

"Out of this World"
Family Science
Night 2Go

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CLOUDS ON VENUS

MATERIALS:

- Skinny glass cup
- Vinegar
- Baking soda
- Match
- Tongs

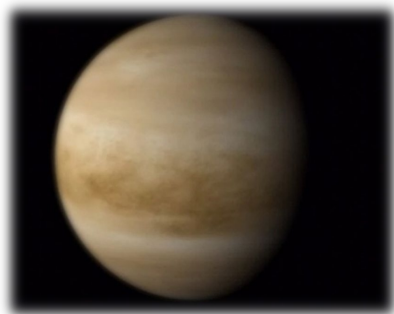


PROCEDURES:

1. Pour about 10–20 milliliters of vinegar into your glass (15 milliliters = about 1 TBSP).
2. Add about a teaspoon of baking soda and watch the reaction.
3. The bubbles are carbon dioxide bubbles. Carbon dioxide is much heavier than our air, so a lot of it will settle in the graduated cylinder after the reaction stops.
4. Light a match and using the tongs, “dip” the match into the carbon dioxide. The carbon dioxide should put out the flame.
5. Keep the burnt out match inside the graduated cylinder for 5–10 seconds while it “smokes.” The carbon dioxide will trap the smoke and make a cloud, just like on Venus!

Fun Venus Facts!

- 2nd planet from the Earth
- The 6th largest planet in our solar system
- Takes 225 Earth days to go around the sun.
- Takes 243 Earth days for one day
- Has an atmosphere made of 96% carbon dioxide.
- Even though Venus isn’t the closest planet to the sun, it is still the hottest.
- The entire surface of Venus is constantly covered by clouds. These clouds are made up mostly of carbon dioxide which has a greenhouse effect keeping in the Sun’s heat like a giant blanket.



METEOROID MOON CRATERS

MATERIALS:

- ❖ Small foil pan
- ❖ 1-1.5 Cups of Flour
- ❖ Meteoroids: rocks, golf balls, marbles
- ❖ 1-2 Tbsp of Cocoa powder



Procedure: Size of the Meteoroid

1. Fill the pan halfway with flour. Sprinkle the cocoa powder on top of the flour.
2. Pick out the smallest “meteoroid” and drop it from eye level into the pan. What do you observe? What do you think will happen if you drop a larger meteoroid from the same height?
3. Drop a medium size “meteoroid” from the same height. What is different about the crater?
4. Drop the largest “meteoroid” from the same height. What do you observe?

What are Moon Craters?

Do you know what sport you'd have to be really good at if you lived on the moon? Dodgeball! That's because every day there are rocky pieces of space debris called **meteoroids** flying toward the moon from outer space. When these space rocks make contact with the moon, they explode like bombs, making holes on the moon's surface called **moon craters**. If you look up at a full moon on a clear night, it looks like a perfect round ball. But if you could fly up closer to the moon, you'd see that its surface is filled with craters thanks to billions of years of impact from space debris. Yet, the moon is not the only target for this flying material. Craters can also be found on planets, like Mars, Mercury, and even Earth!



Meteor Crater near Winslow, Arizona was formed by an impact that happened 50,000 years ago. An explosive force greater than 20 million tons of TNT left a crater 700 feet deep (210 meters) and over 4,000 feet (1,200 meters) across.

MOON SAND



MATERIALS:

- 2 CUPS OF FLOUR
- ¼ CUP OF VEGETABLE OIL
- LARGE ZIPLOC BAG

PROCEDURES:

- 1) In a large Ziploc bag add the flour and then add the oil. Shake the bag until well combined.
- 2) You might have to dig your hands in the bag to smash out some of the lumps.
- 3) Pour it into a plastic container. You can add different objects such as cookie cutters, cups, scoops, etc. to play with.
- 4) Store your moon sand in an airtight container.

LUNAR SOIL

The surface of the Moon is covered with a fine powdery material that scientists refer to it as "lunar regolith". Nearly the entire lunar surface is covered with regolith, and bedrock is only visible on the walls of very steep craters. The Moon regolith was formed over billions of years by constant meteorite impacts on the surface of the Moon. Scientists estimate that the lunar regolith extends down 4-5 meters in some places, and even as deep as 15 meters in the older highland areas.



PLANET IN A BOTTLE

MATERIALS:

- ❖ 1 Cup lukewarm water
- ❖ 3 sugar cubes
- ❖ 1 ¼ oz. package of yeast
- ❖ Empty water bottle
- ❖ Balloon
- ❖ Funnel



PROCEDURES:

1. Mix the water and the sugar in the water bottle until the cubes are dissolved.
2. Using the funnel, add the yeast and gently swirl the mixture.
3. Cap the bottle with the balloon. Wait a few minutes to see what happens.

About this mixture:

This basic recipe can be considered an "Earth in a Bottle". It is a warm, healthy environment for yeast with plenty of nutrients. The total amount of CO₂ in the balloon when it reaches its greatest volume is proportional to the number of healthy yeast microbes present in the initial sample.

