Name _____ Date _____

Ramping It Up

Procedure

1. **Collaborate** Work with a partner. Make a stack of books. Record your data in the chart below.

Distance (cm)	Force (N)

2. **Experiment** Hook the mass to the spring scale. Lift the mass straight up to the height of the stack of books. Read the spring scale and record the force needed to lift the mass.

3. **Record Data** Use a tape measure to carefully measure the distance the mass was lifted. Record the distance in your chart.

4. **Experiment** Lean the cardboard against the stack of books to create a ramp. Align the top edge of the cardboard with the top of the books. While holding the ramp in place, use the spring scale to drag the mass to the top of the ramp. Move the mass smoothly and at a constant speed. Record the force and the length of the ramp.

5. **Use Variables** Cut the cardboard in half to shorten it. **Safety:** Be careful using scissors. Repeat step 4 using the shorter ramp.

Name _____ Date _____

Conclusion

Write the answers to the questions below.

1. **Compare** How did using the ramp affect the amount of force needed to lift the mass?

_____

_____

2. **Infer** How did changing the length of the ramp affect the force needed to raise the mass to the top of the stack of books?

_____

_____

_____

Investigate More!

Design an Experiment Try the experiment using the same length of cardboard but a different-sized stack of books. How does the height of the stack affect the force needed to move the mass the same distance?