

STEM Pioneers – Banknote Information

Bank of England £1 Series D

Featuring Sir Isaac Newton

Information about this banknote

This paper banknote was in circulation between 1978 and 1988. It was designed by Harry Eccleston and the Bank of England's design team.

Sir Isaac Newton was a British mathematician and physicist who discovered the laws of gravity and motion and invented calculus – a way of describing how things change.

Newton was born on Christmas morning in 1642 in Lincolnshire. Despite having a turbulent childhood, he found solace in books, which is where he developed a love of mechanics and technology.

In 1661 Newton enrolled at Trinity College, Cambridge. When Cambridge University was closed because of the plague, Newton was forced to return home. This was the most productive period of his life. He began experimenting and making observations which laid the groundwork for his theories of calculus and laws of motion.

In 1671, Newton continued to experiment in his laboratory. This mix of theory and practice led him to many kinds of discoveries. His theory of optics made him reconsider the design of the telescope.

In 1687, Newton published 'The Philosophiæ Naturalis Principia Mathematica' which took him two years to write; it outlined the theory of calculus, the three laws of motion and the first rigorous account of his theory of universal gravitation. Together, this provided a revolutionary new mathematical description of the Universe. The work cemented his reputation and contains much of what he is remembered for today.

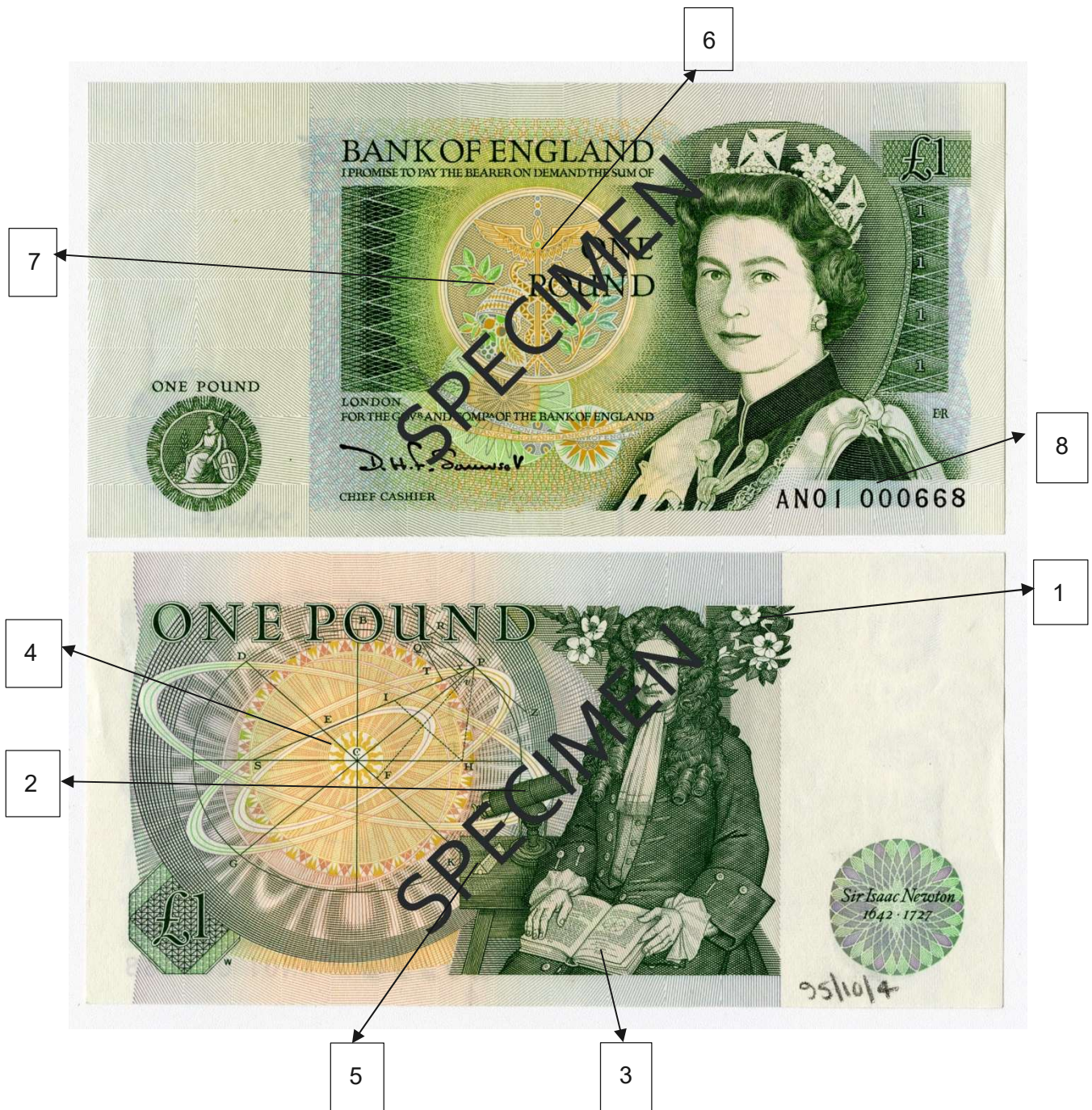
Newton died in 1727, aged 84, and was buried with full honours in Westminster Abbey.¹

