

STEM Pioneers Loan Box

Activity ideas and suggestions

There are many ways that you can introduce object-based learning into your classroom teaching. Below are some suggested ways that you might want to incorporate objects into your lesson:

- Introducing a new topic or module of work
- A revision tool
- To draw connections between two different topics
- Part of a skills development workshop
- Extra-curricular activity
- A themed education week

Objects can be used to facilitate learning in pairs, small groups, or a whole class. Here are a few ideas for activities:

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English activities

- Use the following questions to thoroughly evaluate an object or group of objects:

Materials

What is it made of? Why do you think the material was chosen? How heavy is it (in comparison to another object or everyday item)? What does it feel like? How was it made? What technology does it require?

Function

What does it do? How was it used? How have these objects changed over time? How well do you think it would have worked? How easy would it be to use (ergonomic)?

Context

Who might have owned it? What is its value - historical/sentimental/financial/cultural? What can it tell us about the past? Why is it important today? If it could tell a story, what would it be? How important was it to the people who made/owned/used it? How does it compare with modern equivalents?

Creative writing - sentence starter activities

1. Biography

Research one of the STEM Pioneers on the banknotes (or a person you think should appear on a banknote) using some of the sentence starters below:

- He was born on XXXX
- She grew up in
- From an early age, he
- In her early years
- Whilst he was in XXXXXXXX... he
- Not long after she...
- Shortly afterwards, he...
- When the time came to... she...
- Throughout his life
- Once she had...
- A few years after...
- In XXXX, at the age of... she...
- As he grew older...
- Later in life,
- In her later years
- Towards the end of his life

Legacy statements

- She will probably be remembered most for...
- His greatest achievement was...
- She will be best remembered for...
- His life was...
- Her lasting legacy is that...

Speculating

- He might have been...
- If she hadn't... she may not have...

2. Diary writing

Write a diary entry from the perspective of one of the famous people on our banknotes using the sentence starters below.

Adverbs to start a diary sentence with:

- Hopefully
- Fortunately
- Unfortunately
- Thankfully
- Recently
- Incidentally
- Curiously
- Eventually
- Regrettably
- Miraculously

Other sentence starters

- Even though...
- For once...

- At least...
- At times...
- Sometimes...
- I felt so...
- Anyway ...
- I have no doubt that...

Speaking and listening

- Look at a banknote and describe it to the rest of the class and ask them to guess which banknote is being described.
 - Provide a vocabulary list for children to select all the words relevant to the object they are studying (see 'Useful Vocabulary' list in 'Notes for Teachers' document for some examples).
- Investigate a banknote in groups or pairs. This could be through drawing, or through research in library books or the internet. Present your findings to the rest of the class.

Poetry

- Write a poem in which the banknote describes its owner.
- Create a poem lamenting the owner's loss of a banknote.

Maths activities

- Measure the objects and record their dimensions.
 - Estimate their size (in comparison to X)
- Classify, sort, or group the banknotes based on certain criteria (such as age, colour, size, and value), then justify your decisions and compare the groups.
 - Create tables, charts or graphs using the classifications.

Science activities

Below are some science experiments that can be done in the classroom based upon the STEM Pioneers featured on the banknotes.

Sir Isaac Newton - make a marble run to demonstrate gravity¹

Working solely, in pairs, or in a group, make a marble run using recycled materials like the one pictured below. Gravity is the force that pulls the marble down the run.

What you need:

- Tape
- Cardboard tubes – kitchen roll or toilet roll
- Other bits of recycled packaging – boxes, bottles etc (optional)
- Egg cartons (optional)
- Large box or sheet of card to build it against
- Marble or table tennis ball
- Scissors



Image Credit: science-sparks.com recycled-marble-runs

Want to make it more difficult?

1. Try to defy gravity and make the ball to go up instead of down.
2. Make it a race and see who can make the fastest or slowest



Slow the marble down by adding some friction. This could be using velcro or rough paper attached to the inside of a tube.

¹ [Amazing Homemade Marble Runs - Science Sparks \(science-sparks.com\)](http://science-sparks.com)

Charles Darwin - human evolution²

What is evolution?