Variations:

- **Mercury in a Bottle:** Mercury's surface is very hot. Boil the water before adding sugar and yeast.
- **Venus in a Bottle:** Venus is very hot, and has an acidic atmosphere. Instead of water and sugar, use scalding hot orange juice as a nutrient mix.
- **Moon in a Bottle:** The moon has no atmosphere, so the yeast on its surface would be exposed to a strong vacuum and solar radiation. Expose the yeast to a vacuum, using a hand pump bell jar, and to radiation in a microwave oven.
- **Mars in a Bottle:** Mars is cold and has a thin atmosphere which allows solar UV radiation to penetrate to its surface. Freeze the yeast, and then expose the microbes to UV radiation from a UV lamp before adding yeast to the nutrient mix.
- **Europa in a Bottle:** This moon of Jupiter may harbor the largest ocean in the solar system. The icy surface is a combination of pure water ice, Epsom salts, and unknown minerals. Freeze a briny mixture of water and Epsom salt. Break the ice into chips and mix the salty ice chips with a cold nutrient solution.
- **Callisto in a Bottle:** This moon of Jupiter may have a salty ocean beneath its frozen crust. Add common table salt to the nutrient mix to stimulate a salty environment.
- **Pluto in a Bottle:** Pluto is the furthest from the sun and is very cold. Freeze the yeast in a deep freezer before adding to the nutrient mix.

PLEASE NOTE:

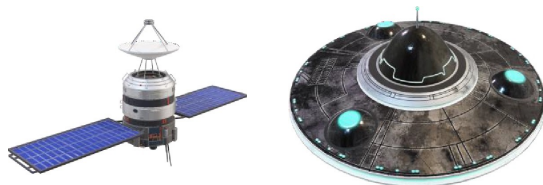
Your box does NOT include supplies for these extensions.



Engineer Your Own Spacecraft

Materials

- Craft Sticks
- Paper Plates
- Dixie Cups
- Pipe Cleaners
- Aluminum Foil
- Paper Towel/Toilet Paper Rolls
- Tape/Glue
- Scissors



Challenge:

Using materials that you have around the house, engineer your own spacecraft. Be as creative as possible!



GRAVI-GOO

MATERIALS:

- Steve Spangler's Gravi-Goo powder
- Plastic cups
- Room temperature water
- Color fizzers

PROCEDURES:

1. Fill a plastic cup with 2 cups of room temperature water.
2. In the other plastic cup, add the Gravi-Goo powder.
3. Add color tablets to the water, be sure the tablets have stopped fizzing before the next step. (Optional)
4. Pour the water quickly and all at once into the powder.
5. Pour the liquid quickly back and forth, from cup to cup. For the first 2-3 minutes you will need to pour the liquid carefully but quickly from cup to cup to avoid clumping.
6. After 2-3 minutes of mixing, the liquid should start to form "strings" of goo as you pour it back and forth.
7. After the formation of the "strings" pour the liquid back and forth more slowly for an additional 5 minutes.
8. Make sure all the liquid is in one cup and let it sit for 30-40 minutes. If it is separated between the cups, you will end up with two separate, small batches of Gravi-Goo.
9. After it has soaked, you are ready for an amazing antigravity experience. Start pouring the liquid between the two cups again.
10. After a few pours back and forth, the liquid crawls up and over the sides of the cup in a "self-siphoning" action. Keep the pouring cup higher than the other cup.
11. As you work with a batch of Gravi-Goo, you hardly need to pour it at all. Almost on its own, it climbs up and out of the cup!
12. When you finish researching Gravi-Goo, dispose of it in a trash can. DON'T POUR IT DOWN THE DRAIN!



What is gravity?

Gravity is a force of attraction that pulls together all matter (anything you can physically touch). The more matter something has, the greater the force of its gravity. That means really big objects like planets and stars have a stronger gravitational pull. The gravitational pull of an object depends on how massive it is and how close it is to the other object. For example, the Sun has much more gravity than Earth, but we stay on Earth's surface instead of being pulled to the Sun because we are much closer to Earth.

Did you know?

Without gravity we would fall right off the Earth's surface and float away? Or that gravity is the reason a ball comes back down when you throw it into the air,

HOW DOES GRAVI-GOO WORK?

Specially formulated by Spangler Science, Gravi-Goo is a unique type of polymer. When added to water, it acts both like a sponge to grab water molecules and link them to the polymer molecules in long chains at the same time. Gravi-Goo is a combination of polyacrylamide and acrylic copolymers.

Gravi-Goo is kind of a combination of Spangler Science's Insta-Snow powder, which absorbs a ton of water, and their Slime Goo, which bonds it into long molecular chains.

The spaghetti-like structure of Gravi-Goo causes the polymer to quickly thicken added water while giving it a strong elastic effect. Although extremely elastic, the Gravi-Goo remains fluid like pancake syrup. The straight chain format of the Gravi-Goo molecule, with no side chains to attach to other molecule strands, allows the separate chains to easily slide past each other and stay fluid. Once part of the molecule gets over the rim of the cup, its elasticity means it can stretch over the rim while pulling the rest of its length with it. It's this elasticity and bonding that defy gravity.

