shedding light on lewis latimer activity sheets

teachers notes

Shedding light on Lewis Latimer

This cross-curricular trail explores what it might have felt like to be a black person living in the nineteenth century. It is aimed at Key Stage 2 and 3 pupils and fits the National Curriculum requirements for history and science. Pupils study two topics concurrently: the history of black inventor, Lewis Latimer, and the science behind light bulbs. Together, these topics highlight black achievement and allow pupils to question why some people's contributions to history have remained invisible for so long.

The Activity

The trail starts in the *Making the Modern World* gallery on the ground floor, continues in *Food for Thought* on the first floor, and ends in *Lighting* on the second floor. It uses a variety of objects, questions and tasks to suit pupils of all abilities. The trail allows pupils to practise a wide range of historical and scientific skills. It will probably take about an hour to complete, but don't forget you can take a break between galleries. To avoid congestion, we suggest that the trail is completed by pupils working in groups of about ten. We have used the term black people throughout instead of African American to make the issues raised as relevant to British pupils as possible.

Teaching objectives

- To make historical deductions by looking at and evaluating original objects and other sources of information.
- To consider the significance of the events and people studied and the effects on different groups of people.
- To support aspects of the Science National Curriculum on the themes of light and materials.
- To practise organising and communicating information using historical and scientific knowledge and vocabulary to support explanations.
- To promote work on mutual respect and multiculturalism.
- To promote group work, discussion and cooperation.

Before your visit

1. Allow the pupils to read and discuss Latimer's life story as explained on the activity sheet. Or ask the pupils to read the information together at appropriate moments while they are doing the trail in the Museum.

2. Allow the pupils to look at a selection of different light bulbs to examine what the various components are made of and how, in simple terms, they work. This will enable them to compare contemporary light bulbs with the historical examples they will see in the Museum.

You could also discuss forms of lighting used before the invention of light bulbs, and their benefits/ disadvantages. This will help pupils to understand why so many people were working on the development of light bulbs.

3. Your visit to the Science Museum will be object-centred. Try the two activities suggested below as part of a pre-visit lesson to get your pupils thinking about objects in an appropriate way. You don't have to hunt for objects to do with history or science. These activities work well whatever objects you use.

(i) 50 ways to look at...
Give your pupils a familiar object, like a tin of baked beans or a light bulb, and ask them to imagine they are someone from another planet or period. They must try to come up with 50 questions that this person might want to ask about the object to find out what it does
e.g. what does it smell like?
e.g. why is it this shape?

(ii) A mystery object
Divide the class into groups of about five. Give each group an unfamiliar object. Ask them to work out what it is through careful observation and handling, and by focusing on its appearance, design, function, materials and the people who might have used it.

These activities will empower pupils to use objects as a source of historical evidence and give them confidence in their powers of observation and deduction. Discussing what you can't learn from an object is just as valid. It is a fresh way of focusing on the

idea that a good historian will always look at several different sources of evidence to get all of the facts and to avoid misinterpretations.

4. Pupils will need to understand the following:

(i) Words:
• To do with Lewis Latimer - inventor, achievement, patent, racism.
• To do with slavery - slave, plantation, abolition, whip, civil war.
• To do with light - incandescent, electricity, current, conductor, insulator, filament, carbon, transparent, opaque, translucent.

(ii) Geography:
• Relative locations of USA (including Virginia and Boston), the Caribbean, Africa and Britain.

At the Museum

To make the most of your visit you might like to combine the trail with other Museum experiences.

Launch Pad is a hands-on science and technology gallery that allows pupils to explore scientific ideas in fun and interesting ways. To build on ideas covered by the trail, direct your pupils to the following exhibits to do with light:
• Shadow box,
•Two-way mirror,
•Shake-hands,
•Kaleidoscope,
•Bubble sheet,
• Picture stick.

Drama characters can be requested as part of your visit. Of particular relevance to black achievement are Mary Seacole and Garrett Morgan (subject to availability).

Ask your pupils to complete the All About Light activity sheet, and the one called The Science and Art of Medicine on the Egyptians available from:
www.sciencemuseum.org.uk/education/sheets

Ask your pupils to complete other activity sheets (still under development) on the theme of black achievement from the above address.

Follow-up work

1. Lewis Latimer display

Discuss the issues about black achievers and invisible histories that your visit has highlighted. Ensure that your pupils are aware that several factors may have conspired together to enable us to forget the part played by Latimer in our lives although the role played by racism is important. It is not necessary for them to reach a consensus on this issue.

Latimer's inventions might have been forgotten in Britain because:
• he was black.
• he was American.
• he worked with Edison and not Swan (Swan was better known in Britain because most of our early lamps followed his design).
• carbon filaments were used for a relatively short time and so the important work the Latimer did is no longer relevant to our lives.

