

Solar System Activity Bag

Rockets! *Engineering Challenge*: Student Activity Guide

In this activity, we will work the way NASA engineers do to build a rocket that can deliver a payload to a specific altitude in as few launches as possible.

These directions will get you started. Your teacher will be in contact to guide you and provide information.

Materials From The Bag

- 1 plastic tube with cushion (rocket body and payload)
- 2 small plastic caps (launch cap)
- 1 plastic cup, 4 oz. (launch cup)
- 1 graduated medicine cup, 30mL
- 6 effervescent tablets

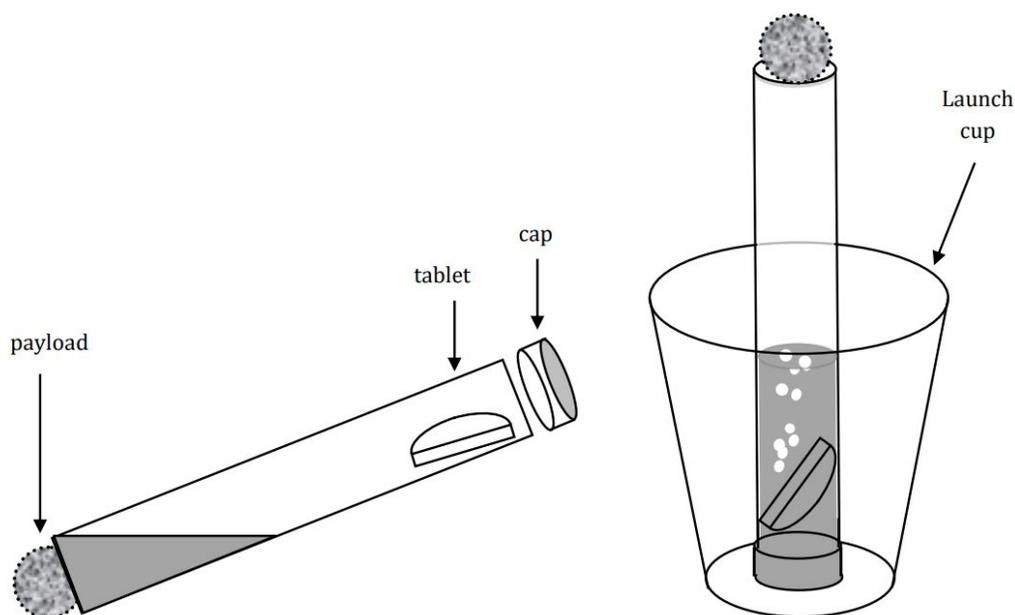
You Will Supply These Materials

- Water
- Tape Measure

Part 1: Exploration, Launching the Rocket

First, we will launch a rocket safely.

1. From the bag, grab the rocket body, small plastic cap, a 4 oz. plastic cup and effervescent tablets.
2. Put the launching cup on the floor where no one will run into it and where it's easy to clean up spills.
3. Open one package of effervescent tablets and break a tablet into 4 equal parts.
4. Use the graduated cup to measure out 7.5 mL of water and pour it into the rocket body.
5. Hold the tube at an angle as shown in the diagram below with the payload angled down and the mouth up. Place a piece of the effervescent tablet just inside the mouth so that it doesn't touch the water.



6. Place the cap carefully on the tube so that the tablet does not slide down into the water.
7. Place the rocket on its cap in the middle of the launch cup. The tablet will fall in the water. STEP BACK!!! The rocket will launch in 3-5 seconds.
8. Use the rest of your tablet to launch a few more times to get comfortable with the launch process.

Part 2: The Challenge – Deliver the Payload

Now that we know how to launch a rocket, it's time to make it go to a certain height and deliver its payload. Here's how to conduct some test launches to figure out how much water and effervescent tablet to use.

1. **Challenge: Using the rocket, determine how much water and effervescent tablet you need to deliver a payload into “outer space.”** You have been hired by NASA to complete this challenge. Each test launch costs a lot of money, so fewer launches is better.

Rules:

- launch only from the launching cup and use only the original rocket materials: a tube with the payload, launching cap, water, and part of an effervescent tablet.
 - the payload is the pom-pom on top of the rocket.
 - the payload must reach 80 inches or 203cm, the height of most interior doors. Place your cup on the floor inside the door frame and try to hit the top. Use your measuring tape to confirm the height.
2. Make a table to record how much water and effervescent tablet you used in each test launch. Also, record the height of each launch. Before placing the effervescent tablet in the mouth of the tube, record the amount by tracing the piece you used in your data table.
 3. When a test launch reaches 80 inches, record how many launches it took to complete the challenge.

Part 3: Extension – How High Can You Fly?

1. Continue to change the amount of water and effervescent tablet and see how high you can launch the rocket.
2. Show how you measured the height your rocket flew.