OREO MOON PHASES

MATERIALS:

- OREO COOKIES
- POPSICLE STICKS
- MOON PHASE CARDS

PROCEDURES:

- 1) PRINT OUT THE MOON PHASE CARDS AND CUT THEM OUT.
- 2) GIVE EACH CHILD AN OREO AND A POPSICLE STICK.
- 3) DEMONSTRATE THE PROPER WAY TO SLOWLY TWIST AN OREO TO MAXIMIZE THE AMOUNT OF FROSTING ON ONE SIDE.
- 4) HAVE THE CHILD TWIST THE HALVES OPEN. HOPEFULLY MOST OF THE FROSTING WILL BE ON ONE SIDE OR THE OTHER. THEY CAN ALWAYS TRANSFER FROSTING IF NEEDED.
- 5) GIVE THE STUDENT A MOON PHASE CARD AND HAVE THEM RECREATE IT WITH THE FROSTING! REPEAT THE PROCESS UNTIL YOU MAKE ALL THE MOON PHASES.



MOON FACTS!

- ALL PARTS OF THE MOON ARE LIT IN TURN BY THE SUN. THE MOON CHANGES FROM A THIN CRESCENT TO A FULL MOON AND BACK AGAIN TO A CRESCENT IN ONE MONTH (ACTUALLY 29 DAYS, WHICH IS A LUNAR MONTH).
- THE MOON IS THE EARTH'S ONLY NATURAL SATELLITE. A NATURAL SATELLITE IS A SPACE BODY THAT ORBITS A PLANET, A PLANET LIKE OBJECT OR AN ASTEROID.
- IT IS THE 5TH LARGEST MOON IN THE SOLAR SYSTEM
- THE AVERAGE DISTANCE FROM THE MOON TO THE EARTH IS 238857 MILES!
- THE FIRST PERSON TO SET FOOT ON THE MOON WAS NEIL ARMSTRONG.
- THE MOON IS VERY HOT DURING THE DAY BUT VERY COLD AT NIGHT. THE AVERAGE SURFACE TEMPERATURE OF THE MOON IS 107° CELSIUS DURING THE DAY AND 153° CELSIUS AT NIGHT.
- THE EARTH'S TIDES ARE LARGELY CAUSED BY THE GRAVITATIONAL PULL OF THE MOON.
- THE PHASES OF THE MOON ARE: NEW MOON, CRESCENT, FIRST QUARTER, WAXING GIBBOUS, FULL MOON, WANING GIBBOUS, LAST QUARTER, CRESCENT AND NEW MOON.
- A LUNAR ECLIPSE OCCURS WHEN THE EARTH IS BETWEEN THE SUN AND THE MOON.





ROCKETS

FUN FACTS ABOUT ROCKETS!

1. A rocket is a manmade vehicle that uses thrust from a rocket engine to travel.
2. Rockets are named after the Italian word "roccchetta", which means "bobbin" or "little spindle".
3. Some of the first rockets, which were fireworks, have been traced back to the 13th century (1200s) in Medieval China during the Song dynasty. There is anecdotal evidence of earlier being developed prior to the 13th century.
4. Rockets can be used to transport humans and spacecrafts into space.
5. Rockets are propelled forward by their engine using liquid or solid propellant (fuel).
6. A rocket engine doesn't need air to operate like a jet engine, which allows a rocket engine to work in space.
7. Rockets ignite their propellant and that produces hot gas that escapes out the back of the rocket as exhaust.
8. Rockets are propelled forward using the exhaust from their engines.
9. A rocket can reach a speed of 15,000 miles per hour in as little as eight minutes.
10. A rocket cannot escape Earth's gravity and make it into space unless it's traveling at least 7 miles per second.



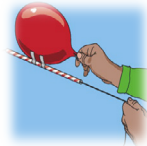
BALLOON ROCKETS

MATERIALS:

- 6 ft of string
- Straw
- Masking Tape
- Balloon

PROCEDURES:

1. Find a partner and thread one end of the string through the straw.
2. Attach the string to something stable like a table or countertop.
3. Inflate the balloon and hold the air inside without tying it.
4. Have someone hold the end of the string tight, then attach the balloon to the straw with the tape.
5. Release the air from the balloon without letting go of the string.
6. Try it again with different amounts of air in your balloon!



ALKA SELTZER ROCKETS

MATERIALS:

- Film Canister
- Alka-Seltzer
- Water
- Scissors
- Rocket Template
- Crayons
- Tape

PROCEDURES:

1. Print out the rocket template and cut out the entire rectangle. Color the rocket.
2. Wrap the rocket template around the film canister and tape it. You will want to tape the rocket upside down with the top of the rocket facing the bottom of the film canister.
3. Go outside to make the rockets, then fill the canister about a third of the way up with water. Put ¼ of the Alka-Seltzer into the canister.
4. Place the lid on the canister, making sure that it is on nice and tight. Give the canister a good, hard shake and place the rocket on the ground with the bottom of the canister facing up.
5. Wait for the rocket to shoot up.



STRAW ROCKETS

MATERIALS:

- Straws
- Tape or glue dots
- Plastic pipettes (or thinner straw)
- Markers, crayons, or colored pencils
- Scissors
- Rocket Template

PROCEDURES:

1. Color the rockets template and cut them out. Tape your rocket onto either the pipette or thinner straw.
2. Slip a straw over your pipette, and you're ready to launch!
3. Give your straw a big puff of air and watch it take off!



