Student Handout

Experiment: Astronaut Lander Challenge - Design a lander to bring the astronaut safely home.

Objective: Design and build a lander to protect your “astronaut” as they land from “space”.

Requirements

What are the requirements that your lander must meet?

- The astronaut must be easily placed into and removed from the lander.

- The light on the astronaut must be visible from outside the lander.

- The lander must be used ____ number of times.

Additional Requirements:

Engineering Goal

Why are you building a lander and what must it do?

Test Plan

How will you test your lander?

(Example:

I will drop the lander 3 times from a height of 5 feet.

I will determine if the landing was “safe” or “unsafe” based on the status of the astronaut LED.)

Methods and Materials

Materials Used:	For each material used explain why you selected the material:

Draw and Label how you plan to design the lander.

Design 1

Design 2

Data Collection

Take the measurements below before you perform your testing/trials

Mass (include units)	
Astronaut (orange test astronaut)	
Lander Design 1 (can list mass of different parts of lander if desired)	
Lander Design 2 (can list mass of different parts of lander if desired)	

Test #	Lander Design	Drop Height (include units)	Safe or Unsafe Landing	Observations after landing: rolled, bounced, astronaut flew out, lander collapsed, etc

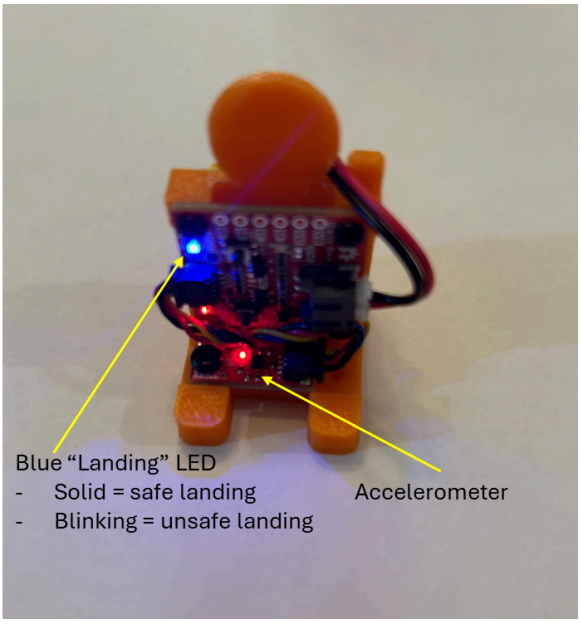
Conclusion

What you learned from your experiment. It explains whether your results answered your question or solved the problem you were investigating.

Example: "The bubble wrap worked best to protect the astronaut. This means that bubble wrap is a great packing material for keeping fragile items safe when they are dropped."

Info on the test astronaut

- The "landing" LED will light up after each landing. View the LED to determine if the landing was "safe" or "un-safe". A landing is safe if it is below the specified threshold for impact.
- The astronaut consists of a microcontroller, accelerometer and battery.
    - Microcontroller: a mini-computer that can be programmed, it reads the accelerometer.
    - Accelerometer: a sensor that measures acceleration



Poster

A poster board should have:
Title
Name(s)
Introduction
Materials
Procedure
Results
Conclusion
Discussion
Bibliography

Explanation and Examples

1. Title - Name of your experiment or project. It should tell you what you are trying to find out.
   Example: "Testing Different Packing Materials to Protect an Oreo Cookie"

2. Introduction - Explain what you are going to do in your experiment and why it's important. It sets up the problem or question you are trying to solve.
   Example: "In this experiment, we want to find out which packing material keeps an Oreo cookie from breaking when it is dropped. We will test bubble wrap, cotton balls, and other materials to see which one works best. This is important because good packing helps keep things safe when they are shipped."

3. Materials - All the things you need to do your experiment. It lists everything you will use.
   Example:
   - Oreo cookies
   - Bubble wrap
   - Cotton balls
   - Paper towels
   - Small boxes
   - Tape
   - Scissors
   - Ruler

4. Procedure - Step-by-step guide on how to do the experiment. It tells you exactly what to do from start to finish.

    Example:

    1. Wrap each Oreo cookie in a different packing material.
    2. Place each wrapped cookie into a small box.
    3. Drop each box from the same height onto a cushioned mat.
    4. Check if the cookie is broken or not after the drop.
    5. Record the results.

5. Results - What you found out from doing your experiment. This section tells you what happened when you tested the packing materials.

    Example: “The cookie wrapped in bubble wrap did not break at all. The cookie wrapped in cotton balls had a few cracks, and the cookie wrapped in paper towels broke into pieces.”

6. Conclusion - What you learned from your experiment. It explains whether your results answered your question or solved the problem you were investigating.

    Example: “The bubble wrap worked best to protect the Oreo cookie. This means that bubble wrap is a great packing material for keeping fragile items safe when they are dropped.”

7. Discussion - Your results in more detail. Explain why you think the results turned out the way they did and what you might do differently next time.

    Example: “Bubble wrap works well because it has air pockets that cushion the cookie from impact. Cotton balls were not as effective because they didn't provide as much cushion. Next time, we could try testing more materials or dropping the cookies from different heights.”

8. Bibliography - a list of any books, websites, or other sources you used to help with your experiment. It shows where you got your information.