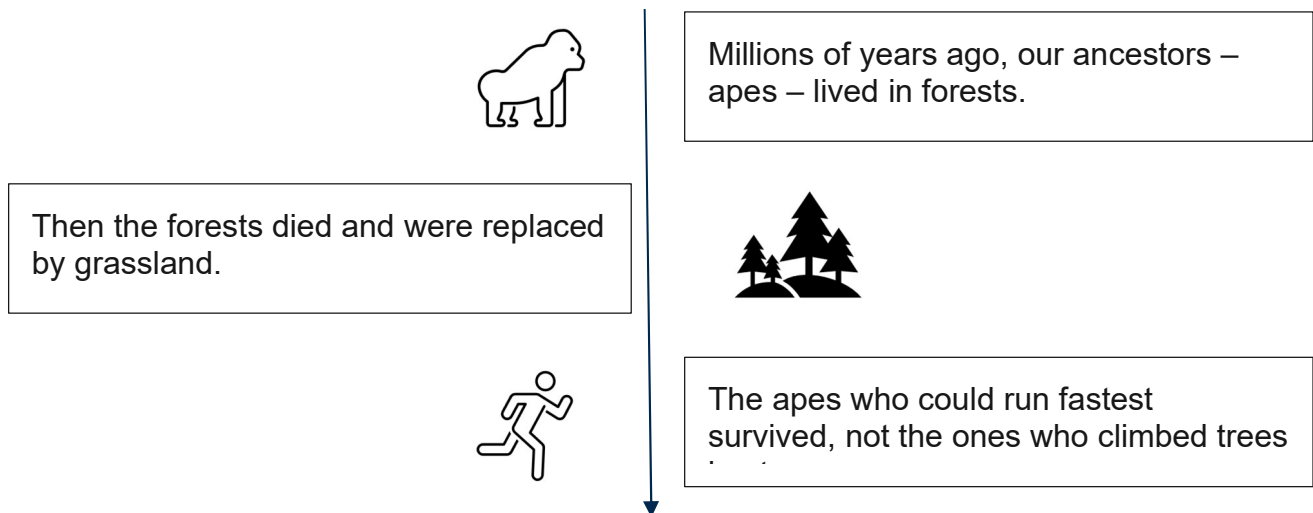
Evolution is a gradual change in living things. It happens by chance.

Babies are not usually exact copies of their parents. Some of their features are slightly different.

For example, a baby monkey might grow up to have longer arms than its parents, so it would be better at climbing.

Changes in habitat often trigger evolution.

The evolution of humans



Activity:

1. Imagine you could control evolution.
2. What is the new feature you would like to see humans evolve to help us to survive more easily?
3. Why would this feature make it easier to survive?
4. Draw a picture of a human with this new feature.



² | [STEM - Evolution](#)

Michael Faraday - Create an electromagnet³

Students will create an electromagnet. An electromagnet is a magnet that is created by electricity.

What you need:

- 1 nail
- 0.6 m of insulated wire
- 1 d-cell battery
- Several paperclips (or tacks or pins)
- A rubber band



Image Credit: <https://stemlibrarylab.org/Build-an-Electromagnet-Lesson-Plan>

What to do:

1. Wrap the wire around a nail at least 20 times (see image). Ensure students wrap their nails tightly, leaving no gaps between the wires and not overlapping the wraps.
2. Connect the ends of the coiled wire to each end of the battery using the rubber band to hold the wires in place (see image).
3. Test the strength of the electromagnet by seeing how many paperclips it can pick up.
4. Disconnect the wire from the battery after testing the electromagnet.
5. Can the electromagnet pick up paperclips when the current is disconnected?
(Answer: No)

Want to make it more difficult?

6. Test how varying the design of the electromagnet affects its strength.
7. The two variables to modify are:
 - The number of coils around the nail
 - The current in the coiled wire by using a different size or number of batteries.



To conserve the battery's power, remember to disconnect the wire from the battery after each test.

³ stemlibrarylab.org/wp-content/uploads/2021/07/Build-an-Electromagnet-Lesson-Plan.pdf

Drama activities

- Role-play using the banknote as inspiration.
- Ask the children to imagine they are one of the people on the banknotes, or someone using a banknote. Ask them to imagine a day in the life of that person. **Please do not use the notes as props during role-play exercises.**

Art and Design activities

- Draw details which feature on part of a banknote, or the same object from different or unusual perspectives.
- Draw one of the banknotes in as much detail as possible and label the drawing to explain the various components.
- Ask the children to re-design a banknote for the future. What technologies will be used? What will it be made of? What will it do and how will it work?
- Design a poster or advert for the banknote appropriate to its time. Children decide on and promote the object's USP (unique selling point).

Aesthetics to consider

- Colour
- Shape
- Size (in comparison to X)
- Decorative style
- Inspiration behind the design
- How and why has it been decorated? Does it have any signs of age and/or wear?
- Which features on the banknotes make them unique? Look for the different serial numbers, marks, creases, or small tears on the notes.