GEOBOARD CONSTELLATIONS



MATERIALS:

- 6 Inch Cork Circle
- Constellation Template
- Mod podge
- Straight Pins
- Small Rubber Bands

PROCEDURES:

1. PRINT OUT THE GEOBOARD CONSTELLATION TEMPLATE AND CUT IT OUT. MOD PODGE THE TEMPLATE ONTO THE CORK CIRCLE. ALLOW THE MOD PODGE TO DRY.
2. ONCE DRIED, PLACE THE STRAIGHT PINS INTO THE STAR POINTS ON THE GEOBOARDS.
3. USE THE RUBBER BANDS TO FORM THE OUTLINES OF THE CONSTELLATIONS. STUDENTS CAN USE THE CONSTELLATION OUTLINES PROVIDED AND THEY CAN MAKE THEIR OWN.

All About Constellations: A constellation is a group of visible stars that form a pattern when viewed from Earth. The pattern they form may take the shape of an animal, a mythological creature, a man, a woman, or an inanimate object such as a microscope, a compass, or a crown. The sky was divided into 88 different constellations in 1922. This included 48 ancient constellations listed by the Greek astronomer Ptolemy as well as 40 new constellations. The 88 different constellations divide the entire night sky as seen from all around the Earth. Star maps are made of the brightest stars and the patterns that they make which give rise to the names of the constellations. The maps of the stars represent the position of the stars as we see them from Earth. The stars in each constellation may not be close to each other at all. Some of them are bright because they are close to Earth while others are bright because they are very large stars. Not all of the constellations are visible from any one point on Earth. The star maps are typically divided into maps for the Northern Hemisphere and maps for the Southern Hemisphere. The season of the year can also affect what constellations are visible from where you are located on Earth. Constellations are useful because they can help people to recognize stars in the sky. By looking for patterns, the stars and locations can be much easier to spot. The constellations had uses in ancient times. They were used to help keep track of the calendar. This was very important because it helped people know when to plant and harvest crops. Another important use for constellations was navigation. By finding Ursa Minor it is fairly easy to spot the North Star (Polaris). Using the height of the North Star in the sky, navigators could figure out their latitude, helping ships to travel across the oceans.

CONSTELLATION VIEWERS

MATERIALS:

- ❖ TOILET PAPER OR PAPER TOWEL ROLLS
- ❖ BLUE OR BLACK CONSTRUCTION PAPER
- ❖ RUBBER BAND
- ❖ CONSTELLATION PRINTOUTS
- ❖ SCISSORS
- ❖ GLUE
- ❖ THUMB TACK



PROCEDURES:

1. Print out the constellation viewer template. Choose the constellation you want to view and cut that circle out.
2. Cut out a larger circle from the construction paper. Use a glue stick to glue the constellation circle onto the center of the circle.
3. Have an adult help you fix the paper circle to one end of the tube using a rubber band.
4. Using the stars on the constellation as a guide to punch small holes with a thumbtack. BE CAREFUL! The point is sharp! Hold your viewer up to the light. Can you see the constellation?

What is a constellation?

A constellation is a group of visible stars that form a pattern when viewed from Earth. The pattern they form may take the shape of an animal, a mythological creature, a man, a woman, or an inanimate object such as a microscope, a compass, or a crown.

How many constellations are there?

The sky was divided up into 88 different constellations in 1922. This included 48 ancient constellations listed by the Greek astronomer Ptolemy as well as 40 new constellations.

