

Buzzing Around

The Physics of Bee Flight

Age group

5th - 6th class



Total time: 1hr - 1.5hrs

Notes for parents/carers and teachers:

This activity can be carried out at home by an adult and child or with a small group of children, by varying the types of age-appropriate tasks. The materials are available at home or easily obtainable. The activity is written out with instructions directed to the child's parent/carer. Feel free to adapt as appropriate.

Outline: To learn about the importance of bees, the science of flying, and how to help protect them

Links to Primary Curriculum

The child should be enabled to

- to appreciate that gravity is a force (Science: Forces)
- become aware that objects have weight because of the pull of gravity (Science: Forces)
- explore and experiment with the properties and characteristics of materials in making structures (Area: Arts Education, Visual Arts)

Key Learning points

This activity will cover

- the everyday importance and the science of bees
- The basic physics of flight

What you need

- Printing paper
- newspaper
- light card
- ruler
- pencil
- colours
- string
- chalk

Why we love bees

Bees are among the earth's hardest working creatures and are one of the most important plant pollinators. This means they help plants reproduce and help us to produce many of our favourite fruits and vegetables.

The SOPhia Project has its very own beehive since last spring 2019 and we are learning so much from our new friends. Check out our website for more bee science and the Beewise blog for updates on our hive.

Check out the All Ireland Pollinator Plan (www.pollinator.ie) It has lots of resources explaining why bees are so important and what actions we can take to protect them. Let's get to work and make them welcome in our gardens.

There's lots of science and physics behind the way bees go about their activities, from the electric charge sensors bees use to decide if flowers are worth visiting, to their [super bee vision](#) which senses polarized light helping them navigate where ever they need to go.

1. What do you think of bees?

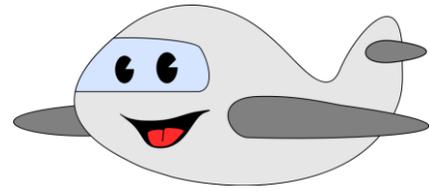
Spark the children's curiosity with the following questions: Do you know why bees buzz? How do you think they fly? Wanna find out?



Did you know?

- A hardworking forager bee may live just three weeks and travel 800Km.
- Each bee produces about a 1/12th of a teaspoon of honey in its lifetime, so it takes around 1000 bees to produce your jar of honey.
- Male bees are called drones and make up only about 15 percent of the population of a bee colony. So female bees rule the beehive!

A bee's wings beat very fast (about 230 beats per second!), and this makes wind vibrations that we hear as buzzes. The larger the bee, the slower the wingbeat and the lower the pitch of the resulting buzz. Let's experiment to find out more about flying.



2. Let's make something fly

We've probably all made a paper airplane at some point. Now it's time to experiment and see what makes them fly better and farther. Remember to observe how different wings work.

1. Go to the [Foldnfly.com](https://foldnfly.com) website for with folding instructions for making a the basic paper plane, called a dart design.
2. Follow the instructions to make a *basic dart paper plane*. Feel free to decorate your plane but be careful not to damage the folds and point!
3. Go to a large open area and mark a line on the ground with string/chalk/stones etc. This will be the starting line from which you will fly the paper airplane.
4. Place your toe on the line you prepared and throw the paper airplane. How far does it fly?
5. Throw the plane at least four more times. Each time before you throw the plane, make sure it is still in good condition (that the folds and points are still sharp). When you throw it, place your toe on the line and try to throw the plane as similarly as possible, including holding it at the same spot. Did it travel the same distance each time? Why or why not?
6. Make paper airplanes that are different sizes (e.g. use different sized paper) and compare how well they fly. Do bigger planes fly further?
7. Try making paper planes out of different types of paper, such as printer paper, light card, and newspaper. Use the same design for each. Does one type of paper work better? Which is the worst paper for these paper airplanes?
8. Try other paper airplane designs with different wing shapes and see what happens.

3. The Science behind flying

Prompt them with some of these questions. You can then read the full explanation to them below or try it in your own words.

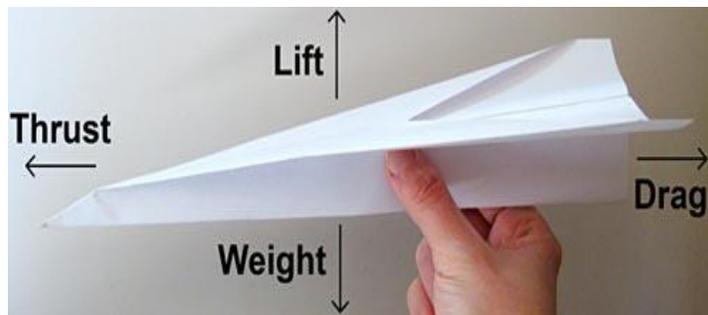
Key questions

What force makes the paper airplane fly across the open space? (Think about what you did to make the plane fly)

Do you know why the plane goes down after a short while? What is the name of that force? (Hint: What keeps our feet on the ground?)

What might happen if you tried to fly your paper airplane in a windy place?

Explanation



A paper airplane is able to fly because of Newton's third Law of Motion – to every action there is an equal but opposite reaction. When you throw the paper airplane into the air (giving it a **thrust** force), the air pushes off the underside of its wings, and the air is deflected downward. This creates an equal but opposite force that pushes the paper airplane up, which is called **lift**. The **weight** of the paper plane is the force of **gravity** acting against the **lift**. There is one more force acting on the plane. This is the body of the plane rubbing against the air particles, slowing it down. It's called the **drag** force. When it's windy, it can cause more drag on your plane, or speed it up if it's in the same direction as your plane is moving.

4. How do bees fly?

We've looked at the basics of how your paper airplane flies. So do bees do the same thing?

A bee's wings must move about very fast to create enough force upwards (*lift*) to balance against the bee's body *weight* downward (gravity force) to be able to lift off the ground and fly. That's basically just like a paper airplane. However, bees have wings that can move in many directions so they have a very fancy flapping motion which you can try out yourself.

How to do the Bee flap:

Take your arm and put it out to your side, parallel to the ground with your palm facing down. Now sweep your arm forward. When you reach in front of you, pull your thumb up, so that you flip your arm over and your palm is upwards. Now, with your palm up, sweep your arm back. When you reach behind you, flip your hand over again, palm down for the forward stroke. Repeat. If you gave your hand a slight tilt (so that it's not completely parallel to the ground), you'd be doing something similar to a bee flap!

5. Bees need our help

We've just learned about the fabulous physics behind the flight of bees. If that gave you a good buzz, we'd love you to continue learning about bees, how they help to grow our food, and why they are in danger from pesticides, loss of habitat, and what we can do to help.

Take action at home

We can all help to make our gardens a welcome place for bees. We can plant wild flowers, mow our lawns less, use less chemicals. For lots more ideas check out the All-Ireland Pollinator Plan website at www.pollinators.ie



6. What did you like? What did you learn?

Adults and kids are both welcome to answer.

What did you most like/least like about this activity?

What did you learn about bees, flying and forces?

What would you like to do to help save the bees?



Some Resources

15 fascinating facts about honey bees -
<https://www.thoughtco.com/fascinating-facts-about-honey-bees-4165293>

Find out more about Bumblebees and Honeybees, and how solitary bees get this name:
https://youtu.be/BXHAHHki_E

Web: www.sophiaphysics.ie

Twitter @SophiaPhysics



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