¹ [Isaac Newton: The man who discovered gravity - BBC Teach](#)

Bank of England Museum

Design features on this banknote include:

1. An apple blossom tree symbolising Newton's discovery of gravity.
2. A reflecting telescope which was one of Newton's inventions.
3. A copy of Newton's famous works 'Principia'.
4. Machine-engraved patterns of swirling orbits suggesting the theory of universal gravitation.
5. A triangular cross-section prism which Newton used to understand optics.
6. A caduceus which is the staff of Hermes, the Greek god of trade and finance.
7. A cornucopia which is a symbol of plentiful supply.
8. A particular feature of this note was that it has only one serial number.



Clydesdale Bank £5 World Heritage Series

Featuring Sir William Arrol

Information about this banknote

Clydesdale Bank introduced this banknote in 2014. Designed by De La Rue, it was the first fully polymer banknote to enter circulation in Great Britain.

Sir William Arrol was a pioneering engineer responsible for the creation and construction of steel bridges, many of which were at the forefront of technology.

Arrol was born in Houston, Renfrewshire, Scotland on 13th February 1839. The son of a weaver, he had to start work in the mills at the age of 9 to help support his family. He started training as a blacksmith by age 13 and went on to learn mechanics and hydraulics at night school. Despite only a basic education, he was determined to learn, and studied in his spare time.

In 1863 Arrol joined a company of bridge manufacturers in Glasgow. By 1872 he had established his own business which secured contracts for the replacement of Tay Bridge (after its collapse in 1879), the Forth Bridge and Tower Bridge, among many others. He also developed and produced specialist cranes which were needed to construct these bridges and often came up with new techniques and inventions which would subsequently be adopted as standard practice in the industry.

Arrol was knighted in 1890 and he served as President of The Institution of Engineers and Shipbuilders in Scotland from 1895–97.

He spent the latter years of his life on his estate at Seafield, Ayr, where he died on 20 February 1913.^{2 3}

² [William Arrol - Engineering Hall of Fame](#)

³ [Tower Bridge | Discover People | Sir William Arrol](#)

Bank of England Museum

Design features on this banknote include:

1. An image of the Titan Crane.
2. The Forth Bridge.
3. An InterCity 125 train on the Forth Bridge.
4. A section of the Forth Bridge in the window.
5. Map of Scotland with the location of the Forth Bridge highlighted.



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Clydesdale Bank £5 World Heritage Series

Featuring Sir Alexander Fleming

Information about this banknote

This paper banknote was in circulation between 2009 and 2018.

Sir Alexander Fleming was a Scottish bacteriologist and Nobel Prize winner, best known for his discovery of penicillin.

Alexander Fleming was born in Ayrshire on 6 August 1881. He moved to London at the age of 13 and later trained as a doctor. He qualified with distinction in 1906 and began research at St Mary's Hospital Medical School at the University of London under Sir Almroth Wright, a pioneer in vaccine therapy. In World War One Fleming served in the Army Medical Corps and was mentioned in dispatches. After the war, he returned to St Mary's Hospital.

In 1928, while studying influenza, Fleming noticed that mould had developed accidentally on a set of culture dishes being used to grow the staphylococci germ. The mould had created a bacteria-free circle around itself. Fleming experimented further and named the active substance penicillin. It was two other scientists, Howard Florey and Ernst Chain, who developed penicillin further so that it could be produced as a drug.

