
 8 metric rulers
 8 pairs of scissors
 staplers (optional)
 glue (optional)
 water

Safety

Use this kit only in accordance with established laboratory safety practices, including appropriate personal protective equipment (PPE). Ensure that students understand and adhere to these practices. Know and follow all school district guidelines for the disposal of laboratory wastes.

Background

Note: Additional Background can be found in the Student Guide.

Most turbines work the same way. The blades rotate like a propeller when water or wind flows across them. The blades are affixed to a hub that turns a shaft; the

- Use the steps listed in the Design Guide to prepare a proposal for your prototype.
- Get your teacher's approval for your proposal before beginning construction and testing.
- You will have 30 minutes to build and test your design. If time and materials allow, try to modify your design to make it better at lifting the paperclip.
- Take notes on your observations, your results, and conclusions drawn from your tests. If you discover that changes must be made as you build your prototype, record those changes in your notebook.
- Your instructor will moderate the competition and have each group demonstrate its design. The group that designs and builds a device that lifts a paperclip the farthest using 100 milliliters of water is the victor.
- Reflect on your design and note options for improvement or other variables that you would like to try.
- Answer the remaining Questions.

Design Guide

- What is your objective?
- What equipment and materials will you need? List the items and quantity you will need.
- What procedure will you follow? Describe the step-by-step process.
- Draw pictures and write descriptions of the model or experiment you are designing. Do you have any modifications of your design that you would like to try?
- What safety issues might be a concern, and what steps will you take to ensure the safety of your group? List the equipment you need and any special precautions you will take.
- How will you perform the tests and collect your data?
- Will you have to perform any calculations or create any graphs?
- How will you analyze and present your data?