Pupils can design a display about Lewis Latimer to place in the *Lighting* gallery at the Science Museum. They will need to do some more research about him, including finding out about his other inventions.

2. Looking at interpretations of historical evidence

Thomas Clarkson, a British abolitionist, drew the plan of the slave ship in *Food for Thought*. You might like to discuss how his intended political outcome might have caused him to exaggerate the overcrowding and conditions the slaves had to contend with whilst on the ships. Is his plan an accurate depiction of the Middle Passage, and what other evidence is needed to find out the truth? In fact, Clarkson carried out very detailed research and gathered lots of different kinds of evidence to prove his case to parliament. He interviewed sailors, inspected ships and even bought devices such as the thumbscrews used to punish slaves.

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Background information to work in the galleries

1. Lewis Latimer (1848-1928)

Lewis Latimer was one of the first major African American inventors. His most important scientific contribution was the work he did on improving the longevity of light bulbs in 1881. Whatever he did, he always tried to be a positive role model to both black and white Americans, to show what African Americans could achieve once they had been given their freedom and equality in 1865.

The biography below is very brief, mainly because the information available has many gaps and is occasionally inconsistent. However, it is clear Latimer was an intelligent, humane, religious and creative family man.

1848 September 4, born in Chelsea, Massachusetts, fourth child of Rebecca and George Latimer, former slaves.

1858 Left school, but carried on educating himself, spending his earnings on books. Sold the *Liberator* newspaper written by abolitionist William Lloyd Garrison.

1864 Lied about his age and joined the Union Navy to fight in the American Civil War for the abolition of slavery.

1865 Honourably discharged at the end of the war. Went to Boston and found work as an office boy at a law firm, Crosby & Gould, that specialised in protecting the rights of inventors. Taught himself how to produce mechanical drawings and once employers realised he had these skills, they promoted him to the post of draughtsperson, and then chief draughtsperson. Worked there until 1876. Whilst there developed a passion for science.

1873 First invention - designed a toilet for trains, with a bottom that opened onto the tracks beneath when the lid was closed, patented in 1874. Married Mary Wilson Lewis on 10 December. They had two daughters, born in 1883 and 1890. Met Alexander Graham Bell. Records in his diary show he prepared the blueprints for Bell's application for a patent for the telephone (although there is no corroborative evidence for this).

1880 Went to work for the United States Electric Lighting Company - hired by Hiram Maxim its chief engineer – and began to study electricity.

During this period he:
- developed a longer lasting carbon filament for the newly-invented light bulb and in 1881 was granted the patent for an incandescent electric light bulb with carbon filament (along with Joseph V Nicholls, a man about whom even less is known than Latimer).
- developed a process for efficiently manufacturing the carbon filament, patented in 1882.
- supervised installation of public electric lights throughout New York, Philadelphia, Montreal and London (while living in Lewisham, south London).

1885 Went to work for Edison in the engineering department. For the first time his diaries mention racism at work, but he succeeded in altering opinion with the high standard of his work, and eventually became chief draughtsperson.

1889 Transferred to the legal department as an expert witness in patent cases.

1890 Revised and edited the standard technical engineering book for lighting engineers, *Incandescent Electric Lighting: a practical description of the Edison system*, written by Sawyer in 1881.

1918 Only African American invited to join the Edison Pioneers, an elite research team looking at electrical lighting.

1924 Retired due to failing eyesight.

1928 Died. Clear from his obituaries that his contribution to scientific progress was recognised by his peers. One said, 'His work in science was an achievement and his personal life was a work of art'.

2. Slavery and the United States

Latimer's parents, George and Rebecca, were both slaves. In 1842 they ran away together from a plantation in Virginia in the southern states. His father's light skin meant that he could pass for a plantation owner while Rebecca pretended to be his slave. They managed to escape to Boston in the north where people were working for the abolition of slavery. Many individuals and groups helped slaves escape from plantations in the south to relative freedom in the north.

America at that time was a country bitterly divided between the north (industrial/ democratic/ anti-slavery) and south (dominated by aristocratic plantation owners who adamantly defended their right to own slaves).

Just after Latimer was born, George was arrested as a fugitive slave. A court ruled that he still belonged to his former owner or master in Virginia, but a group of abolitionists including a former slave called Frederick Douglas, and William Garrison, a white man -- raised funds to buy his freedom. Since 1831 William Garrison had led the press campaign against slavery with his newspaper, the *Liberator*, which the young Latimer sold.

Civil War broke out in 1861 when the 11 southern states, including Virginia, formed the Confederate States of America. The main reason they wanted to be independent from the Union of the American States was because they did not want to abolish slavery. Their economic success depended on its continuance. President Lincoln led the Union, the northern states, and Latimer joined their navy when he was only 16 by lying about his age. The Union eventually won in April 1865, Lincoln having outlawed slavery the month before in the Thirteen Amendment to the American Constitution.