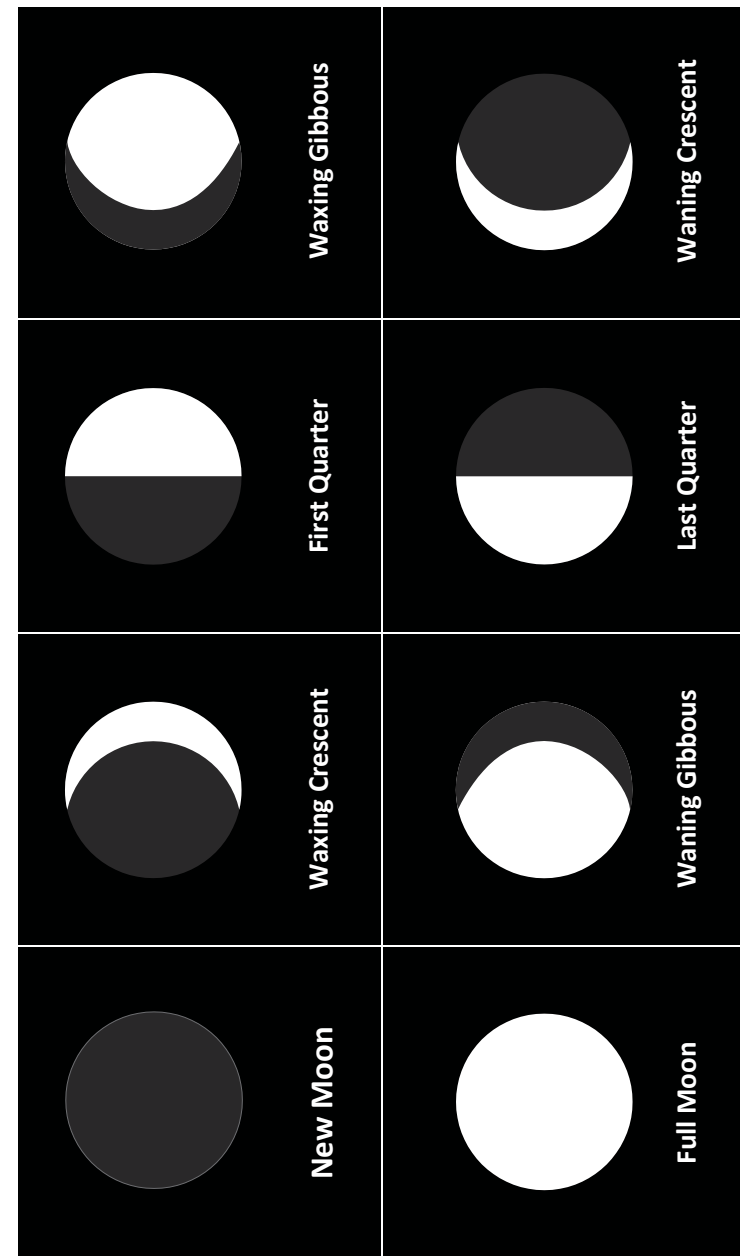
Star Maps

The 88 different constellations divide the entire night sky as seen from all around the Earth. Star maps are made of the brightest stars and the patterns that they make which give rise to the names of the constellations. The maps of the stars represent the position of the stars as we see them from Earth. The stars in each constellation may not be close to each other at all. Some of them are bright because they are close to Earth while others are bright because they are very large stars.

