WONDERS OF THE WOODLANDS SCIENCE CAMP

Blast Off Science!

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How Do Astronauts Live in Space?

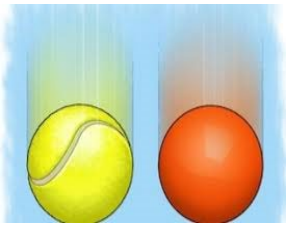
Introductory language for your students: ***"Astronomy is a very fun science to learn about. When we talk about space with its stars and planets, the sun and moon, or other places that are in outer space that is all part of astronomy. Today, you are going to become a Junior Astronaut! Who knows what an astronaut is?*** (An astronaut is a person who explores space to learn about things like stars and planets. Show a picture of an astronaut.) ***Astronauts study and experiment in space to learn more about it."*** Read *There's No Place Like Space* by Dr. Seuss or another astronomy book like *Astronauts at Work* by Deborah A. Shearer throughout the lesson.
Another resource: https://storytimefromspace.com/mousetronaut-2/

Why do astronauts float in space?

"Astronaut, astronaut, what do you do? (children)
I float in space, just like you!" (teacher)

Astronauts seem to float because in space, there is very little gravity. (Show them a photo of astronauts floating in the space station.) To demonstrate what you mean by gravity, hold a pencil in your hand. Ask the children what will happen to it when you let it go. Then, drop it. Crash!

What is it that pulls the pencil down to the floor? **Gravity**! In space, there is very little gravity. Everything floats, including people! So what would the pencil do in space? (It would float away.) Everyone stand up, jump, and float!!!! Can you do that? No way! You have to land back on the floor because gravity pulls you back down! Jump up and down a few times.



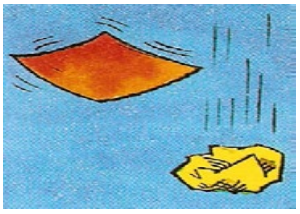
How does gravity affect objects?

*Astronauts must deal with the absence of gravity.
Collect a number of balls of different sizes and weights.

Explain to the class that you will drop 2 different but same-sized balls at the same time from the same height to see which one hits the ground first. Ask them to predict which ball will land first. Will it be the heavier one? Stand and hold the balls at the same height from the ground. To make the fall last longer, stand on a chair or stepladder. Drop both balls at the same time. What happens? Was one ball faster than the other? Why did they fall to the ground?

Roll a piece of paper into a tight ball. Show the class a rock that is about the same size as the wadded-up paper. Which one do they predict weighs more? Let them hold them or weigh them on a toy scale.

Which one do they think will hit the ground first? Drop the objects from the same height at the same time. What happens? (They land at the same time!)
Now let the children take turns dropping balls. They can stand on a stepladder or playground equipment to add height. Be sure they drop both balls at the same time; it might take a little practice!



Extension: Drop different shaped objects together like a feather and a ball, a piece of paper and a wadded piece of paper, etc. Now what happens? Due to air resistance, the objects fall at different speeds. The more there is to resist, the slower the fall. That's why the sheet of paper falls more slowly, similar to a parachute.

Science explanation: Gravity is why objects fall to the ground. When two objects that are about the same size are dropped simultaneously from the same height, they hit the ground at the same time! How much they weigh does not matter. Their shape does matter! When objects like the paper and wadded-up paper are dropped together, the wadded-up paper hits the ground first. It is air resistance that slows down the other sheet of paper.

Need: lots of different sized balls, small stone, piece of paper, toy scale (optional); Options for extension: 2 identical sheets of paper, feather

Gravity Art

Set up a long strip of butcher paper on the ground outside. Use cones or other objects to hold down the edges. Place a stepladder on one side of the paper or use another object on which the children can safely stand. Another option is to do this on the playground and use playground equipment for height.

Provide water color paint in several small dishes. Give each child a pom pom or cotton ball. Try to use different sizes. Show them how to gently apply paint to a pom pom by dipping it. Explain that they are going to paint with a little help from gravity!

Climb the stepladder and drop the painted pom pom onto the paper. Ask them to predict what will happen. Observe the shape and sizes of the splatter. Ask them to explain what they observe. Does the size of the pom pom make a difference? Does height matter? What else can change the size and shape of the splatter?

Now ask the students to stand on the ground and drop their pom poms on the paper. Ask what they observe. Are the splats as big? What about the shapes? Why are they different now?