Fleming wrote numerous papers on bacteriology, immunology, and chemotherapy. He was elected professor at the medical school in 1928 and professor of bacteriology at the University of London in 1948. He was elected fellow of the Royal Society in 1943 and knighted in 1944. In 1945 Fleming, Florey and Chain shared the Nobel Prize in Medicine. Fleming died on 11 March 1955.⁴

⁴ [BBC History | Alexander Fleming](#)

Bank of England Museum

Design features on this banknote include:

1. Depiction of a microscope.
2. A series of tartan patterns to the left of Alexander Fleming's portrait
3. Vignette depicting villagers and their cottages.
4. Two birds (one in flight and one perched on a rock).
5. Image of a Thistle within a patterned circular band.
6. Map of Scotland indicating the location of St. Kilda.
7. Aerial views of cliffs and of village bay.



Bank of England £10 Series D

Featuring Florence Nightingale

Information about this banknote

The paper banknote was designed by Harry Ecclestone and the Bank of England's design team. It was also the first banknote to feature an historic woman.

Florence Nightingale appeared on the £10 note between 1975 and 1994. Nightingale is famous for her treatment of wounded soldiers in the Crimean War (1853-1856) and is known as the founder of modern nursing. She was born in Florence in Italy 1820, and although girls were taught the same things as boys in the Victorian times, her father made sure that she was well educated in many subjects including maths and science.

During the Crimean War, Nightingale brought 38 nurses to Scutari hospital (in modern Istanbul, Turkey) to treat soldiers who had been wounded in battle.

Nightingale was appalled by the hospital conditions. More patients were dying of diseases than their battlefield injuries. She improved hygiene and nursing standards and raised funds to buy medical supplies and equipment. In 1883, she was one of the first people to be awarded the Military Red Cross for her nursing services during the war.⁵

After her return to Britain, Nightingale became a powerful social reformer. She used both her personal influence and statistical investigations to drive change and improve hygiene in hospitals.⁶ She was also credited with designing the pie chart (one of the ways data can be visually represented in segments).⁷

Florence Nightingale died in 1810, aged 90. Her family turned down the offer of a state funeral and burial in Westminster Abbey. Instead, a memorial service was held in St. Paul's Cathedral in London. She is buried in St. Margaret's church in East Wellow (Hampshire).

⁵ [About the Royal Red Cross - UK Parliament](#)

⁶ [Smartify | Historical Women on Banknotes](#)

⁷ [Canterbury Christ Church University | Florence Nightingale... The Lady With The Pie Chart](#)

Bank of England Museum

Design features on this banknote include:

1. In the background detail on the note, you can see Nightingale with a lamp and five other nurses who are looking after patients. She was often called 'the lady with the lamp' as she would carry one with her during hospital night-rounds.
2. Nightingale was also a keen horticulturalist and had an extensive collection of pressed flowers. This is acknowledged by the image of the lilies on the front of the note, which was inspired by an original sketch drawn by Nightingale's sister, Parthenope.
3. The master drawing for Nightingale's banknote portrait is based on two photographs that were taken shortly after her return to Britain in 1856.⁸



⁸ Smartify | Historical Women on Banknotes

Bank of England £10 Series V

Featuring Charles Darwin

Information about this banknote

This paper banknote was in circulation from 2000 to 2018. It was designed by the Bank of England's banknote design team.

Charles Darwin (1809 – 1882) was a scientist who explored the theory of evolution and natural selection. His work highlighted the importance of understanding organisms, and how and why they adapt and evolve over time.

He was born in Shrewsbury and spent much of his time exploring the natural world as he grew up. He initially enrolled to study medicine at the University of Edinburgh but found that he could not complete the course as he was left traumatised by surgeries (which were performed without anaesthetic and often proved fatal).⁹ After university, he travelled across the globe on *HMS Beagle*. The voyage lasted almost five years, but he spent most of his time on land studying the native flora and fauna (plants and animals found in certain places).

During his time abroad, Darwin collected fossils, and studied rock formations. All this work helped him to establish how similar species of animals had adapted to suit their environments. He documented his findings meticulously in notebooks, which would later be used for his best-known work, *On the Origin of Species*. Darwin had finalised his theory of natural selection, which is also known as 'survival of the fittest', where plants and animals which are better suited to their environments survive longer and have more young.

