

**Lesson Title:** Let's Make a Helicopter

**Lesson Overview:** Students will use the engineering design process to make and test helicopters with different variables.

**Topic(s):** Engineering and Technology

**Grade or Grade Band:** 2<sup>nd</sup> grade

**Lesson Objectives:**

1. Design a helicopter to meet a specific goal
2. Test helicopters and communicate findings
3. Redesign helicopters based on findings

**Next Generation Science Standards:** K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

**North Dakota Standards:** K-2-ETS1-3 Analyze data from tests of two objects to solve the same problem to compare the strengths and weaknesses of how each performs.

**Time Needed (estimate):** 45 minutes

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## Preparation/Materials

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**Background knowledge students must have to be successful:** 2<sup>nd</sup> graders should understand that the engineering design process emphasizes open ended problems that encourage students to learn from failure. Discovering something that doesn't work can often be just as important as discovering what does work. Encourage students to brainstorm and try several ideas to find out what works best.

**Differentiation and accommodation to support learning for all students:**

- Glue the paperclip to the popsicle stick to avoid burnt fingers
- Allow extra time for completion on the experiment
- Provide helicopter patterns for students to choose from

**Essential terminology:**

**Variables**-the objects or conditions we can change in a science experiment

**Consistent**-to do things the same each time

**Websites:**

<https://youtu.be/OOcalE6JEIM>

**Materials needed:**

- [Plastic propellers](#) made for rubber band STEM projects
- Popsicle sticks
- A variety of rubber bands with different widths and lengths
- tape
- Paperclips
- Hot glue gun

## Procedure/Activities

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**Engage:** Give students the following hints and see if they can guess what we will be exploring today:

1. It has blades, but it isn't grass
2. It can fly but doesn't have feathers or wings
3. It doesn't use a runway to take off, it often uses a square
4. Some people call it a chopper, but it isn't a knife

\*Riddles by Stephen Pepper

**Explore:** Watch the video "Let's Make a Helicopter": <https://youtu.be/OOcalE6JEIM>

After watching the video:

1. As a class, decide a goal for your helicopters. Possible goals: most height, furthest distance, certain distance etc. Brainstorm as many ideas as possible, then allow students to vote on the goal.
2. Students collect all materials: propellers, popsicle sticks with attached paperclip, one rubber band, sheet of paper, tape.
3. Students should sketch out what they would like their helicopter to look like then cut it out.
4. Tape the paper helicopter to the popsicle stick, add the rubber band and test the helicopter.

### **Explain: Share initial models and redesign**

After the models have been tested, put students in small groups to compare the performance of each helicopter. Possible questions to ask: Which one goes up the fastest/farthest? Which one flies the straightest? Which one is the most consistent? What can you do to make yours more consistent? Encourage students to consider specific variables that influence the consistency of their helicopter, e.g. the number of twists in the rubber band, the width of the rubber band, the way in which the helicopter is held during take-off.

Each small group should vote to determine which helicopter meets the class goal best. Lead students to investigate and identify the specific variables that led to this performance, e.g. the length of the popsicle stick, the shape of the helicopter, the color of the rubber band. Allow students time and additional materials to redesign and retest their helicopters based on the discussion.

As a large group discuss the variable that worked well to help the helicopters meet the class goal. Allow students time to discuss the changes they made to make their helicopters better, i.e. which variables they altered. Did any helicopter perform worse after making the changes? Why?

### **Extensions for learning more about this topic:**

Science: Pick a new goal and add or subtract variables

Math Activities: Measuring height, distance, and speed

English Language Arts: Read and write short stories about helicopters.

**Evaluation of learning:**

- Small group discussion
- Large group discussion

## Additional Lesson Resources / Materials

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### References:

Pepper, Stephen. "Helicopter Riddles." *Riddles For Kids*, 13 Dec. 2017, <https://riddles-for-kids.org/helicopter-riddles/>.