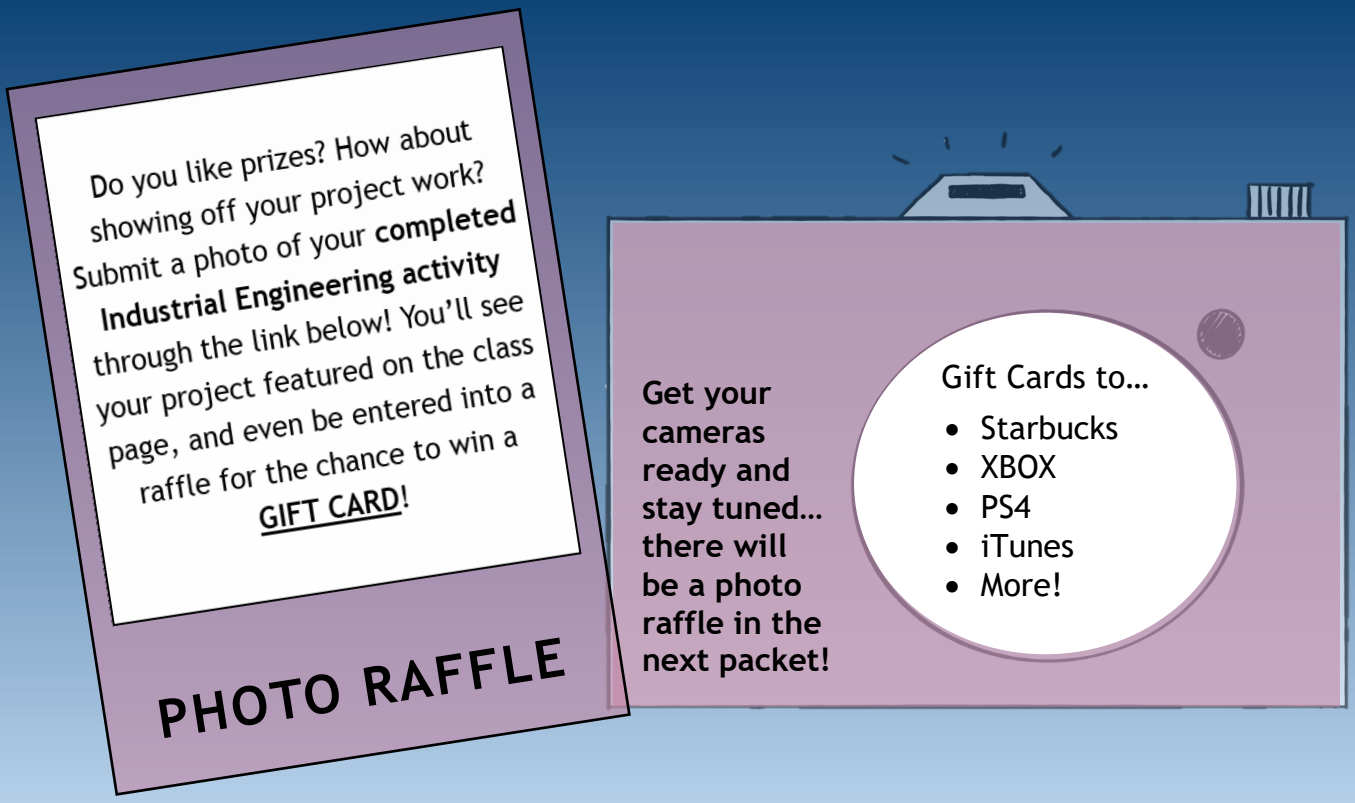
SWEducational

ACTIVITY PACKET

ASTRONAUTICAL ENGINEERING EDITION

WHAT IS ASTRONAUTICAL ENGINEERING?

Astronautical Engineering is a type of Aerospace Engineering that works with designing, testing, and building rockets, satellites, and other objects that will be going to space. These types of engineers allow us to do many activities such as explore space using rockets, predict weather using special satellites in space, and much more!



