Getting Started

1. Discuss with the class why someone would want to know the efficiency of a machine.

2. Read "The Meaning of Efficiency," on page 141.

Inquiry 15.1
Calculating Efficiency

PROCEDURE

1. You will use the data you collected in Lessons 11 and 12 for this lesson. Use the load force and load distance data that you recorded on Student Sheet 11.2 to calculate the output work when moving the sled up the inclined plane. Enter this measurement into the column for "Output Work" in Table 1 on Student Sheet 15.1.

2. In Table 1 on Student Sheet 15.1, record the input work for four different slopes of the inclined plane. To do this step, use the "Work" column in Table 1 on Student Sheet 11.2.

3. Use the input work and output work information that you have entered in Table 1 and calculate the efficiency of the incline for each slope. Express your answer as a percentage.

4. Answer this question in your science notebook:

What can you conclude about the efficiency of the inclined plane that you used in Lesson 11?

5. Now use the data collected on Student Sheet 12.1 to calculate the efficiency of the pulley systems. Record your calculations in Table 2 on Student Sheet 15.1.

6. Answer this questions in your science notebook:

On the basis of your data for pulleys, which pulley arrangement is the most efficient?

REFLECTING ON WHAT YOU'VE DONE

Answer the following questions in your science notebook. Be prepared to discuss your answers with the class.

A. *Examine the efficiencies for the inclined planes and pulleys. Do you see a pattern? How can you explain it?*

B. *You did not calculate the efficiency for the levers in Lesson 13. What do you think this efficiency would be like? Explain your reasoning.*

C. *Which would you rather have, a machine with a great mechanical advantage or a machine with high efficiency? Why?*