Granny on the Ramp

Student Data Page Activity 4B (MS) Part 1

Activity Materials: (Per Group):

Part 1:

- 7 Science textbooks (all the same thickness)
- 6 Pipe cleaners
- 2 craft eyes
- 2 Pom-Poms, 1 large, 1 medium
- 1 Pizza Box (Medium size) or 30 cm cardboard for ramp
- 2 sets toy car wheels
- Elmer's Glue or Hot Glue
- Scissors
- 1 Ruler
- Paper (8 1/2 " X 11 ")
- Calculator
- Small fishing weight and string
- Patterns for Assembling Wheelchair and paper base(included in *Teacher Information Pages*)
- Class set of *Student Information Pages*
- 1 copy of *Student Data Pages* (per student)

Making Pom-Pom Granny and Her Wheelchair

❒ 1. The group will build Granny using the pom-poms, glue and pipe cleaners. *Figure 1* below is an example of how the *"Pom-Pom Granny"* could be made.

❒ 2. The group will build the wheelchair using the template provided in the *Teacher Information Pages*. This template can be copied onto card stock, cut out, and assembled.

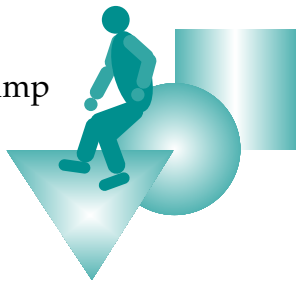
❒ 3. Next, build the ramp by opening the pizza box and cutting the side of the pizza box. **Look at Figure 1 for a reference** before cutting. (A 30 cm straight piece of card board can be used also).

Figure 1 Granny on a Wheelchair

❒ 4. Next, build the paper box for measuring distance traveled by *Pom-Pom Granny* - use the template included. (This step is optional.)

❒ 5. Once all of these steps are accomplished, put your group names on the pieces – you will be using all of them for other parts of this activity.

Procedure: Run, Rise and Ramp Length.



1. Make a ramp by placing 1 textbook under the edge of the cardboard ramp as shown in *Figure 2 Set Up for Granny on the Ramp*.

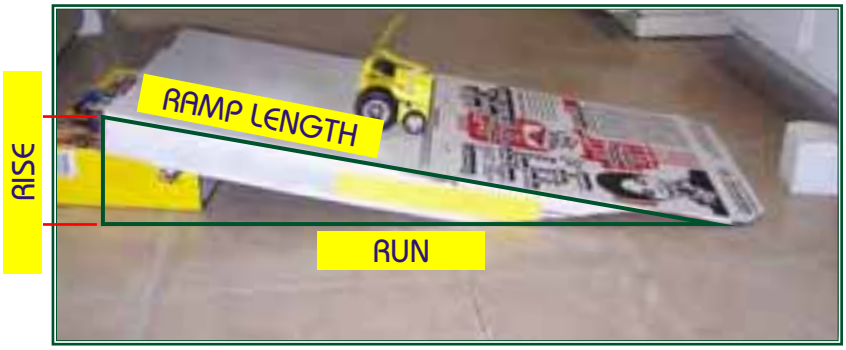


Figure 2 Set Up for Granny on the Ramp

2. Tie a fishing weight onto a string. Tack the string to the highest point of the ramp so that the fishing weight ALMOST touches the table top. This is a plumb bob and it allows you to measure the *rise*, see *Figure 3 Using the Fishing Weight*.

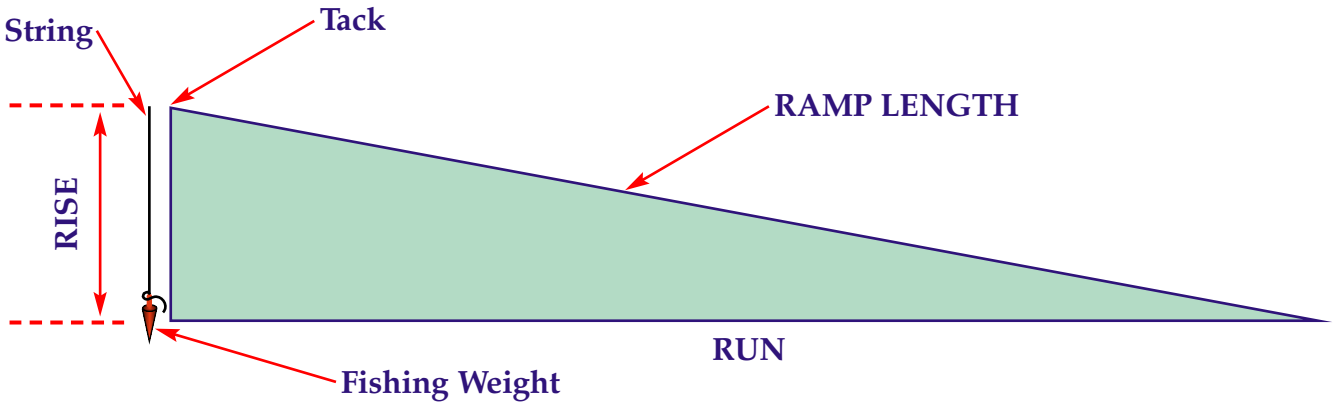


Figure 3 Using The Fishing Weight

3. Measure the *rise* along the string from the highest point of the ramp to the table top in cm. Record your answer in **Table 1**.