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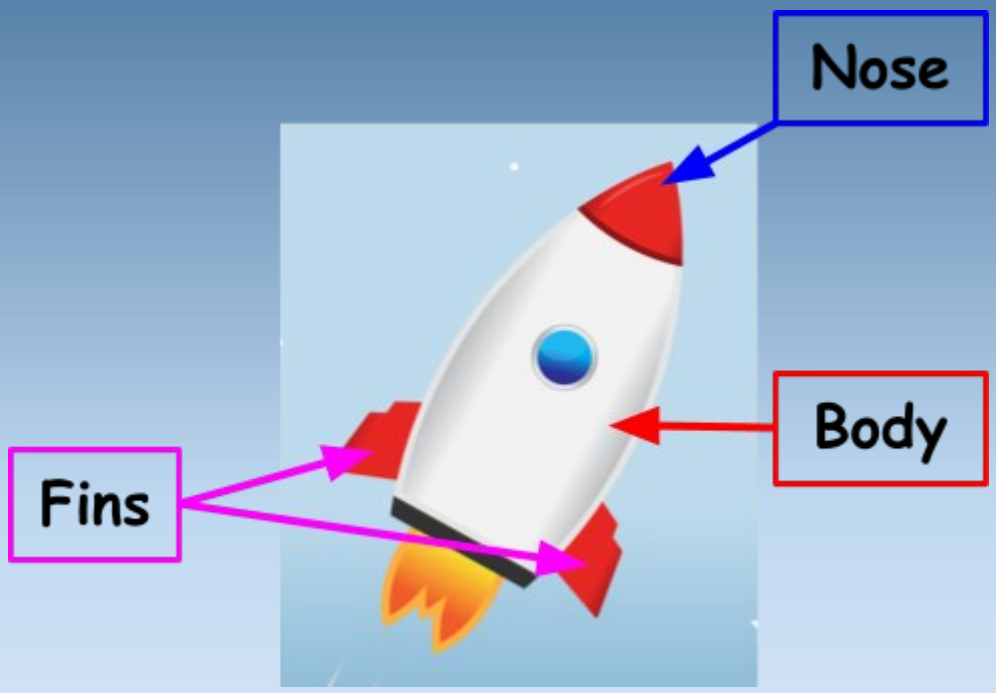
IMPORTANT TERMS

Aerodynamics: studying air properties and how objects move through the air

- Rocket designers study the aerodynamics of the rocket to see how it will move through the air
- In this activity, you will be able to see how air impacts your paper rocket design
- What types of designs or materials do you think would move most efficiently through the air? Least efficiently? (Hint: Think about what materials and designs are used for rockets, satellites, or other objects that move through the air at high speeds.)

Parts of a Rocket: a rocket mainly consists of a nose, a body and fins

- Nose—the tip of the rocket that helps the rocket travel through the air more efficiently
- Body—- the middle part of the rocket that holds the rocket fuel, passengers, and other items the rocket is carrying
- Fins—attachments to the rocket body that help it stay steady and control the direction it moves through the air



- The paper rocket you will be creating will have the nose, body, and fins to help it fly through the air.
- What is another design you can think of for the nose or fins? You can test this design after creating your paper rocket!

Propulsion and propulsion system

- Rockets would not be able to reach space without their propulsion system. The propulsion system is what helps the rocket produce thrust and overcome gravity. Rockets typically have an engine to produce their thrust.
- The propulsion system in your paper rocket will be you blowing through the straw to propel the rocket forward through the air.
- What is one way you could increase the thrust of your rocket or to make it go faster? (Hint: Think about how you could increase the amount of air through the straw.)

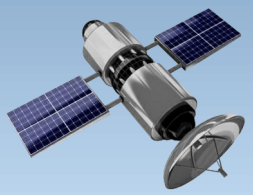
Propulsion and propulsion system

- An orbit is the repeating path an object takes around another object in space. Just as the earth orbits around the sun, satellites orbit around our earth as well.
- Rockets are essential in bringing the satellites to space and putting them into the correct location for their orbit. Think about the rocket as the delivery person and the satellite as the package needing to go to your doorstep.
- What are some other objects that orbit our sun?

ACTIVITY INSTRUCTIONS

Today, you will be making a paper rocket! As you go through this activity, think like an Astronautical Engineer by considering how the design of the rocket affects its flight.

SUPPLIES

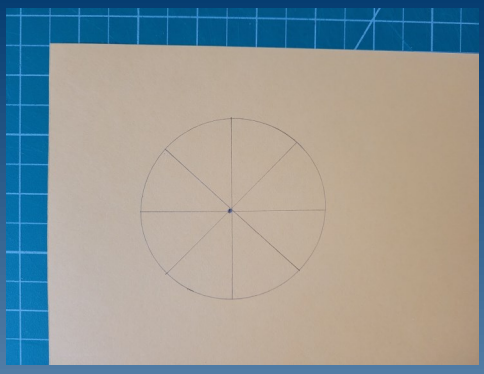


- 2 sheets of paper (any color)
- Paper and pencil
- Scissors
- Ruler
- Clear/masking tape
- Paper cup (or any object that you can trace to draw a circle that is about the same size as the opening of a paper cup)
- Straw

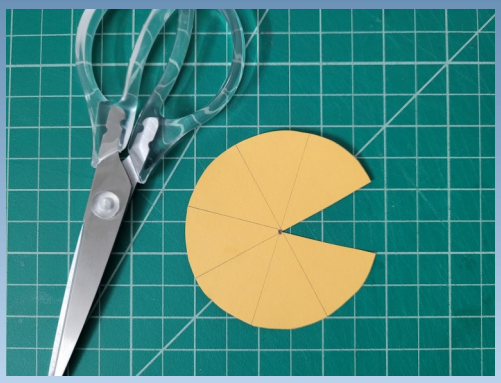
STEPS

1. Place the paper cup (or your circle object) on one of your pieces of paper and trace around its edge to draw a circle.