Science explanation: Guide them in their learning so they understand that when a pom pom falls from a higher place, it makes a bigger splat! Also, bigger pom poms make bigger splats. What is it that is pulling the pom pom down to the ground? **GRAVITY!!**

Need: strip of butcher paper (brown may be thicker), various colors of tempera paint, small containers for paint, different sized pom poms or cotton balls, step ladder or playground equipment

Why do astronauts wear special clothes in space?

Begin each new concept about astronauts with this cute chant.

"Astronaut, astronaut, what do you do? (children)
I WEAR SPECIAL CLOTHES, what about you?" (teacher)

Flight Suit Fun

Ask the children if they ever have to wear special clothes. Think of various sports and seasons, etc. Astronauts must wear special clothes when they are in outer space. Show a

flight suit on an astronaut toy or photo (like in this photo). Lack of gravity is why flight suits have lots of pockets to hold many things. Flight suits also have lots of Velcro on them. Why? (Since everything floats, tools must be attached to the astronaut or they will float away.)

Attach a Velcro dot to a toy tool like pliers or a hammer. Attach the other part of the Velcro dot to your shirt and show them how the tool attaches to it. This is how astronauts keep tools from floating off in space! Give each child a small piece of Velcro. Let them explore its properties as they stick it together and pull it apart.

There are times that astronauts have to leave the space station to do work or experiments outside of the space station. Thus, astronaut flight suits have to be special for specific things.

"A flight suit is special because in space, we can't <u>breathe</u> the air." Show the class pictures of real astronaut helmets. The helmet protects the head and allows them to breathe oxygen from an air supply in the flight suit. Show them the helmet they will make (see below).

"A flight suit is special because it is <u>very cold</u> in outer space." It protects the astronaut from getting too cold.

"A flight suit is special because it is <u>hard to move</u> in outer space." Explain that the jet packs help the astronaut move around if they are outside of the space station. It's almost like they fly!

Extension: Astronauts are given special I.D. numbers on their flight suits. Each child can have their own I.D. number, too! Start with N for United States, then write the month and date of their birthday. Put a zero in front of any single digits. Then add their first and last initials. For example, the I.D. number of astronaut Neil Armstrong, whose birthday was August 5, is N0805NA.

Need: (total): Velcro dots, toy tool, pictures of: objects floating in the space station (to show no gravity) and an astronaut in a flight suit working outside space station

Making Space Helmets and Jet Packs

Read a book about traveling in space. Else Holmelund Minarik's *Little Bear Goes to the Moon* (Harper Trophy 1978) is an endearing story about a little bear who wears a homemade space helmet and tries to get to the moon.

<u>Helmet Option 1</u>: Use paper grocery bags (cut to size) to make space helmets. Cut a circle in each one that is large enough for a child's face. Guide the class in decorating their helmets. Optional: Tape clear plastic (not Saran wrap) on the back of the circle.

Need: paper grocery bag, scissors, markers, star, planet, moon stickers; Optional: clear plastic (the kind used with gift baskets, tape

<u>Helmet Option 2</u>: Included in your hand-outs is a pattern for a different space helmet that can be cut out of card stock. Again, the children can decorate their helmet with space stickers or paint or crayons. Tape a piece of sentence strip to both sides of the helmet, sized to fit the child's head.

Need: helmet pattern, card stock, scissors, crayons, sentence strip, tape, star, planet, or moon stickers

<u>Jet Packs</u>: Cover 2 empty 2-liter soda bottles with silver spray paint or silver duct tape. Tape them together with duct or electrical tape. You can add gas trails by gluing red and yellow streamers or ribbon to the mouth of each bottle. Tissue paper also works.

To make the arm straps, use string, yarn, or old tubing. If you have an old cloth tote bag, the cloth straps work also well for this. Alternatively, you can use ribbon as straps, attaching it to the jet pack with duct tape, or just fold duct tape over itself to make it non-sticky and use that as straps. Tape the arm straps to the back of the jet pack, as if they were backpack straps.

Need: 2 empty 2-liter soda bottles, scissors, silver spray paint or silver duct tape, red and yellow streamers or tissue paper, options for straps: string, ribbon, old tubing, duct tape, or cloth bag straps

How do astronauts travel to space?

