

The Flight of the Bumble Bee

Grade Span

4

Subject Area

- Science
- Math

Materials

- Fab@School Maker Studio
- Digital fabricator or scissors
- 65lb or 110lb cardstock
- Pencils, pens, markers, or crayons
- Stapler, tape, or glue

Online Resources

- [Website: The Physics-Defying Flight of the Bumblebee](#)
- [Website: Bumblebees Can Fly Into Thin Air](#)
- [Video: Bumble Bee in Slow Motion](#)
- [Article: Lasers Illuminate the Flight of the Bumblebee](#)
- [PDF: Fab@School Quick Start Guide](#)

Author

Denine Jimmerson,
*Executive Director of
Curriculum and Design,
FableVision Learning*



There is a common myth that bumble bees defy the laws of physics as they apply to aerodynamics. Basically, they shouldn't be able to fly. Using high-speed photography, Michael Dickinson, a professor of biology and insect flight expert at the University of Washington, published an article in 2005 all about the why and how the bumblebee takes flight. Through this Fab@School Maker Studio activity, your students will examine the anatomy of a bumblebee or other flying insect.

Objective

- Using Fab@School Maker Studio, students will design a 2D or 3D prototype of a bumble bee (or another flying insect) that demonstrates how its structure serves it in its function of flight.

Big Idea

Functions help to determine form.

Driving Question

How do bees fly?

Learning Standards**NGSS**

- [4-LS1-1](#).

CCSS

- [CCSS.ELA-LITERACY.CCRA.R.7](#)
- [CCSS.ELA-LITERACY.CCRA.SL.2](#)
- [CCSS.ELA-LITERACY.CCRA.SL.5](#)

MA DLCS

- [3-5.CT.e.2](#)

MA STE

- [4-LS1-1](#)

Challenge

Show the [Bumble Bee in Slow Motion video](#) to your students. Pose the question: How do bees fly?

Explain to the students that they will be researching how bumble bees (or other insects/animals) fly. Based on their research, students will design a prototype of a bumble bee (or another flying insect) in Fab@School Maker Studio. This prototype will that demonstrate how the insect's structure serves it in its function of flight.

- What will they need to explore first before they start their design?
- Where will they find this information?

Now it is time to get started; inquiring, exploring, and using systems thinking to demonstrate biology and physics.

Workshops

Break students into small groups to begin the systems thinking process and their investigation, then they can continue the design and prototype process in groups or individually.

1. Students begin the inquiry/discovery process using available resources. Students will consider and identify the components of the bumble bee's anatomy that enable it to fly.
2. Students should now conduct research, making meaning of their findings. Then have them create an idea to make their findings actionable in the form of a model that will identify and demonstrate the components of a bumble bee's system that support its flight function.
3. Students begin the ideation phase, creating as many possible designs for their bumble bees. These designs will be in the form of sketches.
4. If not already completed in another lesson, introduce the Fab@School Maker Studio software as a whole group presentation with kids following along on their devices (or small groups if not 1:1). For this introduction, use the quick start guide to share with students an overview of the different sections and functions of the software.

Allow students to play with the software and direct them to either design from scratch or choose one Ready-Made activity to change and fabricate. This step allows students to experiment using Fab@School Maker Studio to design and fabricate prototypes. Students will also use a protocol for getting feedback on their prototypes from others (teacher and/or peers).

5. Once the designs have been created, students have students reflect on the process and next steps. Where will they collect learnings? Could they possibly scale their prototype and engage others in furthering their design examples?



Fab@School Maker Studio Tips

Magnetize: If you want shapes to automatically snap and create fold lines when you drag them together, be sure **Magnetize** tool is on. To learn more about the tool, have students watch the [Fab@School Maker Studio Shapes Tutorial video](#).

Cut Fold Tab: Use the **Cut Fold Tab** tool on the left toolbar to change lines and shape edges into cuts, folds, or tabs. To learn more about cut fold tabs, have students watch the [Fab@School Maker Studio Cut Fold Tab Tool Tutorial video](#).

Resizing Shapes: When creating nets or flat patterns, it's easiest to resize shapes before you snap them together. If you resize a shape that's already snapped to another, you will need to drag the shape away and resnap it to maintain the fold line. To learn more about shapes, have students watch the [Fab@School Maker Studio Shapes Tutorial video](#).

Edit Points: Customize shapes and lines by editing their control points with the white **Edit Point** arrow on the top toolbar. To learn more about edit points, have students watch the [Fab@School Maker Studio Line Tool Tutorial video](#).