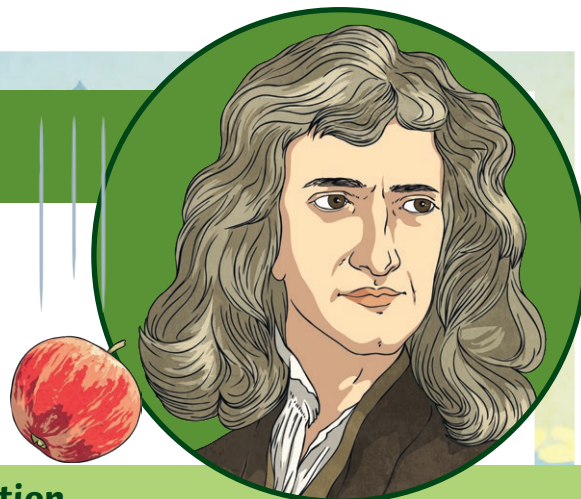


# Sir Isaac Newton

Sir Isaac Newton was an influential physicist and mathematician who played a key role in the Scientific Revolution. He is famous for his pioneering work on the three laws of motion which introduced the concept of gravity.



## Childhood

Isaac was born on Christmas Day (25<sup>th</sup> December) 1642 in the village of Woolsthorpe, Lincolnshire. Following his mother's remarriage when he was around three years old, Isaac was raised by his grandmother. He was sent to boarding school but returned when his mother asked him, as her eldest son, to manage the family farm and the surrounding estate. However, it soon became apparent that Isaac was not suited to this rural role so he returned to boarding school where he continued studying in preparation for university.

## Education

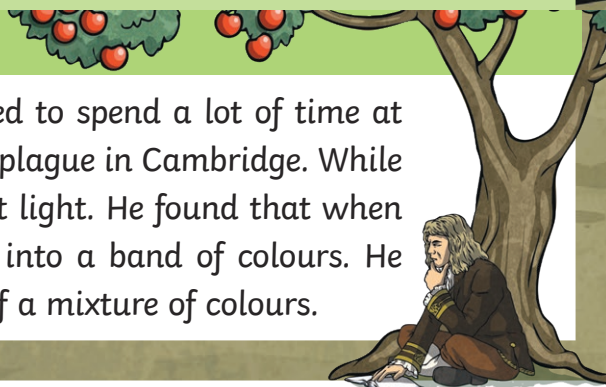
In 1661, Isaac enrolled at the prestigious Trinity College, Cambridge. Initially, Isaac studied the works of traditional scientists and philosophers: such as the ancient Greek thinkers, Aristotle and Plato. However, Isaac soon became interested in the emerging Scientific Revolution: a movement which hugely influenced his views on nature and science. On the cover of one of his scientific notebooks, Isaac wrote, 'Plato is my friend, Aristotle is my friend, but my best friend is truth.'

## What was the Scientific Revolution?

The Scientific Revolution was a movement that took place during the 16<sup>th</sup> and 17<sup>th</sup> centuries. People involved in the Scientific Revolution were interested in using experimental scientific methods to understand how nature works and began to think of nature as a machine. This questioned the popular ancient Greek ideas that were mainly concerned with the elements and viewed the Earth as the centre of the universe.

## Scientific Discoveries

After graduating from university, Isaac was forced to spend a lot of time at home in Woolsthorpe owing to an outbreak of the plague in Cambridge. While there, he conducted some important studies about light. He found that when white light passes through a prism, it separates into a band of colours. He concluded from this that white light is made up of a mixture of colours.



# Sir Isaac Newton

According to a well-known story, Isaac first made what is often considered as his greatest scientific breakthrough when sitting under a tree in an orchard on his family farm. It is said that an apple fell from a tree and landed on Isaac's head, causing him to ponder the reason that the apple fell to the ground rather than floating upwards. He then, supposedly, concluded that the same force that pulled the apple to the ground was also keeping the Moon in orbit around the Earth and the greater the mass of an object, the greater the gravitational pull. While researching gravity and motion, Isaac also made some important contributions to the field of mathematics.

Only four years after graduating, Isaac was appointed as a professor at the University of Cambridge. In 1687, Isaac published his famous work, commonly known as the 'Principia' in which he details his laws of motion. Isaac devised three laws to explain how objects move when forces act upon them:

## First Law

The first law of motion states that something that is still will stay still unless a force is applied to it. For example, a football on the ground will not move unless it is kicked.



