

Reinventing the Wheel

Physical Science and Technology

Introduction:

The purpose of this activity is for you to demonstrate your ability to problem solve by designing and building a device *and* writing the results in a formal lab paper. Each section of this activity has multiple criteria; please finish as many criteria as you can in the time allowed. Some parts of this assignment are individual and some are to be done with a partner.

Day 1 (~30 mins.)

→ *Calculations (INDIVIDUAL)*

You will make two calculations to find a distance and a number of rotations. Here are the formulas you will use for your calculations:

First number (distance)

$$= (\text{the number of letters in your last name} + \text{the number of letters in your first name}) \times 15$$

Second number (number of rotations)

$$= (\text{the number of letters in your first name} \times \text{the number of letters in your last name}) / 4$$

Round this number to the nearest whole number.

The first number will represent a distance **in centimeters** and the second will represent a **number of rotations**. Your goal will be to build a wheel that will travel within 10% of the specified distance in exactly the specified number of rotations.

Finally, **estimate** how much cardboard you think you will need to build a wheel that will travel the correct distance in the correct number of rotations.

Show your instructor *a)* the distance you've calculated, *b)* the number of rotations you've calculated, and *c)* how much cardboard you think you'll need. Once your instructor has approved your information, move on to the next step.

→ *Gather materials (PARTNERS)*

Find ONE other student in the class who is also done with the calculations and estimate. Choose either of your sets of calculations to use. Find the materials you'll need, organize them, and make sure your names are written on the materials whenever possible. If you have time, you can start constructing your wheel.

Day 2 (90 mins.)

→ *Build the wheel and collect data (PARTNERS)*

Build your wheel using the provided materials. Show your wheel to an instructor to make sure you are on the right track. Once you have built your wheel and had it approved, collect 10 trials of data – for each trial, record the exact distance your wheel traveled in the specified number of rotations.

After you have collected your data, turn your wheel in along with the following information written on one side: Your name, the distance specified, the number of rotations specified, and the radius (or diameter) of the wheel you built. Also turn in the data that you collected using your wheel. You and your partner should both record data in case one of you is absent during the next class period.

If you have time, you may move on to the next step of the activity.

Day 3 (~60 mins.)

→ Write a lab report documenting your progress – save to your H: drive! (INDIVIDUAL)

Work individually. You will use Microsoft Word on the computers in the computer labs. When you think you are done with the write-up, HAVE AN INSTRUCTOR REVIEW IT! After it has been reviewed, you can print your write-up and turn it in.

- Your lab report should have your name, the period, and the date in the upper right-hand corner
- Include a title centered and in bold
- Include an Introduction section consisting of 2 – 3 sentences describing what we asked you to do for this project
- Include a Methods section that describes how you decided how big your wheel should be, and how you tested and adjusted your wheel
- Include a data table, made from within Word, which has spaces for you to document 10 measurements of the distance traveled and number of rotations made by your wheel in each trial. Make sure the table is appropriately labeled and attractively formatted
- Include a Discussion section that addresses the following questions:
 1. How easy or difficult did you find this project? What were the most difficult parts?
 2. What types of things did you learn about working with a partner on this project? Describe how you and your partner made decisions when necessary.
 3. What aspects of science interest you the most?
 4. What aspects of technology interest you the most?