"Astronaut, astronaut, what do you do? (children)
I LIKE TO FLY TO SPACE, what about you?" (teacher)

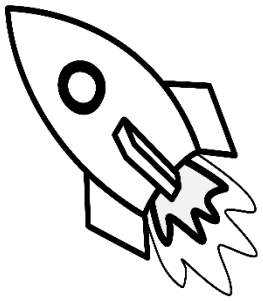
Ask the children to tell you different ways that they travel. Then introduce how astronauts travel.
Teacher says: **"Little astronauts who fly so high, what can you see up in our sky?"**
(Show a picture of outer space.)
Children say: **"I see planets and moons and lots of stars, because my rocket goes so far!"** (Arms held out overhead like a rocket--zoom, zoom!)

Zoom, Zoom, Zoom, I'm Going to the Moon Song:
https://m.youtube.com/watch?v=tMJ9pZ9W7jc and https://m.youtube.com/watch?v=wu3LSyBxkic

Blast Off!

Children love to dress up in their space helmets and jet packs to blast off into space in this fun rocket.

Use a large box to be a rocket. Attaching a poster of a rocket to the outside is a simple method, or have the children decorate the box. Cut a door in the box and cut that piece cardboard into a triangle to be the tip of the rocket. Attach with duct tape. Add glow-in-the-dark stars on the inside.



Choose two children to be the first astronauts. They may get into the rocket (gently).
Sing this song to the tune of "I'm a Little Teapot" to prepare for the countdown!

I'm a little rocket big and strong,
I fly to outer space, all day long!
Hearing the countdown is what I LOVE
So I can blast high into the sky above!

Lead the rest of the class in **5-4-3-2-1 BLAST OFF!** At the words "blast off", carefully shake the box to simulate the movement of a lift off. The teacher is mission control giving commands to the astronauts in the rocket. Be creative! ***"What does space look like? Can you see stars? Planets? Get ready for landing."*** etc.

Need: large cardboard box, scissors, sun, planet and moon stickers, glow-in-the-dark stars, optional: paint

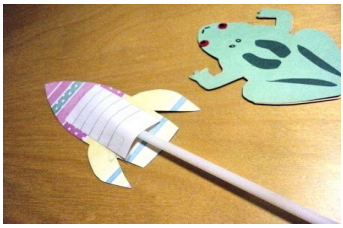
Rocket Parachute Game

Use a parachute or large sheet to represent the moon. Tell the class that they are going to make a pretend trip on a rocket to the moon. Show them how to squat down and grab the edge of the parachute tightly with both hands. Place a toy rocket on the parachute. Say a count down, **"5-4-3-2-1 BLAST OFF!"** Children raise the parachute high in the air, over their heads, causing the rocket to blast off!

Extension: When the parachute is filled with air and high above their heads, call two children's names to "moonwalk" underneath the chute. Encourage them to pretend there

is no gravity and to “float” around. When the parachute starts to fall they must run back to their spot. Continue doing this until each child had had a weightless walk on the moon!

Need: parachute, toy rocket (optional)



Straw Rockets

Cut out 1 rocket per child. See the attached template. Give the children time to color their rocket. Cut out a 1 X 1.5 inch rectangle of index card for each rocket. Use clear tape to secure a rectangle to the reverse side of each rocket. Do not tape the bottom of the rectangle.

Optional: Tape threads or small strips of soft paper to the bottom of the rocket to simulate engine exhaust. (Note the frog pattern in the picture. This activity can be used to launch frogs, too!)

Insert a straw into the open end of the index card. Take a deep breath and blow through the straw to launch your rocket! Awesome!

Extension*:* Place a measuring tape on the ground and kept track of which launch flies the farthest. Set out Hoola hoops or buckets as targets. How many times can they land their rocket into the target?

Science explanation for older students: Rockets are used to launch astronauts into outer space. For 30 years they were used with space shuttles. Show your students a model or picture of a space shuttle like this photo to the left. The first space shuttle was *Columbia* which was launched in 1981. For the first time, a spacecraft could go into space and return to Earth, landing like an airplane!

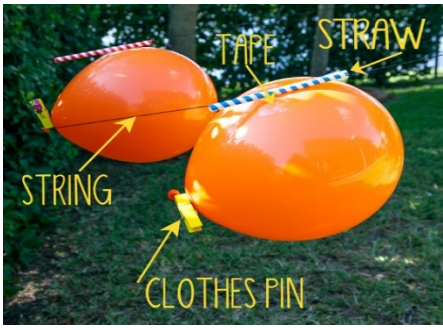
Now shuttles are no longer used and to get a ride to the International Space Station, our astronauts must use the Russian *Soyez* spacecraft.

