



Aerospace: Propulsion

Learn what propulsion is and how different types of fuel affect how far objects go.

Time

40 minutes total (if you have members build the lantern during the lesson it will take longer)

Materials

- Blue Tissue Paper (or any color)
- White Tissue Paper (or any color different than your first color)
- Fire proofing spray
- Non-flammable glue
- 50" Bamboo shoot (if you can't find this try a hollowed out stick or pipe cleaners that are fire proofed.)
- Floral wire
- Cotton balls
- Rubbing alcohol
- Kerosene
- Oil
- Other flammable substances
- Lighter
- Timer
- Measuring tape

Space Required

Room where floating lantern can be built. Outside access where it is legal to let a floating lantern go (irrigated or wet fields work best)



Before the Meeting

Cut out pattern for lanterns out of craft paper (40" long by 12" wide on one side to 22" wide on the other side). Spray fire retardant on all sides of blue tissue paper and let dry (works best to hang from one corner with a clothes pin and avoid spraying that corner). While drying cut out pattern



Background

Propulsion is the force that drives an object forward. It is the thrust that gets a rocket into space or that gets an airplane off the ground and helps keep it off the ground. Thrust comes from the correct combustion of a fuel.

Propulsion can come in many forms such as jets, engines, or rudders. Many factors determine the amount of propulsion needed to get objects off the ground. Drag is the opposite of thrust and can hinder an object from flying, or slow it down when flying.

Hot air balloons use hot air as propulsion. In order for a hot air balloon to fly it needs a cover with material to hold the hot air in and a heat source. Hot air balloons were the first device to successfully fly with human passengers. With modern science we have come a long way in our study of propulsion and are now capable of flight with more advanced propulsion techniques.

Different types of fuels affect the propulsion of objects differently. For example, it would take a lot more regular diesel to move a jet forward a certain distance than it would jet fuel, if the jet could run on both. Finding the correct fuel for vehicles makes them efficient and ensures safe passage. When the correct fuel is not used, it may cause the vehicle to light on fire or explode.



Activity Instructions ...Making Floating lanterns

1. Have members grab 1 wire and attach it to the hoop so it goes across the diameter of the hoop.
2. With the other wire make an X across the hoop.
3. Twist the wire in the middle of the hoop so a heat source can be attached.
4. Attach hoop to the premade bag with glue-(note: glue must be dry for launch to work), or with fire proof tape. Make sure that the blue fireproof tissue paper is on the inside.
5. Attach a cotton ball with fuel to the wire. Light on fire and let go when ready to launch. Please note after you touch the cotton ball don't touch the paper on the lantern. This may cause paper to start on fire



Propulsion Activity:

Have members use different liquids on their cotton balls to see which fuel works best. Can use rubbing alcohol, kerosene, oil, or any other flammable substance. Compare which lanterns go the farthest. Please note: be careful when lighting flammable cotton balls. It might be best for an adult to light them. Have youth take notes and watch their lantern's flight path. If possible measure the distance each lantern goes for later comparison (some of them go long distances and make it difficult to recover and measure distance). Watch how long it takes the cotton balls to burn for later comparison. Time them from when they start burning to when they go out or you can no longer see them. When you talk about the lanterns make a chart on the



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with white tissue paper. Once blue tissue paper is dry, cut out using the pattern and glue (with nonflammable Elmers glue) onto white tissue paper so glue has time to dry- only glue three sides. Do not glue the bottom side. You will fold the blue tissue paper over the bamboo shoots later so that it is protected. Repeat this so you have two panels. Glue the two panels together along top and sides so that you have a large bag. Make bamboo shoots into hoops so members don't break it while at the meeting. Cut wire so that it is longer than the diameter of the hoop. Each member will need two. Have all equipment needed to build a lantern set at each station. (If you want to save time during the lesson you can pre-make lanterns or buy premade ones.)

white board or flip chart of which fuel carried the lantern the farthest and how long the cotton ball burned for:



Reflect and Apply Questions

1. Which fuel made the lantern go the farthest?
2. Which fuel burned for the longest time?
3. Which fuel worked best for the lanterns? How would you justify that answer?
4. What would you do different next time?
5. What other fuel do you think would be good to try next time?



References:

- http://www.ehow.com/how_5867633_make-chinese-flying-lanterns.html
<https://www.grc.nasa.gov/www/k-12/airplane/bgp.html>



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