Quick & Easy
Balloons Starships

I. Observation

SAY SOMETHING LIKE: At our To Mars and Beyond VBS, we are learning how to go beyond with God. Here at the Science Station, we will always use the Scientific Method to take seemingly ordinary things and go beyond with them to make and learn extraordinary things!

ASK:
1 Have you heard of the Scientific Method before? (Briefly explain the steps; see page 5 for details if needed.)
2 Have you seen items like these before? What do you already know about them?

II. Question & Hypothesis

Do you think we can make a starship out of balloons? If we could, how far do you think it would fly? (Optional: Tally votes by raised hands and record the numbers.) Let’s test it!

III. Experiment

Step 1: Tie string to the top of one chair (at the height of about three feet, if possible). Leave the other end loose.

Step 2: Inflate a balloon and seal the air inside by folding the neck over and clamping it shut with a binder clip.

Step 3: Keeping the balloon sealed, tape a straw to your inflated balloon. Make sure the straw and the nozzle of the balloon are parallel to each other.
Step 4: Thread the loose end of your string through the straw so the neck of the balloon is facing towards you. Pull your string taut and tie it to the same position on your second chair.

Step 5: Count down to zero, and let the starship fly! What happens? Mark the point on the string at which the balloon stopped.

Step 6: Invite Voyagers to perform the experiment themselves (divide your group into teams, if needed). Repeat steps as time allows or until each Voyager who wants a turn gets one.

Go Beyond:
1. Use a measuring tape to record your balloon starship's circumference. Keep conducting trials using balloons inflated to progressively bigger circumferences. What happens?
2. STEM option: Provide materials such as paper, index cards, paper cone cups, etc. and invite Voyagers to see what modifications they can make to their rockets to make them go even further!

IV. Analyze & Apply

How Does it Work?
Newton's Third Law says, “For every action there is an equal and opposite reaction.” This means that, when you push on something, it pushes back just as hard. All known spacecrafts—including our balloon starships!—work by pushing gas through their nozzles forcefully, which pushes the spacecraft in the other direction. While all of our balloons pushed air out at roughly the same speed, the bigger balloons had more “fuel,” allowing them to exert force that was stronger and/or lasted longer.

Bible Tie-In!
SAY SOMETHING LIKE: Using science to go beyond in our experience of creation helps us to learn more about God. Even the most ordinary things—balloons, air, and the sky above—become extraordinary when we look at them through the lenses of the scientific method and our faith in the Creator!
**Showstopper**

**Film Canister Rockets**

**I. Observation**

SAY SOMETHING LIKE: In our Bible story, Daniel was under a lot of pressure to give in to his enemies. In this experiment, we’ll see how a lot of pressure can sometimes help us to “go beyond!”

ASK:

1. Have you heard of the Scientific Method before? *(Briefly explain the steps; see page 5 for details.)*

2. *(Show Voyagers the materials.)* Have you seen items like these before? What do you already know about them?

**II. Question & Hypothesis**

We’re going to put one of these tablets into a canister with some water. What do you think will happen? *(Tally votes by raised hands and record the numbers.)* Let’s test it!

**III. Experiment**

**Step 1:** Put on your safety goggles.

**Step 2:** Fill a film canister about halfway with water.

**Step 3 (Do this step very quickly!):** Place half of a fizzy tablet into the water, snap the lid firmly onto the canister, then flip the canister over so the lid is resting on the tablecloth.

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**Materials**

- To Mars and Beyond Tablecloth
- 35mm plastic film canisters with snap-on lids (available online)
- Fizzing antacid tablets, cut in half
- Water
- Safety goggles
- Optional: Stopwatch

**Preparation**

1. Optional: Create and display a poster of Newton’s 3rd Law.

2. Cover tables and set out materials.
Step 4: Step back and wait. What happens? (Optional: Use the stopwatch to time the reaction!)

Indoor Option: If you find in your test experiments that the reaction is too big for your Science Station space, you can do a smaller version by NOT flipping the canister over in Step 3. This will make only the lid fly off the canister. (Just have your paper towels ready!)

Step 5: Invite Voyagers to perform the experiment themselves (divide your group into teams, if needed). Be sure that each Voyager performing the experiment puts safety goggles on BEFORE they begin! Repeat steps as time allows or until each Voyager who wants a turn gets one.

Go Beyond:
1. Repeat the same steps using different amounts and temperatures of water. What happens?
2. STEM option: Provide materials such as paper, index cards, paper cone cups, etc. and invite Voyagers to see what modifications they can make to their rockets to make them go even further!

IV. Analyze & Apply

How Does it Work?
The antacid tablet and water produce a chemical reaction. Carbon dioxide gas is released and begins to build inside the canister. When the pressure is high enough, the film canister launches into the air. This is similar to how real rockets launch into the air or space, but they use rocket fuel to create thrust.

Bible Tie-In!
SAY SOMETHING LIKE: The pressure in our film canister rockets created a force that sent them flying! In our Bible story, Daniel experienced a different kind of pressure—to stop worshiping God. Pressure like that can create different reactions in people. Some might give in to the pressure; others, like Daniel continue to “go beyond” and worship God no matter what!