

**Making Math Meaningful**  
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## Make your own Drone

### Materials Needed:

2 Jumbo Popsicle Sticks  
Kitchen Sponge  
Marker  
Stapler

4 Mini Popsicle Sticks  
Round Color Stickers  
Rectangular Color Stickers



### Pre-Assessment:

- Identify the name of the object in the picture.



**Description:** In this activity, the students learn about flying devices without a pilot, also called as **drones**. They will learn about the fundamentals of the design of a drone, learn to identify parts of a drone, how they integrate all subjects including Science, Technology, Reading, Engineering, Arts and Mathematics and how they can potentially solve society's challenges. For example, while drones were introduced for military application and surveillance, today there are many ways drones can help simplify lots of complex process. Think about agricultural drones that can provide significant benefits for farmers, improving farm efficiency and increasing crop yields by monitoring the health of crops and spraying the right amount of nutrients in the right places. Think about drones that are used for delivering packages. With rapid development in technological innovations, it is important for students to be able to learn about these state-of-the-art technologies that employ mathematics. For example, for the drone uses concepts such as angles, distance, rate, time, circles, intersection of conics and much more.

### Directions:

Start by motivating a discussion about drones. For example, ask the students to think about the following. *"You want to solve an important problem for farmers. The farmers have to use trucks or sometimes walk across their rice fields to spray nutrients to the crops and it takes a lot of time and effort. Can you help find a simple way to help the farmers so they can be more efficient with their time?"* Next, to help them understand parts of a drone by helping them build a prototype.

- First take two of the jumbo Popsicle sticks and put it in the form of a "+" sign and staple in the center. This frame now has **four** parts, which is why this drone we are building is called **quadcopter**. Talk about angles and math in the frame.
- Next, place a small rectangular piece of a kitchen sponge on one side of the frame in the center and a small rectangular piece of a scotch-Brite pad on the other side of the frame in the center and staple them. Explain that the pad acts like the **flight control**, which is like our brain that gives the drone all the instructions. The sponge is like the **battery** needed by all parts of the drone to work well. Talk about engineering.
- Next, we can place four round stickers for the four **motors** and place the little (colored) Popsicle sticks on top of these stickers to act like the **propellers** which are blades that spin. Talk about the direction of spins like clockwise and anti-clockwise.
- Next, place four rectangular stickers on each side of the frame to represent **ESC (Electronic Speed Controllers)** which connects (use markers) the flight control to the motors and they control the speed at which each propeller spins. Talk about science behind it. According to Newton's Third Law of Motion: for every action, there is an equal and opposite reaction. So, as the propellers push the air down, an equal force is also created that also pushes the air up. Therefore, drone flies upwards.



**Important words:** Drone, Quadcopter, Battery, Flight Control, Motors, Propellers, ESC, Clockwise, Anti-clockwise

**Post-Assessment:** Fill in the blank.

In a quadcopter, four \_\_\_\_\_ spins the blades also called as \_\_\_\_\_.