Apollo Rescue Mission (ARM)

CHALLENGE:

Working as a team, **design and engineer** a **space bridge** that will get the three astronauts from Apollo 13 (ping-pong balls) from space safely through reentry and splash down back on earth using only the materials provided. The Apollo 13 mission is best known for all the "challenges" that occurred on the mission and how NASA used science and engineering practices to solve these challenges. This is your opportunity to show that the Apollo 13 mission would have been a success if you and your team were part of NASA and Mission Control.

DIRECTIONS:

1. Each team will consist of **two (2) or three (3) students** from the same period Science class.
2. Only the materials provided by the instructor may be used. **You cannot use the plastic bag.**
3. All construction of the project will be done **in class**.
4. The team will have one class period to work on their design (**brainstorm, obtain materials, create blueprints and/or a model**) and two class periods to construct and build the design. The completed project is due at the **start of period** on the test day.
5. On competition day, each team will have **two (2) minutes** to set up and perform three successful rescues (one per astronaut). The bridge may not be held, touched, or helped in any way once the ping-pong ball has been released.
6. The cup (the ocean) must stay in its original position and cannot be moved.
7. You **may not use the tape, rubber bands, or any other supplies to anchor or fasten your design to the platform**. Tape does **not** work in space if it has nothing to stick to.
8. The **Apollo Rescue Mission Report** is to be completed and turned in **by the due date on BOK**. This will go in your notebook.

WHAT YOU NEED TO DO:

1. Make a **group of 2 or 3** from the same class period
2. **Read the directions** and any other information on this paper
3. Do **background research** on motion, forces, gravity, reentry, and the Apollo Missions.
4. Spend at least **10-15 minutes brainstorming** and **drawing at least one design or model** in your own notebook. **Each person should have one possible model or design.**
5. **Discuss** how your group can use the **SEPs (science and engineering practices)** to design and engineer a working prototype. **Write down** the **steps** to build your device.
6. Get your **supplies** and **label** your zip-lock bag with (Names, Per. # and Group Name).
7. Start planning, discussing, and building your design. **Keep notes in your notebook** on what worked, didn't work and design improvements.
8. **Cleanup** at the end of each period.
9. **Enjoy...**

GRADING:

- **Save all 3** astronauts in under 2 minutes — 1000 pts
- **Save 2 of 3** astronauts in under 2 minutes — 800 pts
- **Save 1 of 3** astronauts in under 2 minutes — 700 pts
- At least **1 of the 3** astronauts **hit atmosphere** (platform) — 600 pts
- Design does not work, but is testable — 500 pts

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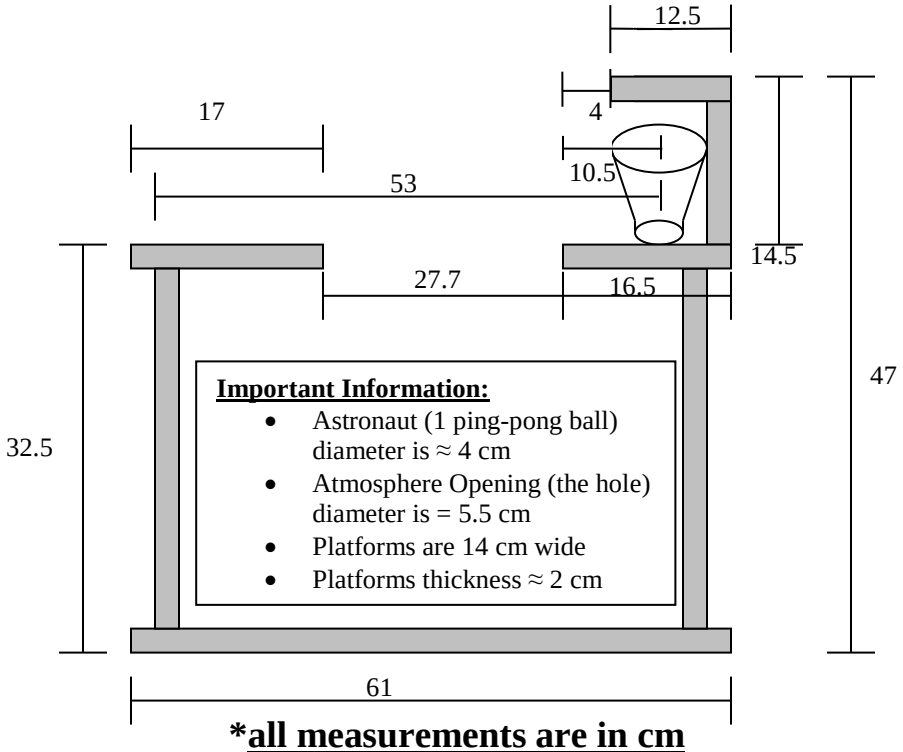

***all measurements are in cm**

Materials:

8	toothpicks
8	clear drinking straws- 20 cm
6	narrow red stir straws-13 cm
4	flex-straws
3	sheets 8 ½ x 11 in paper
2	large paperclips
2	small paperclips
2	rubber bands
2	3-oz. cups
1	30 cm piece of masking tape *(Gently stick it to the outside of your bag)

You will not receive any other supplies and you may not bring supplies from outside the classroom (deep space). You can only use the 3 color pieces of paper inside your materials bag (do not use the directions sheet in your design). **Those 3 pieces of paper might best be used to create a model and not as part of your prototype.** You **many not use** the actual Zip-Lock plastic bag in your design. You may use rulers, scissors, and writing utensils. You can cut or use the materials as you want. If you cut incorrectly or change your mind you cannot retrieve more supplies from the Odyssey. Imagine that you are the Apollo 13 astronauts and all you have to work with are the materials in your space capsule. If you leave any of these materials on your desk after your class, they will float off into space and you won't ever see them again. Protect your materials and **do not pollute space**.

Measure carefully and accurately. Be a problem solver, a team player and use the **science and engineering practices** to bring back Jim Lovell, Fred Haise and Jack Swigert. ***Enjoy.***

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