



# Mr Latimer...what would we do without you! (Electricity) PHYSICS



## SCIENCE LEARNING STATEMENTS

Area of Learning	Knowledge and Skills
<b>Scientific Enquiry and applying knowledge in context</b>	I can raise my own relevant questions about the world around me and begin to look for answers.
	I am given a range of scientific experiences including different types of scientific enquiry to answer questions.
	I can start to make my own decisions about the most appropriate type of scientific enquiry I might use to answer questions and give justifications.
	I can set up simple practical enquiries, comparative and fair tests. I can recognise when a simple fair test is necessary and help decide how to set it up.
	I can talk about criteria for grouping, sorting and classifying; use simple keys and explain how they should be used.
	I can recognise when and how secondary sources might help me to answer questions that cannot be answered through practical investigations. I can use a selection of resources.
	I can make systematic and careful observations. I can make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.
	I can look for naturally occurring patterns and relationships; decide what data to collect to identify them.
	I can take accurate measurements using standard units, learn how to use a range of equipment, such as data loggers and thermometers, appropriately.
	I can collect and record data from their own observations and measurements in a variety of ways: notes, bar charts, tables. I can select and use the most appropriate standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse the data.
	I can look for changes, patterns, similarities and differences in their data in order to draw accurate conclusions and answer further questions
	I can confidently use relevant scientific language to discuss their ideas and communicate their findings, in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions.
	I can identify new questions arising from my data, making predictions for new values within or beyond the data I have already collected and finding ways of improving what I have already done.

### Overview and rationale:

We use electricity every single day and yet rarely do we take notice of where it comes from. In this topic, the children acquire knowledge of the source of electricity and this knowledge is consolidated by practical activities and investigative learning which aids children to see for themselves what makes electricity work and what is needed for electrical circuits to be complete. Bringing it to life in this way enables Year 4 pupils to gain a greater contextual understanding of why things work, why they don't and the importance of being safe when it comes to using electricity, the workings of insulators and conductors being key to this understanding. Here, the children also take a little look at alternative forms of energy and the importance of being **responsible** when looking after our planet's finite resources. Class J4 are named after Lewis Latimer and here, this famous inventor is used as a stepping stone to the children's learning.

## NATIONAL CURRICULUM OBJECTIVES

1. identify common appliances that run on electricity
2. construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
3. identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
4. recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
5. recognise some common conductors and insulators, and associate metals with being good conductors

## KEY VOCABULARY

*electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, parallel circuit, crocodile clip, bulb, switch, circuit breaker, buzzer, motor, conductor, insulator, metal, non-metal, symbol, Lewis Latimer, filament, wind, solar, renewable/non-renewable energy, pylon, substation, transformer, voltage*

*N.B. Children in year 4 do not need to use standard symbols as this is taught in year 6*

‘CORE’ KNOWLEDGE	‘ADDITIONAL’ KNOWLEDGE
1) I can identify common appliances that run on electricity and the dangers of electricity.	a) I know that electricity is a flow of tiny particles called protons and electrons and they provide energy to effect different things - e.g. light, sound, movement, heat. b) I know that electrical items in our homes are powered from mains electricity or batteries. c) I can begin to understand that electrical dangers are associated with materials that are good conductors. I can list a number of safety issues regarding electricity.
2) I know that there are alternative sources of electricity.	a) I know that there are renewable and non-renewable energy sources and can give examples of these. b) I know the advantages and disadvantages of renewable and non-renewable energy. Renewable resources include timber, wind, and solar while non-renewable resources include coal and natural gas. c) I can explain how we have become so dependent on electricity over time.
3) I know that Electricity can be generated using coal, gas, nuclear fuels, the wind or sunlight. Electricity is normally generated in big buildings called power stations	a) I know who Lewis Latimer was and his role in creating the carbon filament in the modern lightbulb. I know the challenges that he faced entering a white male dominated field. b) I know the role of pylons, transformers, substations in transporting electricity to our homes. c) I know why voltage needs to be reduced before entering our homes.
4) I know what a simple circuit is.	a) I know a simple circuit has to have a source of energy, wires, and a device that uses the energy (like a bulb) b) I know that a circuit has to be complete to work. c) I know that a circuit breaker (like a switch) turns components on and off and I know how to use one.
5) I can recognise circuit symbols.	a) I can link circuit symbols to the correct component. b) Using a ruler I can accurately draw circuit symbols. c) I can draw a range of circuits using a variety of components and explain why they work or don’t.
6) I know how to construct a simple series electrical circuit. <b>DO: Observe and measure: CIRCUIT PRODUCTS</b>	a) I can use crocodile clips to link different components together to make a complete circuit. b) I can test, classify and record which materials are good conductors and insulators of electricity. I can associate metals with being good conductors. I can name some good conductors (water, metals like copper, silver, etc) and insulators (like rubber, wood, oil) of electricity. <b>REVIEW: Interpret and report: ELECTRICAL CONDUCTORS</b> c) I know that a parallel circuit gives electricity different ways to flow – I know how to construct a parallel circuit so that some components work and others don’t.