Need: scissors, crayons, drinking straw, card stock or sturdy paper, small index card, thread/string or soft paper, clear tape; For extension: measuring tape, Hoola hoop

Balloon Rocket

Thread a straw through a piece of string or fishing line. Do this on two 6-foot strings so the balloon rockets can race each other. Attach the string or fishing line from one sturdy object to another in an open space. Place 2 pieces of tape on the straws so that it will fasten on to inflated balloons.
Blow up a balloon and pinch the top so air cannot escape (children will need help pinching the balloon). (One option is to pinch the balloon with a clothespin.) Press the balloons against the tape on the straws.

Have a countdown, let go of the balloon, and watch it fly down the string! Move the balloon back to the starting line, blow it up, and have more blast offs. WOW!



What makes a balloon rocket go faster? Slower? How far did it travel? Try this with different sizes of balloons and compare the difference as they race each other.

Science explanation: Real rockets work in a similar way. A rocket engine is powered by exploding fuel inside of a chamber that is open at the bottom. The force of the explosion creates an opposite force that pushes the rocket up and into space.

Need: 12 feet of string or fishing line, different sized balloons, tape (packing tape works well), 2 straws, Optional: clothespins

What do astronauts do in space?

"Astronaut, astronaut, what do you do? (children)
I HAVE TO EAT just like you!" (teacher)

Astronaut Food Tasting

Food weighs less and takes up less space when the water is taken out of it. Show your students a banana. Then show some banana chips. Which takes up more space? Which weighs more? **Why is weight so important in space travel?** Pass both around the room so they can compare the weight of the banana chips to the banana.

Show them the baggie of pudding mix. Carefully add water to it. Squeeze the baggie to mix it. Now it looks like the pudding we eat! Cut off a tip of the baggie and squirt small amounts into open mouths!

Show the children the samples of earth food and space food. Discuss the ways that the food is different and the ways it is similar to our food.

Earth Food	Space Food
banana	banana chips
grapes	raisins
chocolate pudding	chocolate pudding mix (dry)
apple	apple chips

Who wants to taste a banana chip? Pass a piece to each child who wants a taste. Which do they like better? the "earth" version of food or the "space" version of food.

Extension: Give each child a small amount of Kool Aid powder in a small cup. Let them add water to it and stir. What happens when they add water? Compare this to what happens to astronaut food!

Science explanation: When it is time to eat, water is added back into the food. Then the food tastes and looks more like the food we eat. In space, a typical meal might include shrimp cocktail, steak, broccoli, rice, grape drink, chocolate pudding, and fruit cocktail. Since taste buds do not work as well in space, astronauts heap on liquefied salt and pepper, Picante sauce, catsup, and mustard! Yum, yum!!

Need: grapes, raisins, qt. sized baggie, chocolate pudding mix (dry), apple, apple chips, banana, banana chips, For extension: small cup, Kool Aid powder, plastic spoon

"Astronaut, astronaut, what do you do? (children)
I HAVE TO SLEEP, just like you!" (teacher)

Space Snoozin'

The children will have fun pretending to sleep like astronauts. Help a child climb into a sleeping bag and zip them in while standing. (With no gravity, many astronauts sleep vertically attached to a wall!) Wait, what if they start to float off? Why do astronauts have to be buckled in when they sleep? (NO GRAVITY!) Put the belt around the sleeping bag and fasten it. Provide earmuffs and eyeshades.

Need: sleeping bag, ear muff, eyeshade, old belt

"Astronaut, astronaut, what do you do? (children)
I WORK WITH TOOLS, how about you?" (teacher)

Outer Space Tool Box

Children will love putting on space gloves like an astronaut does when they have to work outside of the space station. This activity is an excellent way to practice their fine motor skills.

Cut 4 holes, 2 per side, in the sides of a medium or large sized cardboard box. The children should be able to see over the top of the box, so it cannot be too large. Place a glove in the inside of the box and push its open side through a hole. Fold the ends of the glove around the hole and tape them in place on the outside of the box. (You may need to cut them.) Do this with the other gloves.

Place items in the box; see ideas below. Cover the top with clear plastic wrap and tape it in place.