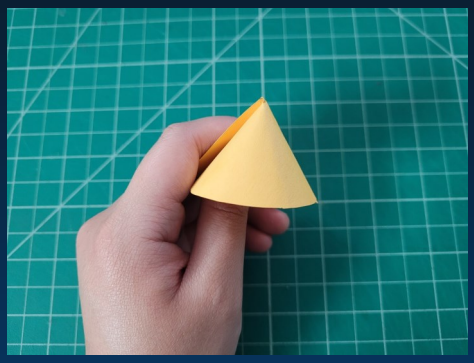
2. Make a dot in the center of the circle and draw four lines through it, across the circle. Your circle should have eight similarly sized triangles and the circle should look like a pizza with eight slices. It is ok if all the triangles don't look the same, precision isn't very important in this step.



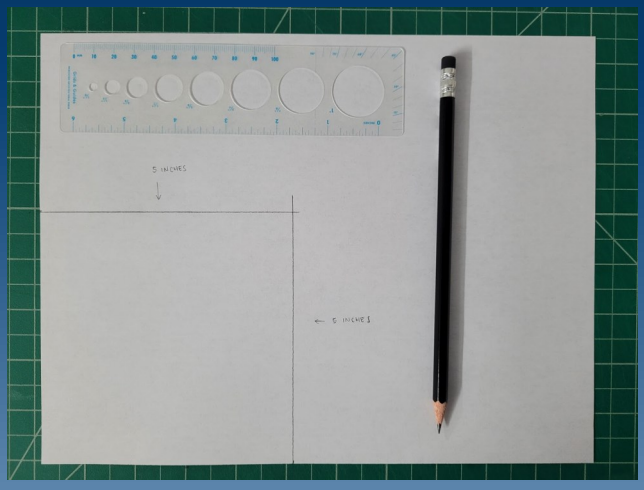
3. Cut out the circle. Then cut out any one of the eight triangles. You should have a Pac-Man shape.



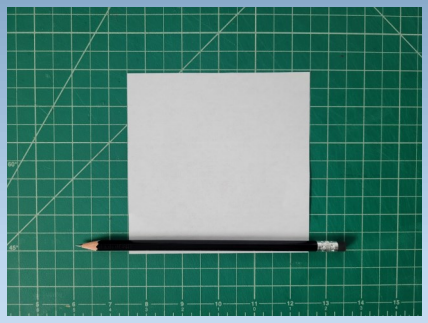
4. Now, face the side without the lines and hold the two edges of the triangle you just cut out. Bring the edges towards each other to form a cone. When the two edges overlap a little, keep them in place using some tape. You can hide the lines from the previous step in the inside of the cone.



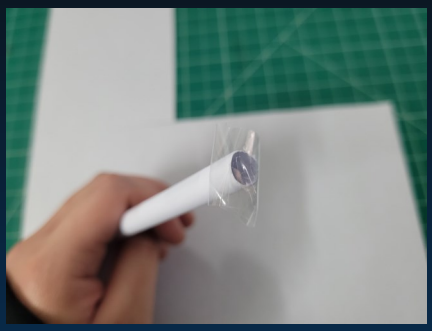
5. Take your other sheet of paper and use a ruler and pencil to draw a square that is 5 inches on all sides. Cut the square.

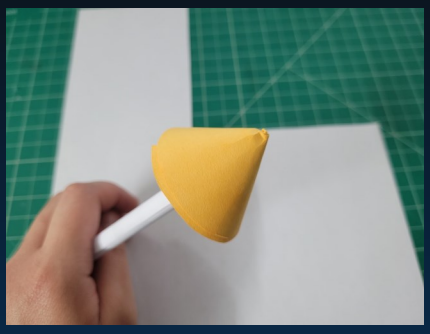


6. Tightly wrap the pencil with the square paper by placing them on the table and rolling them together. Put tape at the bottom, middle, and top of the cylinder to hold the shape in place. Carefully remove the pencil from the cylinder.