ICT activities

- Ask participants to examine the banknotes. Then, in groups, devise a list of questions they have about the banknotes.
- As a class, work out which of the questions are easy to answer, and which require more research or cannot be answered.
- Divide up the research tasks for children to investigate on the internet or at home.

History activities

Often, details on a banknote can provide lots of clues about the lives of the people who appear on them. Ask the class questions such as:

- What does the STEM pioneer's clothing tell us about their profession, or the era they lived in?
- What do details on the notes tell you about the STEM pioneers' lives and achievements?

Choosing a new banknote historical figure activity

Background

Choosing the historical figure which appear on our banknotes is a detailed process. We want to make sure that the figures on our banknotes come from different backgrounds and fields. When selecting a new figure, we think about who has been on notes in the past and look for figures who are fairly well known.

Of course, banknotes need to be easily recognisable and universally accepted, too. So we look for UK figures who are fairly well known, and have made an important contribution to British lives through their ideas, leadership or values.⁴

Until recently, banknote figures used to be discussed and chosen by a small group of people inside the Bank of England as part of a specific committee.

Today, there's a new method for selecting banknote figures. First, our Banknote Figure Advisory Committee selects the field we want to represent, such as 'science' or 'visual arts'. Specialists in that field are also invited join the committee. We then ask members of public to nominate people from the chosen field.

In 2015, we used this method for the first time, and artist JMW Turner was chosen to appear on our polymer £20 note.

In 2018, we received 227,299 nominations for a scientist to appear on our polymer £50 note. 989 eligible scientists were then identified and scaled down to a shortlist of twelve finalists. The Advisory Committee considered these nominations and in July 2019, we announced that Alan Turing had been chosen to feature on the note (which entered circulation on 23 June 2021).

Activity

The aim of this exercise is to encourage the development of oracy skills via a discussion/debating activity. The activity focuses on which person, or people, should appear on a new banknote.

Divide the class into pairs or small groups. Assign the class or small groups with a topic, subject, or field – some examples are below, but the list is not exhaustive:

⁴ [Choosing banknote characters | Bank of England](#)

Bank of England Museum

Science

Technology

Engineering

Mathematics

Literature

Art and Design

Music

Sports

Once the fields have been allocated, each member of the group should then research a famous person from that area. They should discuss why they have chosen that person, and then agree as a group which of famous individuals should be selected.

You may wish to include certain rules, such as:

- The person / people chosen must not be fictitious
- They must no longer be living
- They must have made a positive difference to British society and values.

Once the groups have made their decisions, they should present the reasoning behind their choices to the rest of the group. You may want to invite the whole class to collectively decide from the 'shortlist' of historical figures which person should appear on a banknote.

Banknote Quiz

(Pupils can write answers or vote by putting hands up)

Question

1. The Bank of England issues five banknote denominations: £5, £10, £20, £50, and £100
2. The £20 note is the value most commonly printed by the Bank of England.
3. Only the Bank of Scotland can issue Scottish banknotes.
4. A Bank of England note is always worth something, no matter how old it is.
5. All banknotes issued in Scotland are the same colour.
6. If you take a fake banknote to the Bank of England, they will give you a real banknote as a reward.
7. Banknotes used to be receipts for gold.
8. The most recent banknotes issued are made of plastic.
9. Britannia (the Roman goddess of the British Isles) is the Bank of England's logo and has appeared on every single banknote issued by the Bank of England since we opened for business back in 1694!
10. The £1 note issued by The Royal Bank of Scotland is no longer in circulation.

Banknote Quiz Answers

Once the class have completed the questions, read out the answers and some of the information below if helpful / of interest:

1. The Bank of England issues five banknote denominations : £5, £10, £20, £50, and £100

False: The Bank of England issues four denominations: £5, £10, £20 and £50. £100 notes are issued by three Scottish banks (Clydesdale Bank, Bank of Scotland, and Royal Bank of Scotland), and three banks in Northern Ireland (Bank of Ireland, First Trust Bank, and Danske / Northern Irish Bank). Whilst Scottish and Northern Irish banks are legally allowed to issue their own banknote designs, they must be backed by Bank of England notes of the same value.

2. The £20 note is the value most commonly printed by the Bank of England.

True: it's also the most commonly counterfeited banknote as it's less likely to be scrutinised than a £50 note, but a counterfeiter will get more goods in exchange for a fake £20 note than they would when using a fake £5 or £10 note. Since the new £20 note entered circulation in February 2020, the number of counterfeits in circulation has gone down significantly.

3. Only the Bank of Scotland can issue Scottish banknotes.

False: In most countries it is only the Governments, through their central banks, who are permitted to issue currency. But in Scotland three Banks - Bank of Scotland, Clydesdale Bank and The Royal Bank of Scotland - are still allowed to issue banknotes.

