CHAPTER 7

Inquiry Lab

Machines and Efficiency

Design Your Own

OBJECTIVES

- **Measure** the work input and work output of several machines.
- **Calculate** the efficiency of each machine.
- **Compare** machines based on their efficiencies, and determine what factors affect efficiency.

MATERIALS LIST

- balance
- C-clamp
- cord
- dynamics cart
- inclined plane
- mass hanger
- meterstick
- pulleys, single and tandem
- set of hooked masses
- right-angle clamp
- support stand
- suspension clamp

In this lab, you will design an experiment to study the efficiency of two types of simple machines: inclined planes and pulleys. In your experiment, you should use each type of machine to use a smaller mass to lift a larger mass. With each setup, you should collect data that will allow you to calculate the work input and the work output of the system. The ratio of the useful work output to the work input is called the *efficiency* of a machine. By calculating efficiency, you will be able to compare the two types of machines.

SAFETY

- **Tie back long hair, secure loose clothing, and remove loose jewelry to prevent their getting caught in moving parts and pulleys. Put on goggles.**
- **Attach string to masses and objects securely. Falling or dropped masses can cause serious injury.**

PROCEDURE

1. Study the materials provided, and design an experiment to meet the goals stated above.

Figure 1

- Choose any angle, but make sure the top of the plane is at least 20 cm above the table.
- Make sure the string is long enough to help prevent the cart from falling off the top of the plane. Attach the mass hanger securely to the end of the string.