

Strange New Planet

Overview:

Youth will learn how scientists gain information from looking at things from different perspectives. They will observe model planets through a variety of simulated techniques including Earth-based telescopes, flyby and orbiter missions. Youth will formulate questions for the next lesson.

Goals:

- Learn about the types of missions.
- Learn how scientists observe and learn about planets.

Time Required: 1-2 hours

Materials:

To Make the Planets:

- Different colors of Play doh or modeling clay
- Miscellaneous Craft supplies
- Towel or cloth (to hide planet from view)

For each student:

- Paper towel tube, toilet paper tube or cardstock to roll into tubes.
- Stickers/markers to decorate the tubes
- Student Worksheets
- Crayons / Color Pencils

This activity will need to be set up in a large space, like a gym.

Procedure:

Set up:

1. Use play dough or modeling clay to create the planets. There is no wrong way to make them, be creative! Some tips/ideas:
 - Use multiple colors of dough or clay
 - Carve channels/valleys, make mountains, and/or craters
 - Use cotton to add clouds
 - Attach a smaller object with a toothpick or craft wire to create a moon.
 - Embed beads, sequins or other small objects in the dough/clay
 - Attach small stickers (could use sticker of a bug or other lifeform)
 - A planet or details that are blue will be “hidden” in the first part of the activity because blue cellophane is used to cover the telescopes.



Strange New Planet

2. Place the planets on a desk, table, or chair. Make sure the “back side” of the planet has something interesting that cannot be seen from the “front”. Cover the planets with a towel or cloth before students arrive. If using a gym, place them at about half-court.
3. Use masking tape to mark out a 2-foot distance square and a 5-foot distance square around the planets. You could also use cones or rope to mark off the distances.
4. Students should be grouped into Mission Teams. Each team should have 4-5 students. Try and have 1 planet for every 2-3 groups.

The Activity:

1. Tell students they have a mission. They are scientists who have just discovered a strange new planet, and their job is to find out all about it. They will be exploring this new world in the same way that NASA explores the solar system. Ask them what questions about the new planet they may have. Ask them how they might go about answering the questions.
2. To start, students need to construct a telescope. Give each student a paper towel tube, toilet paper tube, or a piece of cardstock rolled into a tube. Give them time to decorate their tubes with stickers, markers, etc. Give students a piece of blue cellophane and a rubber band. Instruct them to put the blue cellophane over one end of the tube and secure it with the rubber band. Explain to students the tube represents a telescope on Earth, and the blue cellophane represents the Earth’s atmosphere.
3. Arrange Mission Teams on one side of the room (opposite the “planets”). Tell students that they are standing in “Mission Control.” Students should stand with their backs to the planets.

Telescope Observations from the Earth’s Surface

4. Tell students they will have the first look at the “strange new planet” with their telescopes. Instruct students that when you start the time, they will have 30 seconds to view the planets through the telescopes. They can ONLY look through the telescopes (you might have them practice looking through the telescope, they can cover one eye with their free hand). Instruct them that when time is called they need to turn back around.
5. Lift the towel and instruct students to turn around. Allow the team to observe the planet(s) through their telescopes for 30 seconds, when time is up students should turn back around. Cover the planets.
6. Tell teams to discuss and record their observations. Ask students to create questions they have about the planet, based on their observations.

Teacher Tip: Most of the observations at this point will likely be general in nature, such as color, shape, texture, or a large, obvious feature such as the presence of a moon.



Telescope Observations from above the Earth's Atmosphere

1. Ask students to remove the blue cellophane and take one-step toward the planets. Tell them that their viewer is now a space telescope (like the Hubble) and that the atmosphere no longer obscures their view. Scientists operate the telescope and view images from control stations on Earth.
2. Tell students that a space telescope is expensive, and many scientists want time to use it to answer their questions. So, they have short scheduled times to use it.
3. **Like before**, Instruct students that when you start the time, they will have 30 seconds to view the planets through the telescopes. They can **ONLY** look through the telescopes. Instruct them that when time is called they need to turn back around.
4. Lift the towel and instruct students to turn around. Allow the team to observe the planet(s) through their telescopes for 30 seconds, when time is up students should turn back around. Cover the planets.
5. Allow students to discuss and record their observations. Ask students to create questions they have about the planet, based on their observations.
6. At this point, if they have not already done so, each group should identify one specific planet that they will focus the rest of their observations on.

Fly By of the Planets

Teacher Tip: For this part of the activity, students will simulate a fly-by of the planet. If possible, the planets should be set up in the middle of a large space (gym). Have students fly (walk quickly) by the planet and move to the other end of the space, keeping their backs to the planets. A fly by spacecraft is on a one-way trip, it does not return to Earth. Examples of this kind of mission include Voyager 1 & 2 and New Horizons (see links at the end of the lesson). If this is not possible, simulate the flyby by keeping half of the planet covered with the towel/cloth and have students return to the starting point, keeping their back to the planets. Remind students that a real fly by does not return to Earth but continues on that path.

1. Tell students they will have a chance to pretend to be a spacecraft that will quickly fly by the planet. Instruct students that fly by missions are robotic spacecraft that are programmed and controlled from Earth. No astronauts are on board these spacecraft. Images are sent back via radio signals.
2. Instruct students that they will quickly walk pass their planet, but they cannot cross the masking-tape line that is 5-feet from the table. Have the first team turn around and make a pass by (fly by) the planet(s), and either move to the opposite side or return to Mission Control, keeping their backs turned once there.
3. Repeat with remaining teams.
4. Once all teams have conducted their fly by mission, cover the planets with the towels.
5. Give students an opportunity to record their observations and discuss what questions they have for an orbital mission.

Strange New Planet

Teacher Tip: It's okay for students to discuss their finding in earshot of other students. Scientists work in much the same way, learning from their peers and building on top of previously done science.

Orbiting the Planets

1. Uncover all sides of the planet(s).
2. Tell each mission team they have one minute to orbit (circle) the planet at a distance of no more than 2 feet. Allow each team to conduct their mission and return to mission control. Again, keep in mind these are robotic missions controlled by people on Earth. Real orbiter missions do not return to Earth.
3. Hand out a *(D) Orbiter Observation Worksheet* to each student. Give students an opportunity to record their observations.
4. Tell students that the next mission would be a lander or a rover mission. Examples of this kind of mission are the rovers on Mars. Tell students in our next activity we will look at how scientists and engineers work together to design a mission to a planet. Ask students to think about what they learned today and write down questions they might have for a lander or rover mission.
5. Review the vocabulary for this mission as needed (Flyby, Orbiter, Lander, Rover)

Common problems / Additional guidance:

Adapted from the following lesson:

- Mars Education at Arizona State University, Strange New Planet
<https://marsed.asu.edu/strange-new-planet>

Learn more about NASA Exploration Missions:

- NASA Solar System Exploration Missions: <https://solarsystem.nasa.gov>
- NASA Mars Exploration Missions : <https://mars.nasa.gov>
- Voyager 1 & 2 Missions : <https://voyager.jpl.nasa.gov>
- New Horizons Mission : <http://pluto.jhuapl.edu>

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