4. Measure the *run* along the table from the fishing weight to the point of the ramp. **MEASURE** in cm carefully as small changes will occur in the *run* of the ramp as you change the *rise*. Repeat each measurement two more times.

5. Measure the *Ramp Length* and record in **Table 1** on your *Student Data Page*.

6. Repeat steps 3 – 5 two more times and record your data in **Table 1** on your *Student Data Page*.

Table 1 Parts of a Ramp

Number of Books	*Rise(cm)*				*Run(cm)*				*Ramp Length (cm)*			
	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average
1												
3												
5												
7												

Processing Out:

1. How are the ***rise*** and ***run*** of a ramp related to the ramp length?

2. How are the ***rise*** and ***run*** of a ramp related to the steepness of a ramp?

3. If the ***rise*** of a ramp increases, and the ***ramp length*** stays the same, what happens to the length of the ***run***?

4. If the ***run*** of a ramp stays the same, what effect does changing the ***rise*** of the ramp have on the ramp length?

5. If you need to reduce the steepness of a ramp and cannot change the length of the ***run***, what can you do?

Procedure: Rise, Run and Slope

1. Make the ramp by placing 1 textbook under the edge of your pizza box ramp as shown in *Figure 4*.

2. Measure from the **ground to the highest point on the ramp** in cm – this is the *rise*. Record your answer in *Table 2*.

3. Measure the length of *run* in cm as shown in *Figure 4*. Record your answer in *Table 2*.

4. Calculate the slope as shown in *Figure 5*. Record your answer in *Table 2*.

5. Write the *Slope*, which is a ratio (reduced to simplest form) of the rise divided by the run. For example, a ramp with a *rise* of 10 cm and a *run* of 50 cm would have a *slop*e of 10 cm/50 cm. In its simplest form, this ratio would be 1:5.

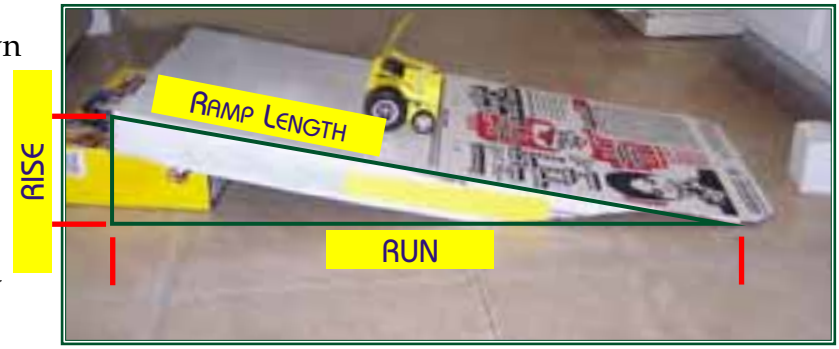


Figure 4 Set up for Granny on the Ramp

6. Put *Pom-Pom Granny* at the top of the ramp and release her for her test run down the ramp. Write your observations in *Table 2*.

7. Repeat steps 1-6 using 3 books.

8. Repeat steps 1-6 using 5, then 7 books.

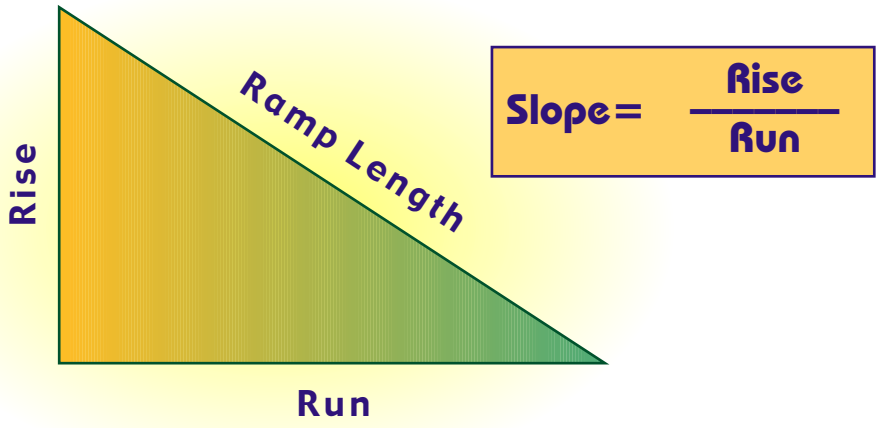
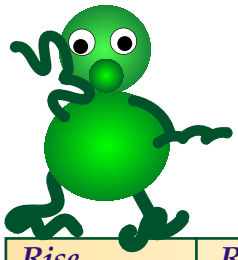


Figure 5 Calculating Slope



$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$

Table 2 Calculating Slope of Ramps

Rise (cm)	*Run (cm)*	*Slope (rise:run)*	*Convert Slope to simplest form*	*Observations*

Processing Out:

1. What effect does adding books to increase the rise of the ramp have on the *slope*?

2. How is the *slope* related to the steepness of the ramp?

3. Calculate the *slope* for the following ramps:

   a. If a ramp has a rise of 20 cm and a run of 100 cm, what is the *slope*?

Slope =

Simplest form of slope =

   b. In a ramp with a rise of 2 cm and a run of 10 cm, what is the *slope*?

Slope =

Simplest form of slope =

   c. In a ramp with a rise of 1 cm and a run of 5 cm, what is the *slope*?

Slope =

Simplest form of slope =

   d. How do the slopes of ramps a, b, and c compare?

4. Why do you think it is important to have guidelines for building public ramps?