## ART AND DESIGN

### Exploring and Developing

Exploring and developing ideas	Select and record from first hand observation, experience and imagination and explore ideas for different purposes. Question and make thoughtful observations about starting points and select ideas to use in their work. Explore the roles and purposes of artists, craftspeople and designers working in different times and cultures.
Evaluating and developing work	Compare ideas, methods and approaches in their own and others’ work and say what they think and feel about them. Adapt their work according to their views and describe how they might develop it further.

### Drawing Using a Variety of Materials

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<i>Explore relationships between line and tone, pattern and shape, line and texture.</i>	-Alter and refine drawings and describe the changes using the appropriate art vocabulary. -Explain the effect of different pencils. -Evaluate their work and make appropriate changes, using their sketchbooks to develop ideas.	-Know how to show facial expressions in sketches and paintings. -Know how to use marks and lines to show texture. - Know how to use line, tone, shape and colour to represent reflection. -Know when to use cross-hatching, hatching and contour hatching.	Cross hatching, hatching, contour hatching, lighter shading effect, pressure, angles, different pencil densities, dimension, observe, H pencils lighter, B pencils darker, depth, dimension, observe

### Artist/Style/Activities

*Matt Deakin/Kelvin Okafor: draw a lightbulb through observations in charcoal. Children to use techniques through experimentation (in the style of the artist).*

## DESIGN AND TECHNOLOGY

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<b>Developing, planning and communicating ideas</b>			
<ul style="list-style-type: none"> <li>Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups</li> <li>Generate, develop, model and communicate their ideas through discussion and annotated sketches./</li> </ul>	<ul style="list-style-type: none"> <li>Generate ideas, considering its purpose.</li> <li>Make labelled drawings and begin to think about different views.</li> <li>Develop a clear idea of what has to be done, planning all elements and suggesting alternative methods.</li> <li>Evaluate existing products and identify criteria that can be used for their own design.</li> </ul>	<ul style="list-style-type: none"> <li>Know how to develop own design criteria for a product.</li> <li>Know how to use annotation in order to communicate design features and ensure design criteria has been met.</li> <li>Know how to carry out own research in order to inform the design of a product.</li> <li>Know that from this, design criteria are created in order for the product to meet the outcomes from the research.</li> <li>Know what design criteria are</li> <li>Know how to suggest ways in which a design can be improved/ modified.</li> <li>Know how to produce more than one design through drawing.</li> </ul>	<p>reasons, purposes, target group, key audience, product, design, designed, research, inform, product, design criteria, outcomes, improved, modified, produce, annotation, design features</p>

<b>Working with tools, materials and components to make products</b>			
<ul style="list-style-type: none"> <li>Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately</li> <li>Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities</li> </ul>	<ul style="list-style-type: none"> <li>Select a wider range of appropriate tools and techniques for making their product safely.</li> <li>Measure, mark out, cut and shape a range of materials using tools, techniques and equipment.</li> <li>Join and combine materials more accurately in temporary and permanent ways.</li> <li>Measure, tape, pin, cut and join materials with some accuracy.</li> <li>Use simple graphical communication techniques – maths link.</li> <li>Use finishing techniques to strengthen and improve the appearance of their product using a range of equipment including ICT.</li> </ul>	<ul style="list-style-type: none"> <li>Know how to measure, mark out, cut and shape a range of materials, using appropriate tools, equipment and techniques.</li> <li>Know different ways to join materials temporarily and permanently.</li> </ul>	<p>cut, fold, trace, shape, produce, product, create, simple lever slider, pop-up book/card, join, finish, tools, equipment, make, equipment, techniques, reinforce, strengthen</p>

