

Group Members' Names: _____

Pop Can Race

TASK:

With your group, you will be participating in a race to roll your pop can to the end of the track through the power of static electricity.



RULES:

- During the race, touching your pop can in any way is forbidden. Interfering with other groups is forbidden (e.g. by blocking/distracting/sabotaging them) and will result in disqualification.
- Modifications: (Ask your teacher if you are unsure about a modification).
 - You may not modify your pop can by **removing** any parts of it.
 - You may modify your pop can by **adding** things to it, as long as they are **non-electronic**. (E.g. motors and engines are prohibited.)
 - Your pop can must be able to **roll on its own** to the end of the track for the duration of the race.
- You may bring a pop can from home if you think it will work better than the ones available in class.

RESEARCH QUESTIONS

You will investigate each of the following three research questions in your groups.

- 1) Research Question 1: What is the fastest way to get the pop can down the track?
- 2) Research Question 2: What pop can will we use?
- 3) Research Question 3: Will modifications to our pop can improve its performance? What modifications work best?

For each research question, you will design one or more experiment(s). You will carry out these experiments, record your observations, and then draw conclusions from your experiments.

- **3 group members:** Assign each person to different research questions. You will submit 3 experiment write-ups in total.
- **4 group members:** Assign each person to a different research question. The fourth member can 'double up' on research question #1 or research question #3. You will submit 4 experiment write-ups in total.

SUBMISSIONS AND GRADES

You may conduct as many experiments as you desire. Record and submit the **conclusion** from each experiment.

In addition, each group member is responsible for writing and submitting the write-up of one experiment. These write-ups are marked individually.

EXPERIMENTAL DESIGN WRITE-UPS

Please use the following guidelines to help you design, carry out, and write-up your experiments.

Each experiment has 5 components which all need to be submitted. Each person's experimental write-up should be typed and approximately 1-2 pages in length. Handwritten or digital submissions (e.g. google docs, e-mailed) will *not* be accepted.

1) Research Question

- ✓ Copy the research question that your experiment aims to address.

2) Experimental Design: Materials

- ✓ A complete list of everything used in your experiment. Includes details about **quantity, size/mass, source (where it is from), and appearance** where relevant. (E.g. "2x 500 mL beakers", "1 piece of ebonite-12 cm long, 89 grams", "1x Ambrosia Apple from the Safeway next to Alex's house")

3) Experimental Design: Procedure

- ✓ A complete list of **step-by-step instructions** that is clear and can be used to replicate your experiment.
- ✓ Describe **what is being measured or observed**. Give instructions for how and when to make these measurements and observations. (E.g. "Time how long it takes to roll from one end of the table to the other." "Drop the can from a height of 1 meter and observe the type of sound you hear when it hits the floor.")
- ✓ Optional: If your procedure is complicated or hard to explain with words alone, include a labelled diagram with your procedure.

Tip: Give your experimental design to another group, then watch/listen to them as they try to follow your instructions. Make changes to your design based on what you observe or based on their feedback.

4) Results

- ✓ All of the observations that you made during the experiment. Observations are clearly organized in a table. Don't forget to give your table a title.

Sample table for research question #2

Observations	Diet Coke*	Coke Zero*	Arizona Green Tea*	Diet Pepsi*
Rolling Distance*				
Rolling Speed*				
Smoothness of Rolling*				

Sample table for research question #3

Observations	Without Modification* (Control)	With Modification 1* (Trial)
Rolling Distance*		
Rolling Speed*		
Smoothness of Rolling*		

* Change these categories to suit your experiment.

5) Conclusion(s)

- ✓ Answer your research question in 1-2 short sentences. Include any relevant results from your other informal experiments that will affect how your group approaches your final pop can race.