The Civil War did not erase racism. It continued to be widespread in the northern as well as the southern states. Latimer still had to struggle against racist notions about the worth and qualities of black people, but he was determined to be a positive role model to both black and white Americans, Racism in America was not dealt with in any great depth by successive governments until the civil rights movement took off in the 1960s, led by Dr Martin Luther King.

3. Britian's role in the slave trade

The Black people who worked on the plantations had originally come from Africa. They were part of a trade triangle that started in Britain:

Stage 1 – ships left London, Bristol and Liverpool loaded with textiles, guns and domestic goods (all made in England's factories)
Stage 2 – these goods were exchanged on the African coast for slaves, who had been captured mainly by other Africans. They were shipped across the Atlantic (the Middle Passage). The slaves were packed in as tightly as possible into these ships with many dying on the way from disease, starvation, depression and neglect.
Stage 3 – The slaves were sold to white plantation owners in the United States of America and the Caribbean (then called the West Indies). The ship owners bought sugar, spices, rum, tobacco and coffee with their huge profits and shipped those goods back to Britain for the cycle to start again.

Once on the plantations the slaves were treated worse than animals. They worked very long hours and in appalling conditions with no thought given to their safety or wellbeing. To ensure the slaves always worked their hardest and did not try to escape or organise a rebellion, their masters devised horrific ways of punishing wrong doing. These often resulted in death.

It has been estimated that over 20 million Africans were captured and sold as slaves.

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In 1807 the selling of slaves was abolished throughout the British Empire, and slavery was abolished altogether in 1833. Many different types of people campaigned to bring it to an end: white middle class people such as William Wilberforce, Thomas Clarkson and Granville Sharp; the Quakers; black people such as Olaudah Equiano and Ottobah Cugoano; white working class people, including the Chartists; and slaves themselves by revolting against their masters.

A successful slogan adopted by the abolitionists was 'Am I not a man and a brother?' with a picture of a black man, kneeling and chained, beneath. You can find an example of a trade token with bearing this slogan and image in the Museum's *Synopsis* gallery, between cases 61c and 60a under the heading 'political and social tokens'.

4. Light bulbs

In 1879 two people invented a light bulb suitable for homes and offices at about the same time: Joseph Swan (1828-1914) and Thomas Edison (1847-1913). To avoid lengthy and costly legal wrangling over their patents, they decided to merge their British interests and formed the Edison and Swan Electric Lighting Company Ltd in 1883.

Light bulbs work because of a process called **incandescence** – the bulb gives off light because an electric current heats up a conductor or filament that is connected to the electricity supply. The glass bulb contains a partial vacuum, which reduces the amount of oxygen inside. This allows the filament to turn white-hot and give off light without catching fire.

One of the main problems for the nineteenth century inventors was to find a filament that would last a long time. Sometimes they lasted only a few hours. Once they had burnt out, the light bulb stopped giving out light. This made bulbs unreliable and expensive.

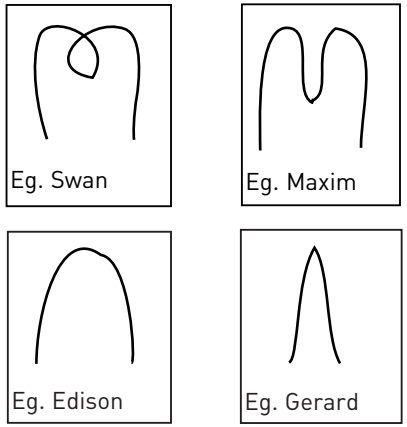
Before the inventors settled on carbon ones, filaments had been made from paper, platinum, thread (parchmentizing), bamboo, grass fibre (French whisk), cardboard and tamadine. There are examples of these in the *Lighting* gallery.

In 1881 Latimer successfully made a longer lasting filament out of carbon. He then developed a way of making lots of filaments at the same time.

By about 1910, carbon filaments had been replaced by tungsten ones, which are still used today. However, Latimer is still important in the history of the light bulb. His invention meant that more people wanted to buy light bulbs that could easily be used indoors, which meant a greater variety became available and they became cheaper.

The labels for some of the bulbs on display in the case called 'The Further Development of Incandescent Lighting', show that their power was measured according to candle power and not wattage as today.

At this time, the length of the filament dictated the brightness and size of the bulb. So the longer the filament was, the brighter the light and the bigger the bulb.
To create longer filaments without making larger light bulbs different inventors tried different shapes. The four different shapes on display in the Museum are:



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Lewis Latimer was born on 4 September 1848 in the United States of America. He was a man with a passion for science who grew up to be one of America's first black inventors. Many of Latimer's inventions were to do with the light bulb.