Hemispheres and Seasons

Not all the constellations are visible from any one point on Earth. The star maps are typically divided into maps for the Northern Hemisphere and maps for the Southern Hemisphere. The season of the year can also affect what constellations are visible from where you are located on Earth.

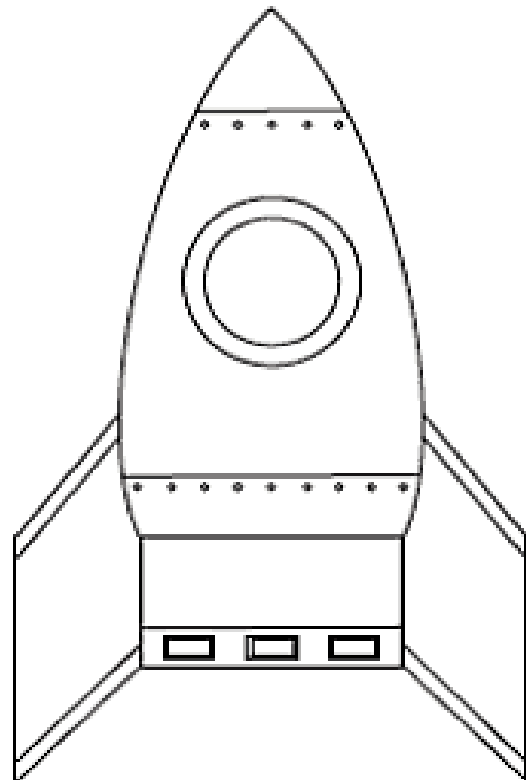
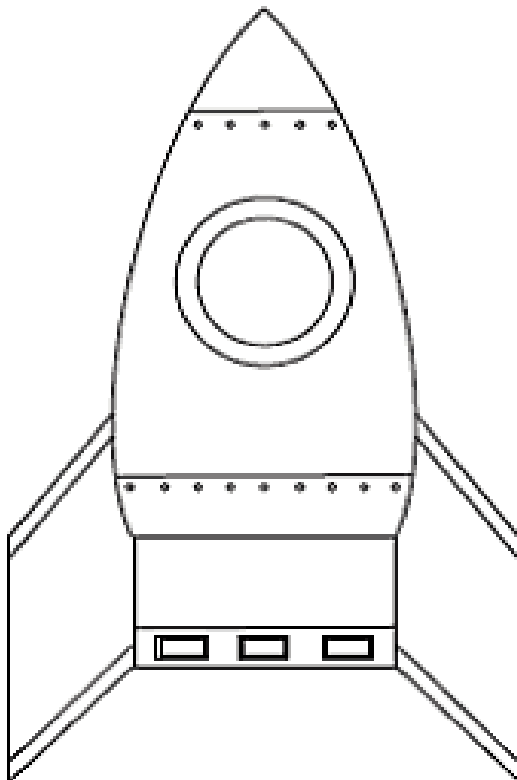
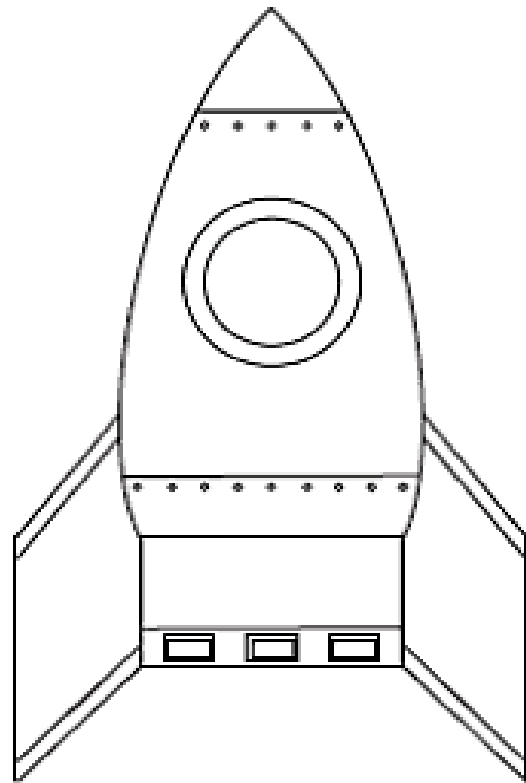
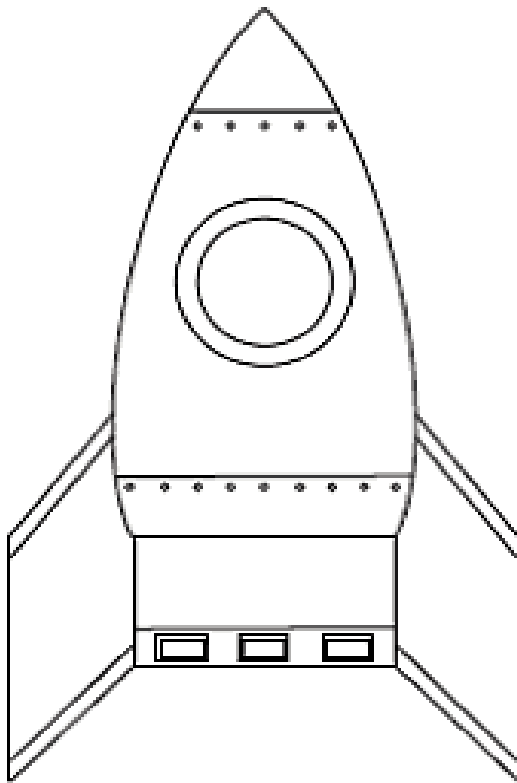
Oreo Moon Phase Cards