Show your class how to put their hands into a pair of space gloves and perform various tasks. Can you pick anything up using the tweezers and the tongs? What about using a magnetic wand to attract things in the box? Can you look at items closely using the magnifying glass? Place some of the space rocks into the kitchen strainer. Can you attach the Duplo or Lego blocks together? What else can you do just like an astronaut in space?

Is it easy or hard to handle the items with space gloves on? How do astronauts do their work with such large gloves on?

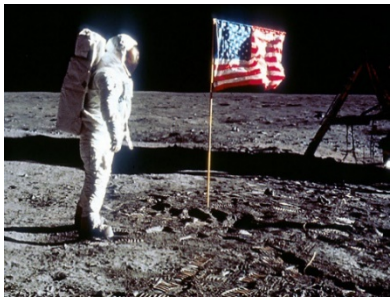
Teacher tip: This can also be done without making the box described above. The items can be placed in a water table, rubber tub, or box.

Extension: Show the children how to use a gripper tool to pick up balls, Duplo or Lego blocks, and paper clips. How hard can it be to use the gripper tool to put a paper clip into the plastic bowl? Can you do these things while wearing space gloves? Try it and see!

Science explanation: When astronauts work on things outside of the space station, they must wear special gloves for protection. Outer space is very cold and has no gravity for them to hold their tools easily. They have to practice doing all kinds of tasks wearing their large space gloves.

Need: medium to large-sized cardboard box, clear packing tape, 2 pairs of small rubber gloves, sharp scissors or box cutter, clear plastic wrap, items for box: tweezers, magnetic wands, magnetic marbles, paper clips, twist-ties, tongs, pom poms, magnifying glasses, rocks, aluminum foil balls (space rocks), small kitchen strainer, Duplo or Lego blocks, etc.

For extension: gripper tool (as seen in photo or use the toy ones with animal heads), balls, large paper clips, plastic bowl, pair of gardening gloves or small rubber gloves, 6-8 balls of aluminum foil (moon rocks), other objects that you choose



How did astronauts walk on the moon?

In July 1969, astronaut Neil Armstrong from the U.S. took the first steps on the moon! There are 12 astronauts who've landed on the moon! People have always been curious about the moon. Let's learn more about the moon just like the astronauts did!

Moon Walking

Set up a moon walking area in a designated area. This will consist of large foam pads placed on the floor. Make "moon walking" shoes by wrapping strong rubber bands around sponges at both ends. These should be loose enough to wrap over the children's shoes. (Optional: Make the rubber bands tighter if you want the children to take off their shoes.) Draw a foot on the sponge to show foot placement.

Sing this song (to the tune of "The Farmer in the Dell") during the activity.

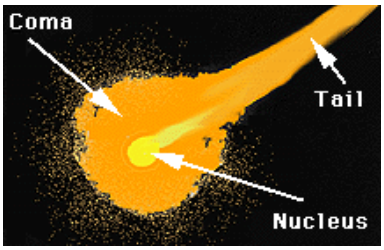
"I'm walking on the moon,
I'm walking on the moon,
There is no gravity,
I'm walking on the moon!

I can jump real high,
I can jump real high,
There is no gravity,
I can jump real high!"

Need: 1-2 large foam pads (like the kind used on beds), several pairs of medium to large kitchen sponges, thick rubber bands (2 per sponge), and permanent marker

What else do astronauts like to learn about?

