



Adventure Description:

In this adventure, students will think like a NASA engineer and test how sound travels in space.

Activity

Teacher Note: This activity requires downloading an app on a smartphone to measure noise. It also requires Teacher Prep. See

[Handout: Teacher Prep](#).

Step One: Background Information on NASA Engineers and Sound in Space (5-10 minutes)

- Ask students how they think sound works. Explain that sound is a form of energy that is carried by moving molecules. For example, when you clap your hands, the air molecules around your hands push into each other. This causes a wave of air molecules pushing into each other, like when you push on a spring (slinky). Show [Handout: Sound](#).
- When astronauts are onboard a space craft or space station, the air surrounding them is a lot like the air surrounding a person on Earth. The pressure is about 1000 millibars in both locations, and there are about the same amount of air molecules. The astronauts can breathe oxygen in the air and can hear noises. For example, if someone uses a drill, the astronaut will hear the sound.
- Although sound on spacecraft works the same way as on Earth, astronauts will hear noises differently when they step outside on different planets. Show [Handout: Sound on Different Planets](#).
- Explain to students that a NASA Engineer is an engineer that specializes in designing equipment like spacecraft for NASA to use in space. NASA engineers also help teach and train astronauts about what to expect when they go up in space.
- Explain to students that they will think like a NASA Engineer and perform tests to see how changes in air pressure affect the sound that travels to our ears. Then, they will record a video that will be used to train new astronauts!

Step Two: Testing Sound (20 minutes)

- Explain to students that they will now investigate how sound changes when air pressure changes.
- Divide students into pairs or small groups. Ensure that one student in each group has a smartphone or tablet to record their training video. If you do not have access to recording devices, skip the training video portion and perform the experiment only.
- Provide students with [Handout: Testing Sound](#). Walk through the steps on the handout as a class.
- Provide students with the following materials:
 - Prepared buzzer in mason jar
 - D battery
 - 4 1" pieces of electrical tape

Please contact Allison Bischoff, Director of Teacher Support, at allison@rozzylearningcompany.com or 314-272-2560 with questions.

NASA Engineer: Testing Sound in Space

- Tea light candle
- Long handled lighter
- Timer
- Shallow bowl of ice water
- Have students complete Steps 1-3 on the handout.
- While students are working, ask students the following questions:
 - Why do we want to know the noise level in the room before we start? (Because we want to see how much noise the buzzer adds to the room.)
 - Why do we want to know the noise level of the buzzer before it is in the jar? (Because we want to know how much noise the buzzer makes.)
 - Why do we want to know the noise level of the buzzer in the jar before we lower the pressure? (Because we want to compare the buzzer in a normal Earth pressure to the buzzer in a lower pressure.)
 - Why do we heat the air before we seal the jar? (Heating the air spreads out the air molecules and makes them move fast.)
 - Why do we cool down the air after we seal the jar? (The spread out, fast molecules will slow down which will lower the pressure.)
- Teacher Note: An explanation of the different results students will see is on [Handout: Teacher Key](#).

Step Three: Writing a Training Video Script (10 minutes)

- Explain to students that they will now write their script for their training video. Have students complete Step 4 on the handout.
- As students are working, ask the following:
 - What do you think astronauts need to know about how sound travels in space?
- Teacher note: students can practice their script if they finish before other students.

Step Four: Record an Episode (10+ minutes)

- Explain to students that they will record their training video using a tablet or phone. Students can use the video feature on a smartphone and record themselves.
- Have students first record a practice video so they can get used to talking in front of a screen.
- Have students record their training video!

Step Five: Discussion (10-15 minutes)

- Have students share their training videos with the rest of the class.
- Have a concluding class discussion about air pressure's effect on sound.

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NASA Engineer: Testing Sound in Space

Materials List

Provided online:

- Handout: Teacher Prep
- Handout: Sound
- Handout: Sound on Different Planets
- Handout: Testing Sound
- Handout: Teacher Key

Not provided (Each group needs):

- 1 pint size mason jar (wide mouth) with metal top
- Buzzer with wires attached
- D battery
- 4 1" pieces of electrical tape
- 1/16" drill bit Drill
- Tea light candle
- Long handled lighter
- Smart phone with noise meter app
- Timer
- Shallow bowl of ice water

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