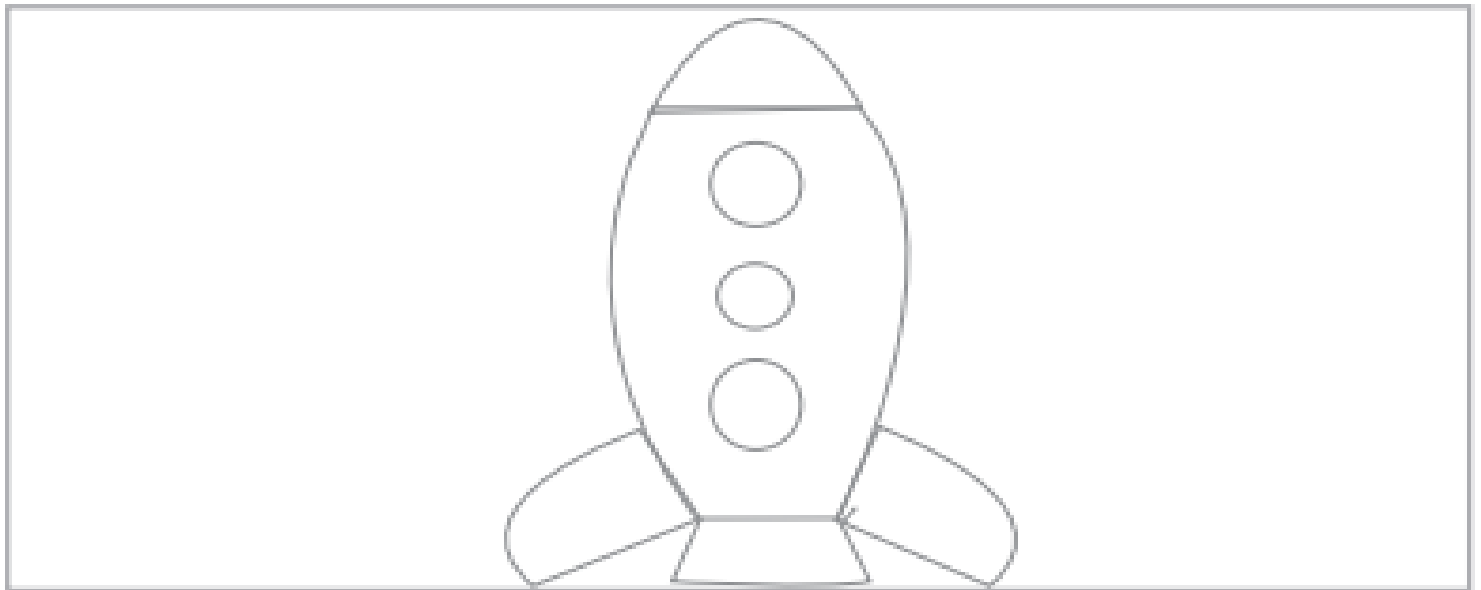
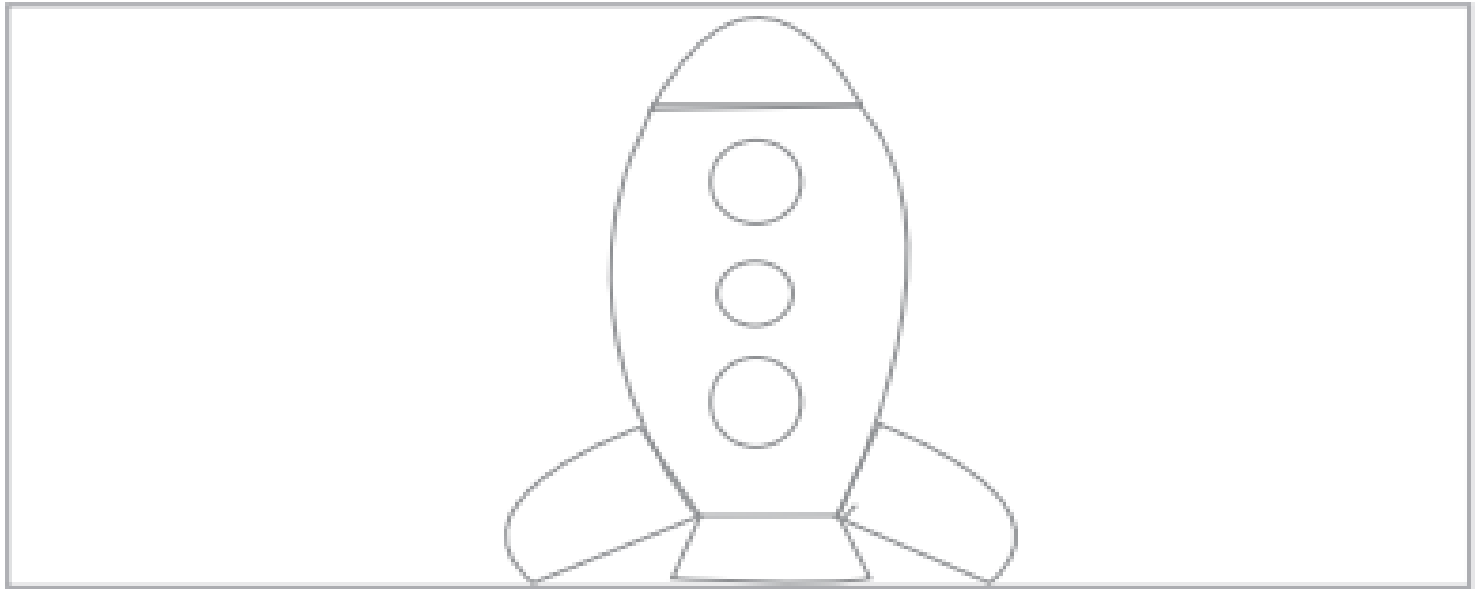
Geoboard Constellation Template



