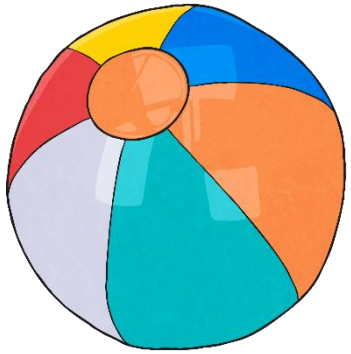
Lesson 3/4 – Air Resistance

- L.O. To investigate the effect of air resistance.

- What is air resistance?
- What effect does it have?



Which will hit the ground first?

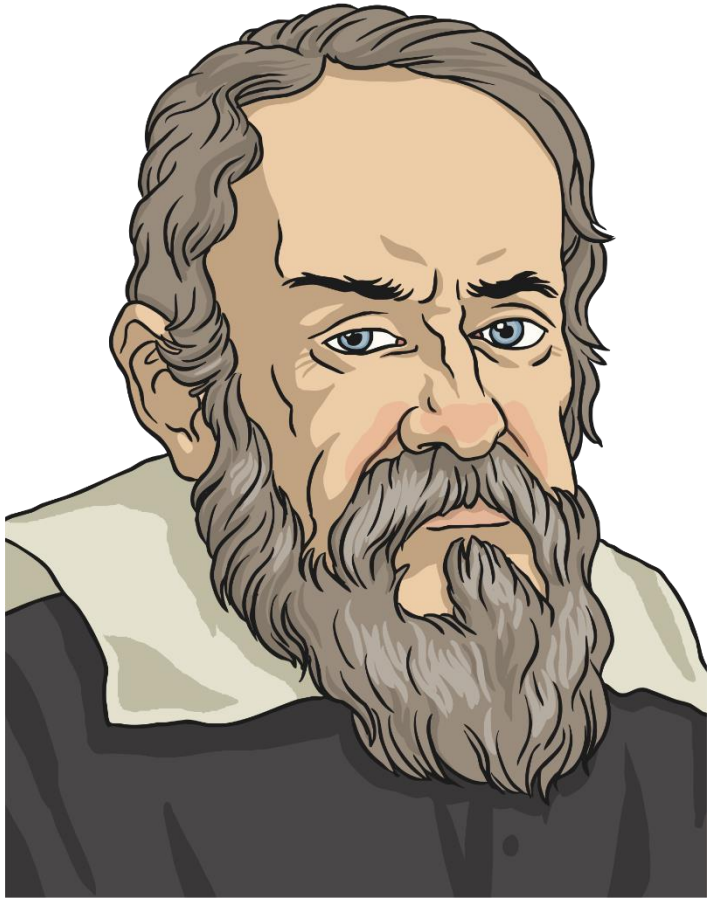




Here is a beach ball and a cannonball. They are both the same size but, obviously, they have a different mass. If they were dropped from a great height which would hit the ground first?



Gravity and Falling



Galileo Galilei (1564 – 1642) was an Italian scientist and mathematician who wondered about this.
In 1590, he decided to carry out an investigation to find the answer.
He climbed to the top of the Leaning Tower of Pisa with two balls of similar shape and size, but of different masses.
He dropped both of the balls from the top of the tower at the same time.

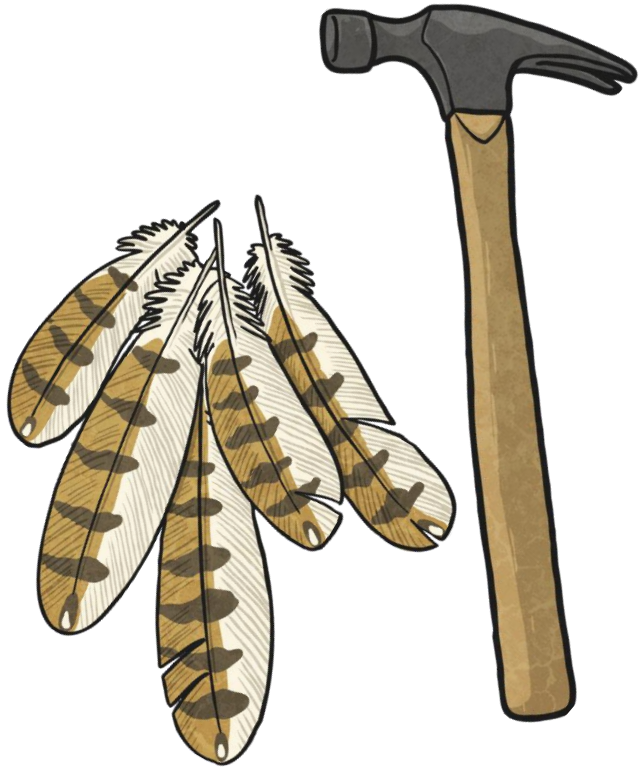
Both balls hit the ground at the same time.

Gravity and Falling

Galileo's experiment proved that **all objects fall at the same rate**, no matter what their mass is.

But this can seem hard to believe!

Think about a feather and a hammer. If you dropped both objects at the same time, would they hit the ground at the same time?




Watch this clip of astronaut David Scott dropping a feather and a hammer on the Moon.
What do you notice?

Gravity and Falling



The feather and the hammer hit the surface of the Moon at the **same time**!

This proves that Galileo's findings are correct.

Can you think why the two objects fall at the same speed on the Moon, but the feather falls so much more slowly on Earth?

What is different about the Moon and the Earth that could cause this to happen?

Air Resistance

There is **no air** on the Moon.

Air pushes against any object moving through it. This is known as **air resistance**. Air resistance pushes on different objects with a different force, which is what causes the feather to fall much slower than the hammer on Earth. Air resistance pushes the feather up with a bigger force than it pushes the hammer.

Since there is no air on the Moon, there is no **air resistance** to push on the feather, so the two objects are able to fall at the **same speed**.

Air resistance can be a useful force, but it can also be unhelpful in certain situations.
Look at the two diagrams below. Which one shows a **useful** effect of air resistance, and which one shows an **unhelpful** effect of air resistance?





Spinner Investigation

You will make three spinners and drop them from a height. Each of the three spinners will have the same mass but will have different sized wings.

You will observe which of your spinners falls the **slowest**. This spinner will have the most **air resistance** pushing it up.

Make each spinner using a sheet of squared paper measuring 9cm by 12cm. See the examples that your teacher has made. Place a paper clip on the body of the spinner to help it fall better.

Planning your investigation

- What will you keep the same?
- What will you change?
- What will you measure?
- What will you record?
- What do you predict will happen?



Sharing your findings.

You will need to write up the investigation in your science book under the following sub-headings:

Aim: To investigate how wing-width affects the speed of a falling spinner.

Prediction: (Write what you think will happen)

Equipment: (Write all the things you have used)

Method: (Write what you did)

Results: (Record your observations and measurements – probably in a table)

Conclusion and Evaluation: (What did you find out? What went well? What could you improve if you did this investigation again?)

Review your learning

- What have you discovered about gravity and falling?
- Would your spinners fall at different rates on the moon? Why?