The trail starts in the *Making the Modern World* gallery. In the middle of the gallery there is a line of benches with objects in them. Go to the fourth one along just before you reach the big lighthouse lamp (Eilean Glas light, 1907).

Find objects 4 and 5. These are two of the earliest designs for the light bulb.

Draw both objects and write the name of their inventor underneath.

Latimer was a very successful man, despite the fact that in the nineteenth century many people thought black people weren't very clever.

To understand what made Latimer work so hard, we need to find out about his background. His story really starts before he was born: a story that is the same for lots of black people living in America.

He was the fourth child of Rebecca and George Latimer. They were both runaway slaves. They ran away together from a plantation in Virginia, in the southern part of the United States, to Boston, in the north, where some people were trying to get slavery abolished. His parents weren't caught because George had light skin, which meant he could pretend to be a plantation owner, while Rebecca pretended to be his slave. Plantation owners were always white.

Go to the right-hand side of the gallery, to the large glass case labelled 'Technology in Everyday Life c.1750–1820'.

Find object 47. This is a slave punishment whip.

Look at it carefully. Is it possible to understand why slaves ran away from their masters by looking at just one object?

Try to work out how it was used. Think about the type of materials it is made of. Try to think of reasons why these materials were used.

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Draw and label the whip in the space below. Write a caption explaining why it was used.

What does it tell you about the attitudes of plantation owners to black people?

Write down three words describing what it must have felt like to be a slave.

Go to the *Food for Thought* gallery. Find the 'Refining Sugar' display in the 'Food in the Factory' section (between 'Snacks' and 'Bread').

Find the plan of the slave ship on the information panel.

What else can you learn about slavery from looking at this picture?

Does this new information agree with what you found out when you looked at the whip?

Many slaves worked on plantations in America and the West Indies (what we now call the Caribbean). They grew sugar cane, tobacco, coffee and cotton. Plantation owners made lots of money, because the slaves were not paid and were forced to work very long hours in horrific conditions.

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Go to the *Lighting* gallery. Find the section called 'Incandescent Lamps'.

Latimer left school when he was 10 years old. This wasn't unusual for the period, especially for black people, but what was extraordinary was that Latimer managed to achieve so much despite this. Latimer joined up in 1864 to fight in the American Civil War against slavery. Once the war was over and slavery was abolished in 1865, he returned to work. He was determined to show that black people could do great things, now they had been given freedom and equality.

Black people did not expect to be given good jobs in those days, because of racism. So, at first, Latimer had to take a very poorly-paid job. But he managed to educate and train himself so well that he was promoted several times. Eventually he was given a very important job that required a great amount of skill. His job was to draw other people's inventions. This got him interested in science and inventing, two things he was very good at.

In 1879 two people, Joseph Swan and Thomas Edison, invented a light bulb that could be used in homes and offices. In about 1885 Latimer went to work for Edison, and in 1918 he asked Latimer to join his research team, called the Edison Pioneers. Latimer was the only black person in the team.

Why had Latimer impressed Edison so much?

To make light bulbs give off light, an electric current is passed through a conductor (or filament). The current needs to be so strong that it makes the filament hot enough to turn white and give out large amounts of light. This type of light is called incandescent light.

One of the main problems for the nineteenth-century inventors was that the filaments didn't last very long. Sometimes they lasted only a few hours. Once they had burnt out, the light bulb stopped giving out light. This made them unreliable and expensive.

Find the displays 'Incandescent Lamps' and 'Other Inventors'.

Write down at least five of the different types of materials that filaments were made from during the development of the electric light bulb.

Draw the three main shapes that filaments could have. Can you find a fourth?

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In 1881 Latimer successfully made a longer-lasting filament out of carbon. He then developed a way of making lots of filaments at the same time.

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Find the display called 'The Further Development of Incandescent Lighting'.

Draw two of the different types of bulbs on display here. Look out for the ones that pretend to be candles!

Write down three words that show how light bulbs have changed or stayed the same since 1900.

How is Latimer remembered today?

Look around the displays. You'll see there are many people whose work contributed to the type of light bulbs that we use today, but we seem to have forgotten most of them now, including Latimer.

Many people think that the reason Latimer's inventions have been forgotten is because he was black. Others say it is because we didn't use carbon filaments for very long, or because he was American. What do you think?

When you go back to your classroom, design a display about Lewis Latimer that would fit into this area of the *Lighting* gallery. You will need to do some more research about him, including finding out about his other inventions!

To get you thinking about his personality, this is how Latimer described the light bulb in his diaries: it is 'like the light of the sun, it beautifies all things on which it shines, and is no less welcome in the palace, than in the humblest home.'