DIY Air Force Activities:

Constellation Collection

Materials:

- one empty toilet paper roll per constellation (or a paper towel roll cut in half)
- construction paper
- duct tape
- scissors
- safety pin or paper clip
- scotch tape or masking tape
- marker
- phone with a flashlight

Astronomy is the study of celestial objects outside the earth's atmosphere, including the planets, comets, and stars. The twinkling stars in the night sky can easily capture our imagination. Their light has traveled millions of light years to reach us! Scientists can study this light to determine how far it traveled, and even the make-up of the star that is the light's source. In ancient times, the patterns the stars made were often named and associated with heroes and gods. Their position in the sky was used to help sailors navigate the seas. There is so much you can choose to study in the vast field of astronomy. You can begin your own journey by following these directions to create projections of your favorite constellations. Share your findings and facts with friends!

Directions

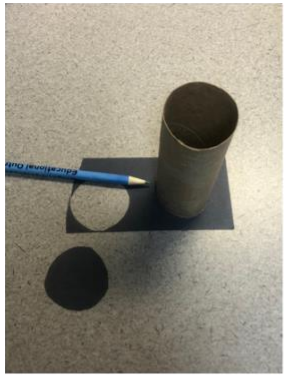
1. Trace the open end of your cardboard roll on a piece of construction paper and cut it out.
2. Research a constellation you want to collect! Draw the pattern of dots (stars) on your paper.
3. Cut an appropriately sized piece of duct tape out and place your circle on it.
4. Use your pin or paper clip to poke holes through the paper and tape.
5. Take your roll and cut a piece of construction paper that is the same width.
6. Tape the cut-out to one of the ends of your cardboard roll.
7. Wrap more tape around the edges to seal it. Be careful not to cover the holes you poked!
8. Wrap the outside of the roll in construction paper. Start by taping an edge of the paper to the roll **(a)**, then wrap it around and secure it with more tape **(b)**.
9. Write the name of the constellation on the outside.

You can view your constellation two ways. First, you can look through your tube while pointing it towards a light source. You can also project the constellation on a wall or ceiling! To do this, take a smartphone and turn on the flashlight app (see image on the left). Place your tube over the light and look up! There are so many constellations to choose from! As you collect them, do some more research about the stars they are comprised of; what types of stars make up each constellation? How far away are they? What stars can you see from home during each season? How are these different from the stars you would view in other parts of the world?

Air Force Associations:

The Astronomical Research Group and Observatory (ARGO), based at the United States Air Force Academy (USAFA) in Colorado Springs, Colorado, houses multiple high powered telescopes and supports the worldwide Falcon Telescope Network. This global network of telescopes help to enhance space situational awareness and offer opportunities for undergraduate research and STEM community outreach. ARGO conducts research like astronomical spectroscopy and photometry, as well as asteroid tracking. https://www.usafa.edu/research/research-centers/astronomical-research-group-observatory/

Step 1:



Step 2:

Step 3:

Step 4:

Step 5:

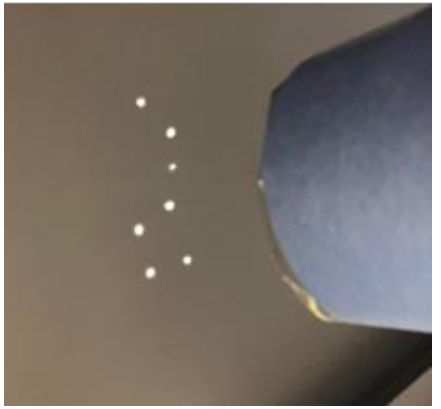
Step 6:

Step 7:

Step 8 a:

Step 8 b:

Step 9:



Possible constellations to collect:

- The Big Dipper (Ursa Major)
- The Little Dipper (Ursa Minor)
- Orion (look for his belt!)
- Cassiopeia (The Queen)
- Scorpius (The Scorpion)
- Cygnus (The Swan)
- Taurus (The Bull
- Pleiades (Seven Sisters)
- Gemini (The Twins)
- Delphinus (The Dolphin)

Astronomers sort stars into different classes based on their color, size, and brightness (luminosity). This information can help determine the star's temperature, age, and composition (what it is made of). Different classes of stars are determined by studying the wavelength of light they give off (see our Simple Spectrometer DIY for more on this topic). Astronomers then plot them by luminosity vs temperature using a chart called a Hertzsprung-Russell Diagram (H-R diagram). This allows them to compare, contrast, and share information about different stars to learn more about our universe as a whole. What classes are the stars in your constellations? What does this tell you about their age, temperature, and size?

Petersen, Carolyn Collins. "Diagramming the Lives of Stars." ThoughtCo, Aug. 28, 2020, thoughtco.com/hertzsprung-russell-diagram-4134689.