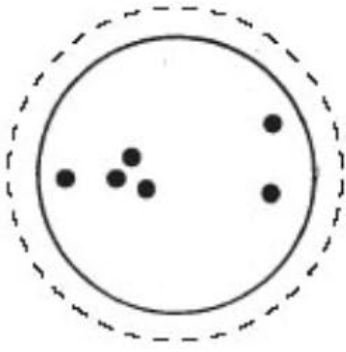
Straw Rocket Template



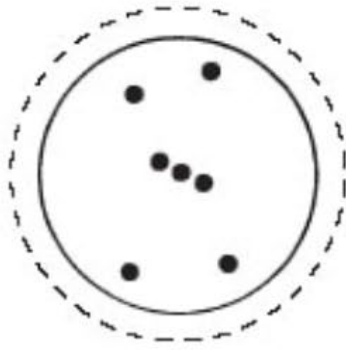
Alka-Seltzer Rocket Template



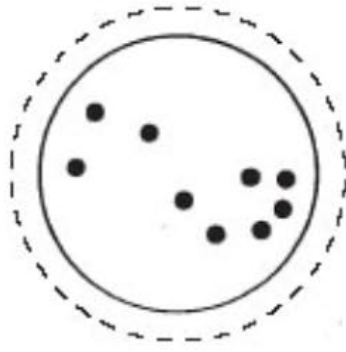
Constellation Viewer Template



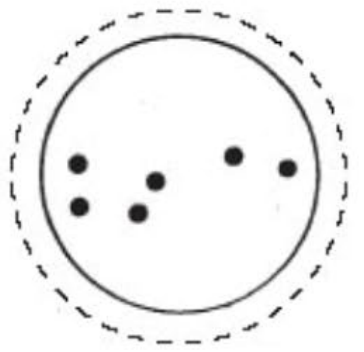
TAURUS
The Bull



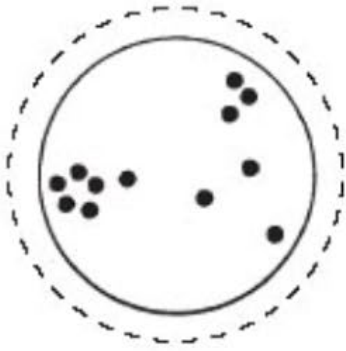
ORION
The Hunter



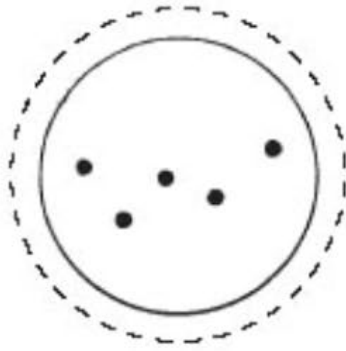
SCORPIUS
The Scorpion



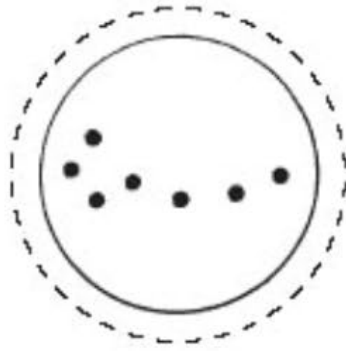
URSA MAJOR
The Great Bear



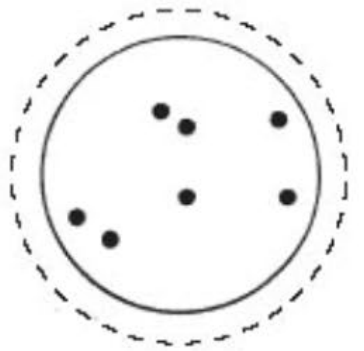
PISCES
The Fishes



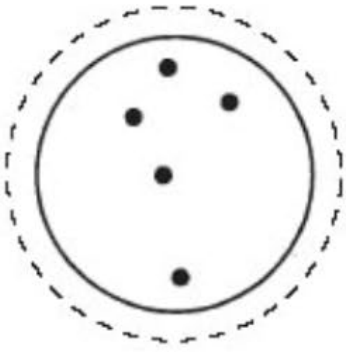
CASSIOPEIA
The Queen



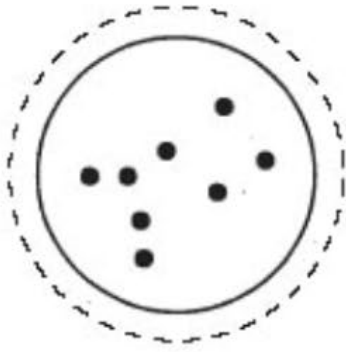
URSA MINOR
The Little Bear



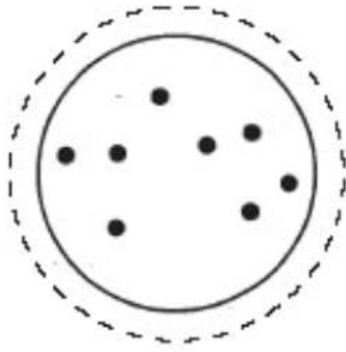
PEGASUS
The Flying Horse



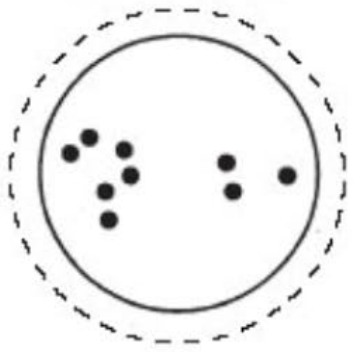
BOOTES
The Herdsman



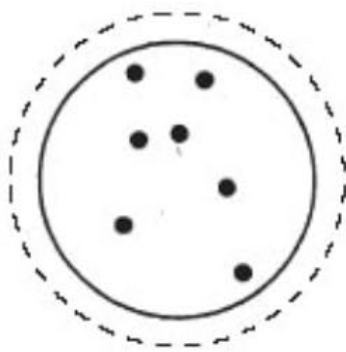
GEMINI
The Twins



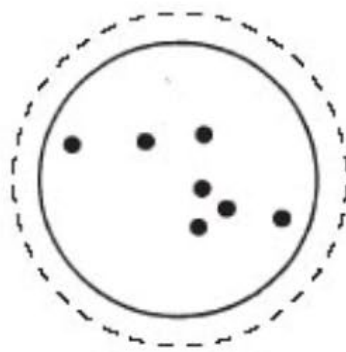
SAGITTARIUS
The Archer



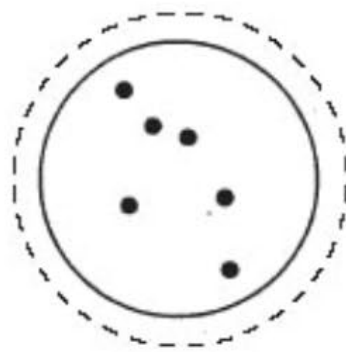
LEO
The Lion



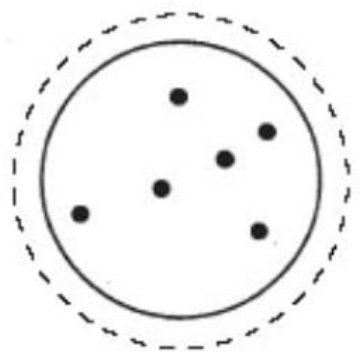
HERCULES



CANIS MAJOR
The Big Dog



PERSEUS



CYGNUS
The Swan