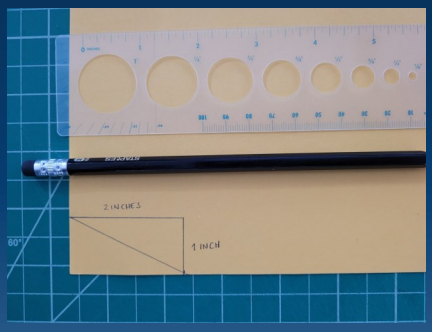


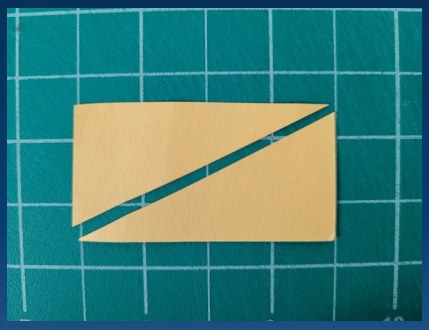
7. Take a short piece of tape, fold it, and place it on one end on the cylinder. Securely connect the end with the tape to the inside of the cone.



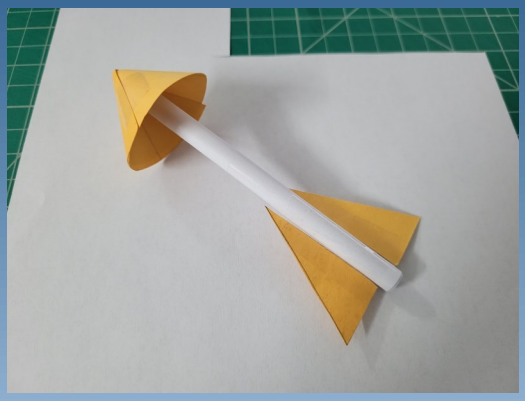


8. With your remaining paper, draw a rectangle that is 2 inches on two sides and 1 inch on the other. Draw a diagonal line connecting two opposite corners and cut out the triangles formed.

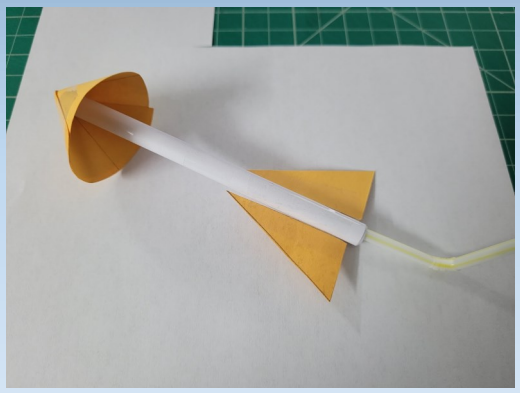




9. Tape the long side of the triangles to the lower sides of the cylinder. These will serve as the fins of the rocket.



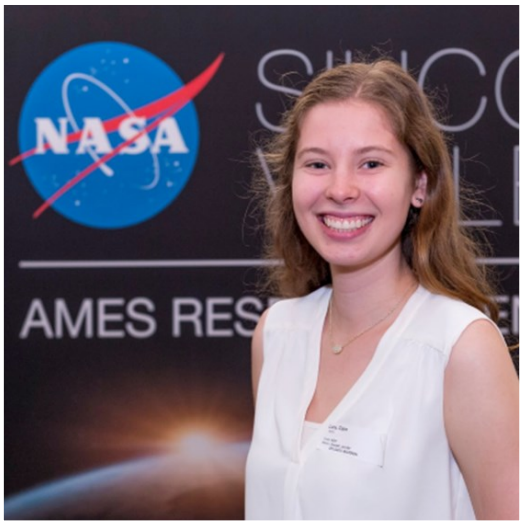
10. Insert the straw into the cylinder. To make your rocket blast off, blow into the straw.



RESOURCE LINKS / VIDEOS

- Airbus: Website for Aerospace - https://www.airbus.com/company/sustainability/airbus-foundation/discovery-space/kids.html
- Air Traffic Control Simulator - https://atcsim.nasa.gov/
- What is Aerospace Engineering? (Astronautics) - https://youtu.be/qbsYELrhvks

CAL POLY ENGINEER SPOTLIGHTS



My name is Claire Luce and I am a 4th year Aerospace Engineering major and I fell in love with aerospace in middle school! As an aerospace engineer, you have the ability to work on things that will either help people travel through the air or even into space. It is rewarding to know that things you have designed are orbiting around the earth over 20,000 miles above us. In college I have been able to work on some really cool projects such as an autonomous solar plane (imagine a drone that can fly because of the sun!) as well as interning in the wind tunnels at NASA and interning for a satellite company, Maxar. We are all part of the Artemis Generation and we are going to experience the first woman go to the moon. I am excited to help us achieve the goal of going back to the moon by working on rockets for Blue Origin after college.