4. A Bank of England note is always worth something, no matter how old it is.

True: a banknote is still worth the value that is written on it, no matter how old it is. You can fetch old banknotes which are no longer in circulation to the Bank of England, where you can have it exchanged for a new note worth the same amount.

5. All banknotes issued in Scotland are the same colour.

False: For ease of identification, all three issuing banks in Scotland use the same principal colour for each denomination: Blue for £5, brown for £10, purple for £20, red for £50, and turquoise for £100.

Banknote Quiz (continued...)

- 6. If you take a fake banknote to the Bank of England, they will give you a real banknote as a reward.**

False: The Bank of England can only exchange real notes for real notes. But if you do find a fake banknote, you should hand it into your local police station. The police can't give you a cash reward either, but you should get a receipt from them to prove that you handed it in. The fake banknote can then be used as evidence to bring the people copying banknotes to justice in court.

- 7. Banknotes used to be receipts for gold.**

True: The Bank of England used to be like other banks in that we had customers who kept their money safe with us. In the past, that money would often be in the form of gold coins and bars (or bullion). So whenever a customer's gold was deposited at the Bank of England, a cashier would write them a receipt. Over time, these receipts were traded between other people, so anyone who held the receipt could collect the equivalent amount in gold. These gradually evolved into the banknotes we have today!

- 8. The most recent banknotes issued are made of plastic.**

True: All of the banknotes the Bank of England print today are made of a thin, flexible plastic called polymer. There are lots of benefits to using polymer instead of cotton (which is what our older banknotes used to be made of): they are cleaner as they are more resistant to dirt and moisture; they are harder to copy because of some of the extra security features we can include on them; and they also last longer (around 2 to 3 times longer than their cotton counterparts).

- 9. Britannia (the Roman goddess of the British Isles) is the Bank of England's logo, and has appeared on every single banknote issued by the Bank of England since we opened for business back in 1694!**

True: Britannia was chosen to be the symbol of the Bank of England when we first opened for business back in 1694 as she was a symbol that was recognised (she had appeared on coinage before the Bank of England was founded) and ultimately trusted.

- 10. The £1 note issued by The Royal Bank of Scotland is no longer in circulation.**

False: The Royal Bank of Scotland continues to issue a small volume of £1 notes. The £1 note is currently the smallest denomination of banknote.

Banknote Descriptions Word Search

G	B	A	L	V	D	U	R	A	B	L	E	J	D	Q
M	E	T	A	L	I	P	L	D	W	B	C	N	T	M
C	B	T	J	S	S	A	F	S	M	O	O	T	H	A
V	T	B	U	L	W	T	D	H	V	Y	T	X	V	N
W	I	D	L	E	G	T	K	W	U	I	T	A	M	U
F	C	B	W	N	R	E	B	R	Y	U	O	M	D	F
O	R	N	A	T	E	R	V	B	A	D	N	A	N	A
T	N	E	T	N	U	N	U	S	U	A	L	N	S	C
N	A	P	U	F	L	E	B	O	R	D	U	M	C	T
E	S	C	L	G	E	D	Y	A	B	A	D	A	E	U
D	E	O	B	A	P	D	I	Q	O	N	E	D	T	R
F	D	L	X	I	S	T	O	R	V	G	I	E	Y	E
L	Y	O	B	L	E	T	N	R	T	U	M	P	S	D
U	B	U	M	P	Y	B	I	M	G	L	O	P	N	E
G	L	R	U	F	T	I	B	C	V	A	T	L	U	F
O	V	F	I	J	L	Y	D	O	U	R	N	A	I	W
P	M	U	B	I	P	R	I	N	T	E	D	I	R	I
D	R	L	D	T	R	O	P	C	A	L	I	N	C	B
U	D	F	L	A	R	T	I	U	P	T	M	N	A	A
H	A	N	D	D	R	A	W	N	F	G	U	L	I	T
L	A	Z	R	A	O	N	W	I	T	L	O	R	L	K
I	Z	O	P	L	U	N	T	Q	P	E	Y	M	A	E
F	W	Y	B	R	G	P	N	U	Y	B	D	P	B	L
D	Z	R	U	Y	H	F	L	E	X	I	B	L	E	T
O	E	N	G	R	A	V	E	D	U	V	T	D	G	Y

Aesthetics		Materials	
Ornate	Unique	Manufactured	Cotton
Organic	Unusual	Engraved	Durable
Colourful	Creased	Printed	Natural
Patterned	Rough	Flexible	Manmade
Hand drawn	Smooth	Metal	
Angular	Bumpy	Plastic	
Pointed			