Cool Comets

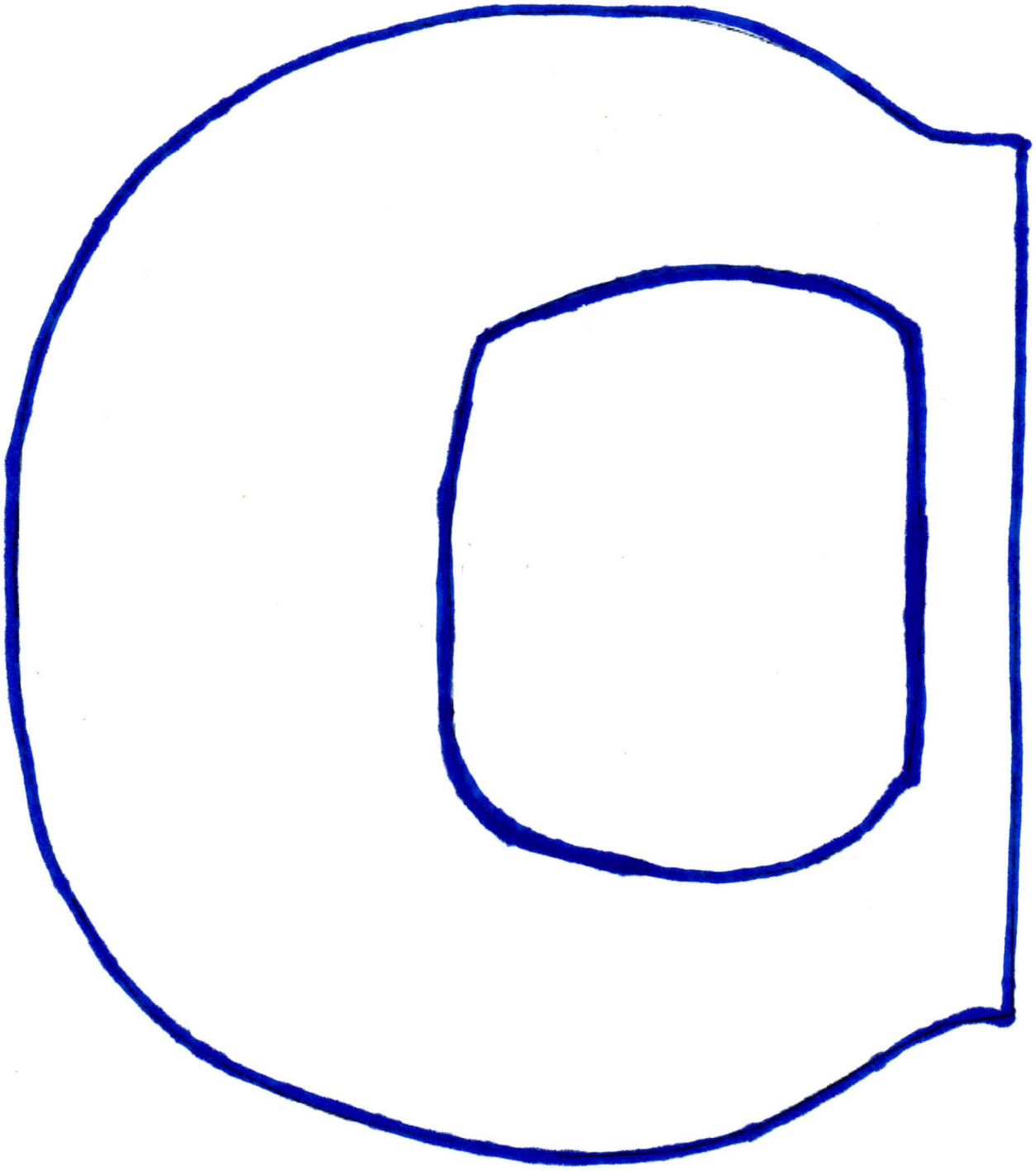


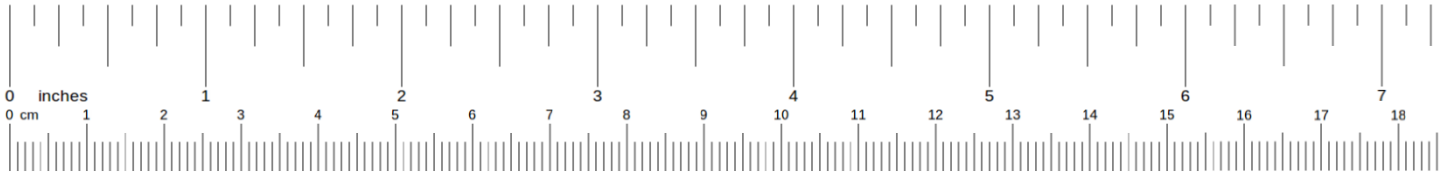
Comets are balls of dust, stones, gases, and ice that travel through space around the sun. Sometimes at night we can see them speed across the sky!
For younger students, the teacher should make a few comets to share. Older students may help make a model of a comet to help them learn the main parts.

For 1 comet: Cut yarn or string into an 18 inch piece and streamers into 12 inch pieces (1 yellow, 1 blue per comet). The streamers represent the gas and dust tails of a comet. Crumple up a piece of aluminum foil into the size and shape of a lemon to be the nucleus. Place the ends of the streamers in one end of the foil and tie the string securely around that end.
Show your class how to twirl the comet in a circle around their head or take them outside to run so their comet really flies behind them!

