

## STEM Pioneers Loan Box

### Notes for teachers

#### Introduction

Welcome to the Bank of England Museum's loan box service.

We have over 40,000 objects in our collection and have started to include some of these in our new loan box service. The boxes are primarily designed for school groups, which we hope will make our collection more accessible to a broader audience.

The boxes are loaned for up to six weeks at a time and can be used in a variety of ways in the classroom. Object-based learning can be a great way to engage learners in new topics and allow them to develop a number of key transferable skills, including analytical, oracy and literacy skills. We have included some suggestions as part of this resource pack.

We hope you and your students enjoy interacting with the objects and that they provide a new way to explore topics and ideas.

If you have any ideas or feedback to help us improve our loan box service, please let us know by completing the evaluation form included with the box or emailing [Education@bankofengland.co.uk](mailto:Education@bankofengland.co.uk).

We are very keen to hear from you!

#### STEM Pioneers

This loan box explores historical figures who feature on Scottish and English banknotes, and how their contributions to science, technology, engineering, and mathematics continues to shape the way we live today.

Historical figures have appeared on English banknotes since 1970. They do not include fictional characters, or people who are still alive (except for the monarch, who is on the front of all English notes). Sir Walter Scott has featured on Bank of Scotland notes since 1970 and Clydesdale Bank notes since 1971.

This loan box has links to a number of different topics and themes across the national curriculum for England and Curriculum for Excellence in Scotland, including history, art & design, English, science, and citizenship at key stage 2/P5 and P6.

## The benefits of object-based learning

The opportunity to handle objects is a unique experience and allows participants to learn in a very different way. Interacting with objects is a multisensory experience and offers a tangible connection to the past, which can help to support engagement and deepen understanding.

Observing, critical thinking, problem solving, questioning, making predictions and drawing conclusions are all skills which can all be promoted and developed through object-based learning. Creative expression can also be encouraged through drawing, designing, and writing.

## Object handling guidelines

All the items in the handling collection are unique, and although they may not be highly valuable in monetary terms, we want as many people as possible to enjoy and interact with the objects both now and in the future.

Please make sure the guidelines below are followed, to minimise wear and tear and ensure that learners understand why there are rules given the age, fragility, and difficulty in replacing the items. Alternatively, classes may find it helpful to come up with their own rules for handling.

- All participants should thoroughly wash and dry their hands before handling any of the objects. Any cuts and grazes on hands should be dressed and covered.
- One person should handle one object at any given time (unless passing the object to someone else).
- Always pick up objects with two (dry) hands.
- Always pass an object carefully, using both hands, while both parties are seated (or standing over a table).
- Paper-based objects should be handled with care. Please ensure they are not snatched, crumpled, or folded.
- For safety reasons, please do not leave the objects with unsupervised children.
- All items should be stored securely; they should not be separated for use elsewhere or used as part of a display.

## Links to the curriculum

Relevant links to the curriculum for key stage 2/P5 which can be explored through the loan box include:

### History:

- Studying an aspect or theme in British history that extends pupils' chronological knowledge beyond 1066...such as a significant turning point in British History.
- Discussing why people and events from a particular time in the past were important, placing them within a historical sequence.

### Citizenship:

- Thinking about the lives of people living in other places and times, and people with different values and customs.

### Art & Design:

- Recording observations in sketchbooks and use them to review and revisit ideas.
- Improving mastery of art and design techniques, including drawing, painting, and sculpture with a range of materials.
- Creating images and objects through observing and recording experiences from across the curriculum, which demonstrates pupils' awareness and recognition of detail.
- Expressing and communicating ideas, thoughts, and feelings through activities within art and design.

### Science:

- Learning about the work of naturalists and animal behaviourists.
- Understanding the concepts of evolution and inheritance.
- Making observations about the banknotes and collecting information and measurements using appropriate devices and units.
- Analysing, interpreting, evaluating, and presenting scientific findings.
- Researching and discussing the creative use of new materials such as polymers.
- Researching the banknote figures and discussing how their contributions have made to scientific discovery and invention and the impact this has made on society.

## Useful vocabulary

Aesthetics	Materials	Context	Function
Stylish	Manufactured	Old	Practical
Organic	Engraved	New	Useful
Colourful	Printed	Old fashioned	Versatile
Patterned	Flexible	Modern	Universal
Hand drawn	Metal	Value (historical)	Medium of exchange
Angular	Plastic	Value (sentimental)	Store of value
Curved	Cotton	Value (monetary)	
Pointed	Robust		
Unique	Durable		
Unusual	Natural		
Creased	Man-made		
Rough	Paper		
Smooth			
Bumpy			

## More useful vocabulary

### Banknote security features and explanations

#### Paper banknotes

**Material** – cotton-based paper, which gives the notes a unique feel and make them hard to copy.

**Raised print** – the curly ‘Bank of England’ text on the side of the Bank of England notes which features Queen Elizabeth II’s portrait is slightly raised. There is also raised print on the Clydesdale paper banknote featuring Fleming including on the bank name and the logo. This is achieved through a technique called ‘intaglio printing’. This is where the ink is added to an engraved, metal plate, which is forced down onto the cotton paper under high pressure. The ink used is specially designed to dry very quickly. So that’s how the raised, bumpy feel is achieved.

**Watermarks** – these can be seen in the oval windows on the Bank of England notes when held up to the light. On the Clydesdale note featuring Fleming, there is a multi-tonal watermark image of Sir Alexander Fleming accompanied by bright images of the numerical value of the note and a depiction of a molecular pattern. Watermarks are created by pressing the cotton paper substrate (whilst it is still a wet pulp) against a wire mesh which contains an image.

**Holograms** – these reflective patches on the Bank of England notes change between an image of Britannia, the Bank’s logo (which has been on every banknote issued since 1694), and the value of the banknote. ‘Depth image’ holograms also feature on the Fleming Clydesdale paper banknote.

# Bank of England Museum

**Metallic thread** – look for a dotted thread which runs from the top to the bottom of the note. When held up to the light, the dotted line becomes a dark, solid line instead. This is because the metallic thread is woven into the note, but it only pierces the surface of the note on one side. The Fleming Clydesdale note features the same metallic security thread but if you hold the note up to the light you should see that the thread is continuous in the paper and that it contains a tartan pattern.

**Micro-lettering** – this is tiny writing on the notes which can often only be seen with a magnifying glass. Some good examples of this micro-lettering can be seen in the patterns underneath Queen Elizabeth II's portrait on the English banknote featuring Darwin and on the Scottish note, to the left of the portrait of Fleming, there is microprint reading 'Clydesdale Bank PLC'.

## Polymer banknotes

**Material** – Modern banknotes are made of polymer, a thin, flexible plastic. Polymer banknotes are manufactured from a transparent plastic film, specially coated with an ink layer that enables it to carry the printed design features of banknotes. The material allows the inclusion of 'windows' or clear portions in the design which enhance protection against counterfeits.

**Raised print** – there is also raised print on all the Clydesdale and Royal Bank of Scotland banknotes.

**Holograms** – Clydesdale and Royal Bank of Scotland banknotes use holographic foil or iridescent ink which can be clearly seen when you move the note around.

**UV Florescence** - If you place the polymer notes under a good quality ultra-violet light certain features fluoresce on the Clydesdale and Royal Bank of Scotland banknotes.

**Micro-lettering** – this is tiny writing on the notes which can often only be seen with a magnifying glass. Microprinting can be found at the bottom right of the Scottish note featuring Arrol that reads 'forthbridgefivepounds'.