

Name: \_\_\_\_\_

# Jump Off

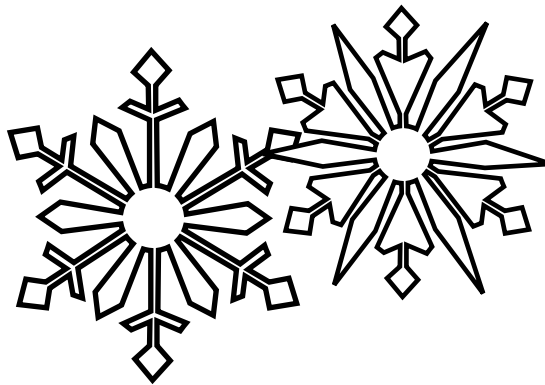
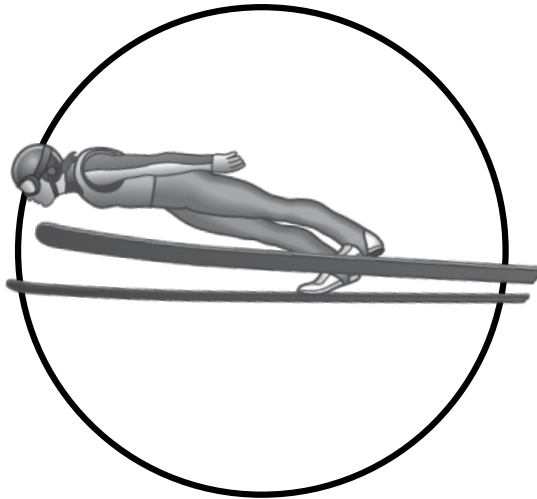
After reading "Air Force" (p. 8), build a miniature ski-jump ramp to test the force of friction.

**YOU NEED:**

- 1 cardboard tube from a roll of paper towels
- scissors • pencil • meter stick • textbooks
- 20 pennies • clear tape • aluminum foil • fine-grain sandpaper • masking tape

**TO DO:**

1. Cut the cardboard tube in half lengthwise. Keep one piece. This is your ski-jump ramp.
2. Draw a line at 4 centimeters (1.5 inches) from one end of the ramp. This will be the starting line.
3. Place an 18 cm (7 in.) stack of textbooks on an uncarpeted floor or on a large, cleared table. Place one end of the ramp on the floor/table and lean the other end on the textbooks. Use a strip of masking tape to secure the ramp to the books. Be careful not to obstruct the ramp.
4. Place 20 pennies in a stack. Using long pieces of clear tape, secure the pennies into a tightly wrapped roll. This is your ski jumper.
5. Hold your ski jumper at the start line and let go. Measure the distance your ski jumper traveled past the end of the ramp. Record the measurement in a data table.



6. Repeat Step 5 four more times.
7. Wrap the ski jumper in a piece of lightly crumpled aluminum foil. Repeat Steps 5 and 6.
8. Remove the aluminum foil.
9. Repeat Step 7 using sandpaper. Use masking tape to secure the sandpaper to the ski jumper. For each trial, be sure the masking tape faces upward and does not touch the ramp.
10. Calculate the average distance the ski jumper traveled while wrapped in each type of material.

**CONCLUSIONS**

With which wrapping did the ski jumper travel the farthest or the least far? Why do you think that is?

**TAKE IT FURTHER**

Prop the end of the ramp using a 2.5 cm (1 in.)-thick book. Repeat the activity to observe how the results change.