Science explanation: The nucleus of a comet is made of ice, and it is surrounded by a cloud of dust called the coma. As a comet approaches and gets close to the sun it starts spewing more dust and gas. This debris forms a tail which is the image we are familiar with; the tail will always point away from the sun.

Need: picture of a comet, scissors, piece of 12 X 12 inch aluminum foil, 12 inch strips of a yellow streamer and a blue streamer, yarn or string (cut into 18 inch length)

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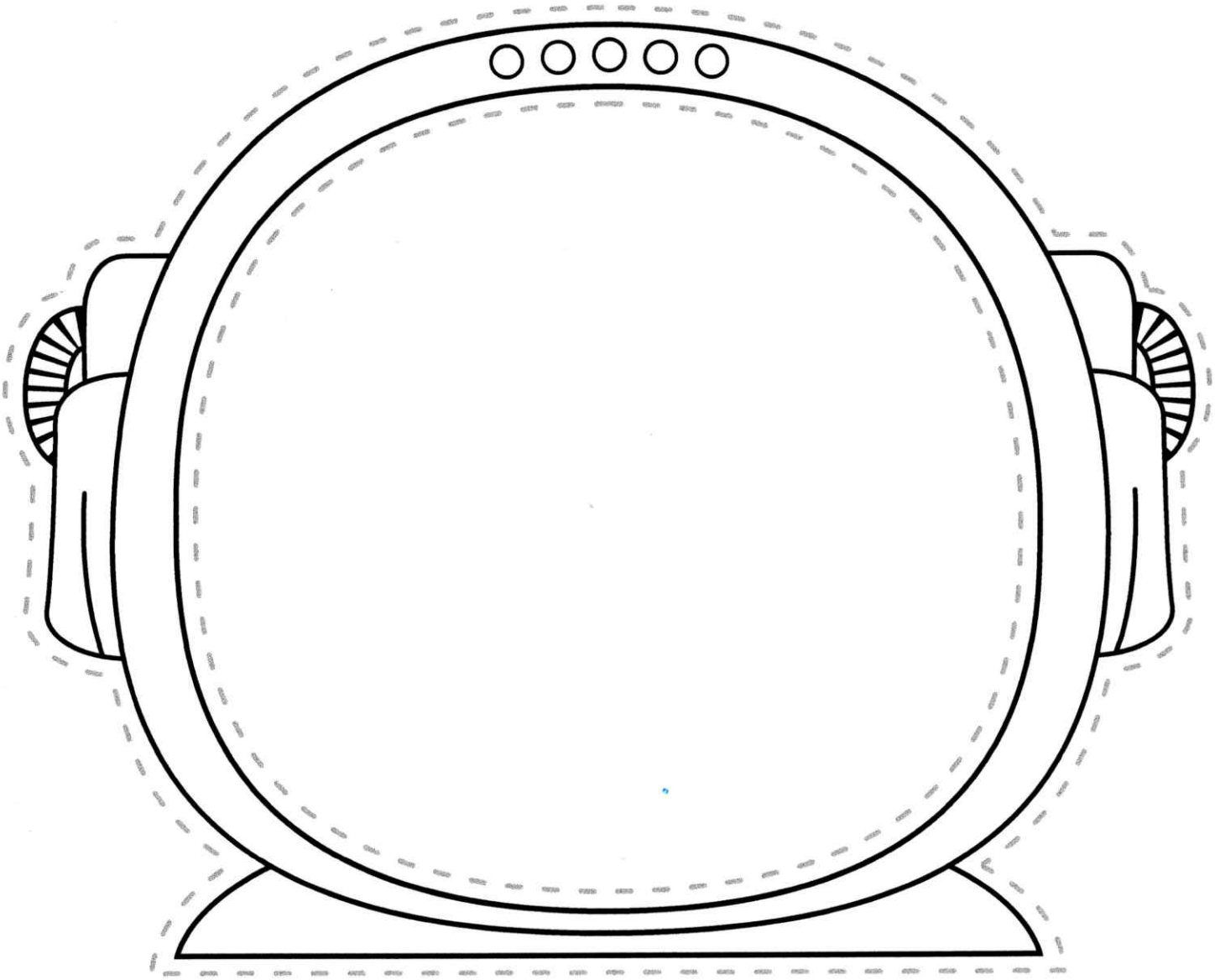

Landing on the Moon Headband