In 1858, *On the Origin of Species by Means of Natural Selection* was published. The book sold out immediately after its first publication 24 November 1859. Most scientists quickly embraced the theory, but some audiences condemned Darwin's findings.¹⁰ Darwin's ideas became even more controversial with the publication of *The Descent of Man, and Selection in Relation to Sex* (1871), in which he presented evidence that mankind had evolved from apes. By the time of Darwin's death in 1882, however, his theory of evolution was generally accepted. He was buried in Westminster Abbey in recognition of his scientific work.¹¹

⁹ [Charles Darwin - On the Origin of Species | Britannica](#)

¹⁰ [KS2: Charles Darwin – The biggest name in Victorian science - BBC Teach](#)

¹¹ ["Origin of Species" is published - HISTORY](#)

Bank of England Museum

Design features on this banknote include:

1. Darwin's pocket compass used on HMS Beagle.
2. His magnifying lens.
3. HMS Beagle.
4. Ammonite fossils (and similarly shaped patterns).
5. Plants and animals that Darwin would have likely come across during his travels.



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Royal Bank of Scotland £10 Fabric of Nature Series

Featuring Mary Somerville

Information about this banknote

The Royal Bank of Scotland first entered this polymer banknote into circulation in 2017. The note was designed by De La Rue.

Mary Somerville was a British Science writer whose published works influenced many different scientific disciplines including astronomy, physics and chemistry.

Somerville was born on December 26, 1780, in Jedburgh, Scotland, and had a minimal education as a child. She attended boarding school for one year when she was ten and, upon her return home, she began to educate herself from the family library. The only member of her family who encouraged her study was her uncle, Thomas Somerville. Women did not generally study science at the time because of the long-held belief that women were not intelligent enough.¹²

In 1804 Somerville married her cousin, Samuel Greig. She continued to study mathematics although her husband found this unfavourable. After his death in 1812 Mary had the freedom to dedicated herself to her studies.

Mary Somerville was married again in 1812, to another cousin, William Somerville, who took pride in his wife's educational accomplishments. She began to study botany and geology and in 1826, she published her first scientific paper, "On the Magnetizing Power of the More Refrangible Solar Rays". She later published two more papers and two books: her second book led to the discovery of Neptune. She became one of the first two women to be named Honorary members of the Royal Astronomical Society in 1835.¹³

In 1869 Somerville received the Patron's Medal of the Royal Geographical Society for Physical Geography.

Mary Somerville died in Naples, Italy in 1872, aged 91.¹⁴

¹² [Mary Somerville: Her Legacy for Women in Science - The Oxford Scientist \(oxsci.org\)](https://oxsci.org/)

¹³ [Mary Somerville | National Library of Scotland \(nls.uk\)](https://nls.uk/)

¹⁴ [Britannica | Mary Somerville](https://www.britannica.com/biography/Mary-Somerville)

Bank of England Museum

Design features on this banknote include:

1. A quote from Somerville's work 'The Connection of the Physical Sciences'.
2. Two Otters.
3. An excerpt from the poem 'Moorings' by Norman MacCraig.
4. Background imagery of botanicals used in the dyeing process.



Bank of England £20 Series E

Featuring Michael Faraday

Information about this banknote

This paper banknote was in circulation between 1993 and 2001. It was designed by Roger Withington and the Bank of England's design team.

Michael Faraday was a British scientist who studied electromagnetism and electrochemistry. These subjects explore how electricity can be generated through using magnets and chemical reactions.

Born in 1791 in South London, Faraday did not receive a formal education. Instead, he taught himself about science by reading a variety of papers whilst he was working as an apprentice for a book binder.

In 1813, Faraday was employed at the Royal Institution as a chemical assistant and founded the Royal Institution's Friday Evening Discourses and the Christmas Lectures in 1826 (which still take place today). Faraday often delivered the talks himself and was perceived to be an outstanding scientific lecturer.

In 1831, Faraday discovered electromagnetic induction, which enabled electricity to be transformed into a powerful new technology.

Faraday died in 1867 and is buried at Highgate Cemetery in London.¹⁵

¹⁵ [BBC - History - Michael Faraday](#)

Bank of England Museum

Design features on this banknote include:

1. Images of magnets and magnetic fields. The patterns surrounding the bar magnets are like those which are created with iron filings.
2. Droplets referring to Faraday's studies on the liquefaction of gases (turning gases into liquid).
3. The scientific terms Electrode, Anode, Ion, Cathode, Anion, Electrolyte, Electrolyze, Electrolysis, and Cation which Faraday was partly responsible for coining.
4. The chemical diagram of Benzene, which is used in many plastics, synthetic fibres, and dyes today, which Faraday discovered.
5. Some of the attendees in the lecture scene on the back of the note were modelled on the faces of some of the people who worked alongside Roger Withington (who was the lead banknote designer) in the Bank of England's banknote design team.

