HEAVY LIFT ROCKET ACTIVITY

Name _____

Class _____

MISSION

Heavy lift rockets will help the space program progress by lowering the cost of sending cargo and supplies into space.

Working as an engineer, you will use engineering practices to design and develop heavy lift rockets.

DIRECTIONS

- Use the materials provided to lift as much cargo (paper clips) into space as possible on a given launch.
- You can use any or all of the materials provided to develop your rocket.
- How to launch:
  - Use the fishing line or smooth string that is attached to the ceiling as a guide for the rocket's path.
  - Thread the string/line through the straw(s) so that the straw(s) can slide straight up toward the ceiling as propelled by your rocket.
- The rest of the design is up to your team. Your goal is to get as many paper clips (cargo) as possible to reach the ceiling (space) using your launch system.

MATERIALS (PER TEAM)

- Large binder clip
- Fishing line/smooth string
- 4 long balloons per team - 5" x 24" or 3" x 60"
- Bathroom size (3 o.z.) paper cup
- 2 straight drinking straws
- 50 small paper clips
- Sandwich-size plastic bag
- Masking tape
- Wooden spring-type clothespins (optional)
- Scissors

INVESTIGATE

1. What are the problems you are working to solve?

2. What criteria and constraints have you been provided within which to work? What are you allowed to use to solve the problem? What are the limits to your solution? As you are building your heavy lift rockets, what materials can you use? Is there anything you're not allowed to use? How long do you have to complete the task?

3. What else do you need to know to fully understand the problem?

DEVELOP SOLUTIONS

4. What questions or ideas do you have for achieving this challenge? Brainstorm some ideas, designs, materials, and anything else that can assist the performance of your heavy lift rocket. Create one or more diagrams that explain the problem and solution ideas. If needed, use additional paper to draw your design.

5. What is your plan for collecting and measuring the data from each trial? Consistency in testing and collecting data is important. Describe exactly how you will measure the weight that your rocket lifts.

6. Predict how much mass your rocket lift system will lift. (1 paper clip = 2 grams)

BUILD YOUR ROCKET

7. Use the materials to build your model rocket per your design.

EVALUATE

8. Launch your model rocket and record data.

FLIGHT TEST	ACTUAL MASS LIFTED	OBSERVATIONS
1		
2		
3		

9. What needs to be improved? What needs to be changed?

DEVELOP SOLUTIONS

10. As you learned, some practices in the engineering design process need to be repeated in order to solve for a problem.

    In this space, re-design and draw modifications for your heavy lift system. Include details about the changes you've made to the shape, materials and other factors.

11. Once again, predict how much mass your rocket lift system will lift. (1 paper clip = 2 grams)

EVALUATE

12. Launch your modified rocket and record data.

FLIGHT TEST	ACTUAL MASS LIFTED	OBSERVATIONS
4		
5		
6		

13. Were the modifications to your heavy lift system an improvement from your original design? Why or why not? Describe what happened and if there were any differences in performance between your first and second rocket launches.

SHARE YOUR FINDINGS

14. Provide a 1- to 2-minute explanation of how your design functions, what you learned through your testing, what modifications you made as a result, and how your rocket performed with particular reference to the engineering practices you used.

    Be prepared to defend the design choices you made, and also be ready to describe what limitations, errors, and ideas you have for moving forward with the design, as well as what you learned.