## Second Law

The second law of motion states that if you apply more force to an object, it is accelerated at a higher rate. Similarly, if an object has a greater mass, more force will be needed to accelerate it. For example, a shopping trolley with a smaller mass will require less force to accelerate than a shopping trolley with a greater mass.



## Third Law



The third law of motion explains that forces work in pairs: for each force applied, another force will act in the opposite direction. For example, when rowing a boat, we move the water backwards with the paddle and the water reacts with equal force, pushing the boat in the opposite direction.

## Later Years

In 1703, Isaac was elected as the President of the Royal Society (a major scientific group) and, in 1705, he was knighted by Queen Anne. Isaac was also elected as a Member of Parliament (MP) and given the post of Warden of the Royal Mint — where he supervised the manufacture of British coins.

# Questions

1. Isaac is best known for his work in which areas? Tick **two**.

- farming
- science
- medicine
- mathematics

2. Number the events from 1-5 to show the order in which they happen in. The first one has been done for you.

Isaac began his education at Trinity College, Cambridge.

Isaac was elected as President of the Royal Society.

**1**  Isaac was born in Woolsthorpe, Lincolnshire.

Isaac published his book, 'Principia'.

Isaac was sent to boarding school.

3. Look at the section called **Education**.

Find and copy one word which means the same as 'at first'.

\_\_\_\_\_

4. Which **two** ancient Greek thinkers did Isaac study at Trinity College?

• \_\_\_\_\_

• \_\_\_\_\_

5. Fill in the missing words.

People involved in the Scientific \_\_\_\_\_ were concerned

with \_\_\_\_\_ scientific methods to understand how nature works.

6. Explain how you think that Isaac would have felt about having to move back to rural Lincolnshire during the plague outbreak in Cambridge.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Predict how you think people of the time would have responded to the publication of Isaac's 'Principia'.

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8. **...when rowing a boat, we move the water backwards with the paddle and the water reacts with equal force, pushing the boat in the opposite direction.**

Provide another example of the third law of motion.

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9. **Isaac wrote, 'Plato is my friend, Aristotle is my friend, but my best friend is truth.'**

Explain what you think is meant by this quote.

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10. Summarise Isaac's achievements in 25 words or fewer.

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# Answers

1. Isaac is best known for his work in which areas? Tick **two**.

- farming
- science**
- medicine
- mathematics**

2. Number the events from 1-5 to show the order in which they happen in. The first one has been done for you.

**3** Isaac began his education at Trinity College, Cambridge.

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**1** Isaac was born in Woolsthorpe, Lincolnshire.

**4** Isaac published his book, 'Principia'.

**2** Isaac was sent to boarding school.

3. Look at the section called **Education**.

Find and copy one word which means the same as 'at first'.

**initially**

4. Which **two** ancient Greek thinkers did Isaac study at Trinity College?

**Aristotle**

**Plato**

5. Fill in the missing words.

People involved in the Scientific **Revolution** were concerned with **experimental** scientific methods to understand how nature works.

6. Explain how you think that Isaac would have felt about having to move back to rural Lincolnshire during the plague outbreak in Cambridge.

**Pupils' own responses, such as: Isaac may have felt frustrated that he had to move back to rural Lincolnshire because he had not enjoyed the rural role that he had experienced earlier in his life and he may have missed life in Cambridge. However, he may also have felt safe in the countryside knowing that he was away from the plague outbreak.**

7. Predict how you think people of the time would have responded to the publication of Isaac's 'Principia'.

**Pupils' own responses, such as: People at the time may have been impressed with Isaac's ground-breaking ideas and inspired by his discoveries. However, some people may have been shocked by how different his ideas were from those of the traditional Greek thinkers.**

8. ...when rowing a boat, we move the water backwards with the paddle and the water reacts with equal force, pushing the boat in the opposite direction.

Provide another example of the third law of motion.

**Pupils' own responses, such as: Another example of the third law of motion could be when you let go of a balloon: the air pushes down and the balloon reacts by moving upwards.**

9. Isaac wrote, 'Plato is my friend, Aristotle is my friend, but my best friend is truth.'

Explain what you think Isaac meant by this.

**Pupils' own responses, such as: Isaac could have meant that he respected the work of Aristotle and Plato but he also believed that it was important to keep searching for the truth. He was not afraid to look for new answers to problems that may not agree with the beliefs of these ancient thinkers.**

10. Summarise Isaac's achievements in 25 words or fewer.

**Pupils' own responses, such as: Isaac was a highly influential scientist and mathematician. He made ground-breaking discoveries into gravity, motion and light which are still relevant to this day.**