EagleForce Robotics

EagleKit

Instruction Booklet

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@EagleForce2073

About Us

Hello! We are EagleForce Robotics, a competitive robotics team and STEAM-focused nonprofit that works to spark a love and passion for science, technology, engineering, art, and math in young people such as yourself.

Our mission with this EagleKit is to bring the hands-on fun of STEAM directly to you. We hope that you'll have fun with the activities in this kit and learn a thing or two about STEAM!

What's in your EagleKit?

Your very own EagleKit has most of the supplies that you would need to complete the activities in this book – you will also need a few common household items such as vegetable oil and empty plastic water bottles.

For some extra fun, we've included some fun EagleForce stickers and extra information about our team so that you can show off your spirit as an honorary Eaglet!

Share your fun with us!

We'd love to see how you have fun with STEAM! With the help of a parent or guardian, scan the QR code to send us pictures of your activities – remember to ask for your parent or guardian's permission first! (You can also email your photos and feedback to Board@EagleForceRobotics.org.)

If you're interested in playing with more STEAM, check out the extra activities listed on our website by other creators and bloggers! Visit our EagleReach page on our website.

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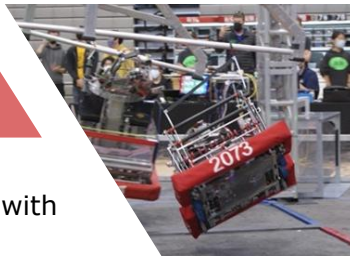
Homemade Lava Lamp

In this experiment, you will explore how hydrophilic oil interacts with water. Keep an eye on that bubbly chemical reaction between an acid (Alka-Seltzer) and a base (water)!



What You'll Need

- A clean, plastic bottle with a cap (works best with a 16 oz bottle) *(not provided)*
- Vegetable oil *(not provided)*
- 1 x Alka-Seltzer tablet
- 1 (or both!) x water dyeing tablet(s)
- Water

Instructions

1. Fill up your empty plastic water bottle with water until it's about ¼ full.
2. Add your dye tablet(s) – if they fizz in the water, wait for the fizzing to stop before continuing.
3. Fill the rest of the bottle with oil – don't fill it to the brim!
4. Break the Alka-Seltzer tablet into four pieces.
5. Drop one piece into the glass.
6. After the reaction with the first piece settles, feel free to drop in another piece to keep the lava effect going!

This activity was inspired by Education.com. Check out their website to learn more about the science between acids and bases!

Light-Up Cards

Learn about electricity through this light up card. You can also learn about how our team's robots use a special sensor to see on the field, and get an inside look at this year's competition robot!

What You'll Need

- White cardstock printed with an EagleForce robot template
- 1 x Green LED
- 1 x coin cell batteries
- Transparent tape

Instructions

1. Color your robot!
2. Poke (2) holes that are 3 millimeters apart anywhere you want on the robot so you can put in the LED light.
3. Insert the LED light into the holes.
4. Flip the card over and insert the battery between the contacts of the LED light so that a leg is touching each side – be sure to have the longer leg (positive) connected to the positive side of the battery and vice versa.
5. Tape the wires and battery to the card.
6. For extra fun, head to theblualliance.com/team/2073 and check out some of our competition matches from this season to see how your robot performs on the field!

This activity was inspired by LeftBrainCraftBrain.com. Visit their website for more Star Wars fun!

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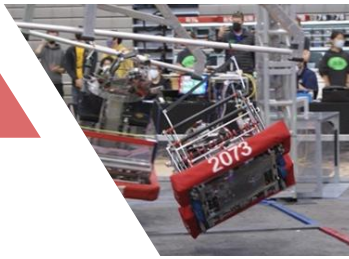
Popsicle Stick Catapults

Test out your catapulting skills with this quick and easy catapulting craft!



What You'll Need

- Jumbo popsicle sticks
- Rubber bands
- Plastic spoon
- Soft ammunition (mini marshmallows or foam balls) *(not provided)*

Instructions

1. Stack (7) popsicle sticks and tie them together with rubber bands at both ends
2. Stack (2) popsicle sticks and use a rubber band to tie them together at one end.
3. Pull the two popsicle sticks apart vertically and wedge the larger stack of popsicle sticks between them – the larger stack of sticks should sit perpendicular to the smaller stack.
4. Use two rubber bands or tape to secure the spoon to the upper popsicle stick.
5. Put your ammunition on the spoon – use one hand to hold the catapult and your other hand to push down the spoon.
6. Let go of the spoon and watch your ammunition fly!
7. For extra fun, try out different sized stacks of popsicle sticks to see how many it takes to launch the farthest!

This activity was inspired by the 2020 Cub Scout Backyard Challenge. Visit their page for more catapult designs!

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Gimp Lanyards

Tune into your creative side and show off your EagleForce spirit as an honorary Eaglet with an EagleForce-themed lanyard!

What You'll Need

- 4 x lanyard strings in different colors that are 30" each
- 1 x lanyard clip

Instructions

1. On a flat surface, place your (2) strings on each other so they form a +. Place your index finger onto where the two strings touch – you should see (4) strings branching out.
2. Starting with the bottom string going in a counterclockwise direction, we'll call the strings A, B, C, and D.
3. Fold string A upward and over your index finger.
4. Fold string B across to the left and over string A.
5. Fold string C downward and over string B.
6. Fold string D across to the right and over string C, but underneath string A (kind of like a basket weave or a lattice on a pie).
7. Pull on all four strings slowly and evenly until they're tightly "stitched" together – the shape should look like a square!
8. Note that string A is now at the top – repeat the above steps until your lanyard has about 2 inches left on it.
9. When you're almost done with your lanyard, stretch one end of your lanyard out enough that you can slide the lanyard clip in. Once the clip is in, you've got your lanyard! Show off your Eaglet pride by attaching your lanyard wherever you want!

Check out this page on wikiHow.com for video instructions if you need help!
Our instructions were inspired by the "Single Loop" method.

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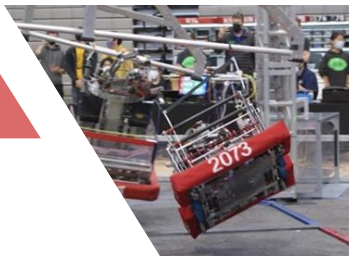
Paper Airplanes – Part I

Members of our team have shared their secrets for making the best paper airplanes. Follow their steps to see what makes a high-flying airplane!

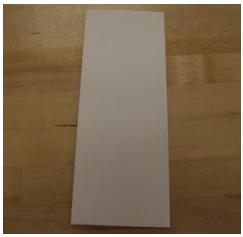


What You'll Need

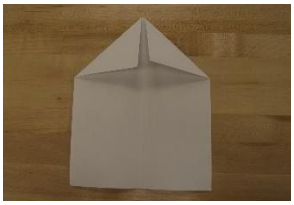
- 1 x paper

Instructions (By Matthew)

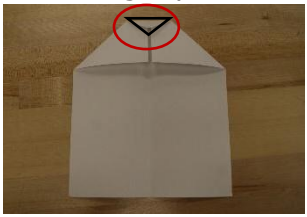
1. Fold paper in half hotdog-style



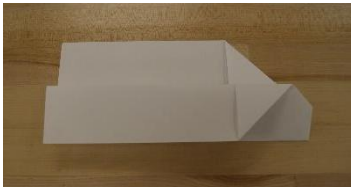
2. Open up the paper and take the top left corner and fold it to line up with the center, repeat for the top right corner



3. You should have a triangle at the top of the paper, fold it down slightly



4. For the "wings," fold the paper hotdog-style with the flaps on the inside. Fold each side down/outwards until it reaches the bottom

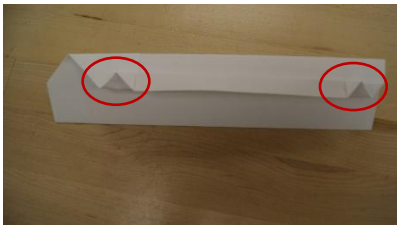


Instructions (Continued)

5. Fold the bottom corners of each wing in

6. Take the bottom part of each wing and fold it up to line up with the fold you just created in Step 4

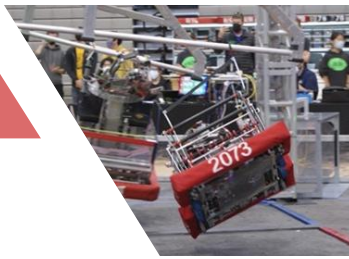
7. Take the top part once more and fold it down to line up with the fold you created in Step 6



8. All done!

Paper Airplanes – Part II

Members of our team have shared their secrets for making the best paper airplanes. Follow their steps to see what makes a high-flying airplane!



What You'll Need

- 1 x paper

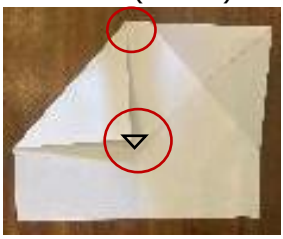
Instructions (By Logan)

1. Fold the piece of paper in half lengthwise.

2. Open the paper to fold the top corners to the center line.

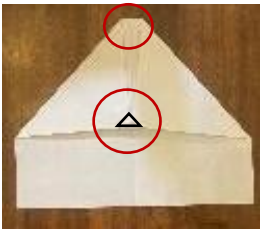
3. Fold the tip of the triangle down.

4. Fold the newly formed corners to the center line – make sure to leave some space at the top and bottom for the notch (in red)



Instructions (Continued)

5. Fold the triangular notch upwards.



6. Fold over the center line so that the triangular notch shows

7. Fold both wings down to the edge (former center line)

8. Finished!

Test Out Both Airplanes!

You should find that Logan's airplane design works better than Matthew's design. Why?

The design for Matthew's plane falls apart easily because there are so many folds that the structure of the plane doesn't stay together during flight. The overall shape of the plane was also not designed to be aerodynamic, and the wings are too big to properly lift the plane through the air properly!

Congrats, Eaglet!

Congratulations on becoming an honorary Eaglet member of EagleForce Robotics! Thank you for taking part in these activities and we hope you had lots of fun learning hands-on with STEAM.

For more projects, visit our EagleReach page on our website, www.Team2073.com, for a list of our favorite STEAM activities by other creators and bloggers!

Share your fun with us!

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Follow us!

Follow us @EagleForce2073 on Twitter, Instagram, and Facebook for updates about what our team is up to and any outreach events that we'll be at near you!

(You can also tag us in your stories and pictures to show us how you had fun with STEAM!

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