<b>Evaluating processes and products</b>			
<ul style="list-style-type: none"> <li>Investigate and analyse a range of existing products</li> <li>Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work</li> <li>Understand how key events and individuals in design and technology have helped shape the world</li> </ul>	<ul style="list-style-type: none"> <li>Start to evaluate their work both during and at the end of the assignment.</li> <li>Evaluate their product carrying out simple tests.</li> <li>Disassemble and evaluate existing products.</li> </ul>	<ul style="list-style-type: none"> <li>Know that a product has a purpose and we evaluate it to see if it has fulfilled that purpose.</li> <li>Know that a success criteria helps us to evaluate success and see what we can do better next time.</li> <li>Know that it is important to evaluate a product as we go along so we can make improvements.</li> <li>Know that we can learn by listening to others' ideas and opinions.</li> </ul>	<p>net, disassemble, packaging, shapes, evaluate, durability, net design, strength, materials, suggestions</p>

<b>Electrical Systems</b>			
<ul style="list-style-type: none"> <li>Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors].</li> </ul>	<ul style="list-style-type: none"> <li>I can create simple and parallel circuits.</li> <li>Explore and explain how the direction and speed of an electrical motor can be controlled.</li> <li>Explore and program a simple control device.</li> <li>Explore and describe how electrical circuits can be created and controlled.</li> </ul>	<ul style="list-style-type: none"> <li>I know the hazards and safety issues associated with electricity.</li> <li>I know a variety of output devices e.g. motors, bulbs etc. and can explain what they do.</li> <li>I know the difference between parallel and simple circuits.</li> </ul>	<p>series circuit, fault, connection, toggle switch, push-to-make switch, push-to-break switch, battery, battery holder, bulb, bulb holder, wire, insulator, conductor, crocodile clip, control, program, system, input device, output device.</p>

### Project

*Current board games aimed at primary school children.*

*Electricity trivia for the matching questions.*

<p><b>Possible Enrichment activities (including trips/visitors, etc)</b></p>	<p><b>Could we survive a whole day without electricity? Let's see...</b></p> <p><b>Now press play audio lesson</b></p>
--	--

**MUSIC**

**Controlling sounds through Singing**

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<ul style="list-style-type: none"> <li>- Pupils should be taught to play and perform in solo and ensemble contexts, using their voices and playing musical instruments with increasing fluency, control and expression</li> <li>- Sing songs from memory with accurate pitch.</li> </ul>	<ul style="list-style-type: none"> <li>- Re-join the song if lost</li> <li>- Listen to the group when singing</li> <li>- Sing a range of songs in tune with expression as part of a group or individually.</li> <li>- Perform with an awareness of tempo and dynamic.</li> <li>- Be able to sing a response part to a call part.</li> <li>- Evaluate their own singing and make improvements.</li> </ul>	<ul style="list-style-type: none"> <li>- Know that a solo singer makes a thinner texture than a large group</li> <li>- Know what call and response means in music</li> </ul>	<ul style="list-style-type: none"> <li>texture (layers of sound), pitch, control, expression, tempo, dynamics, call and response</li> </ul>

**Controlling sounds by Playing (and Performing)**

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<ul style="list-style-type: none"> <li>- Play instruments and perform in solo and ensemble contexts. Glockenspiels</li> <li>- Perform with control and awareness of what others are playing.</li> </ul>	<ul style="list-style-type: none"> <li>- Treat instruments carefully and with respect.</li> <li>- Play any one, or all four, differentiated parts on a tuned instrument – a one-note, simple or medium part or the melody of the song from memory or using notation.</li> <li>- Rehearse and perform their part within the context of the song.</li> <li>- Listen to and follow musical instructions from a leader.</li> <li>- Experience leading the playing by making sure everyone plays in the playing section of the song.</li> <li>- Present a musical performance designed to capture the audience.</li> <li>- Communicate the meaning of the words and clearly articulate them.</li> <li>- Talk about the best place to be when performing and how to stand or sit.</li> <li>- Record the performance and say how they were feeling, what they were pleased with what they would change and why.</li> <li>- Improvise (including call and response) within a group.</li> </ul>	<ul style="list-style-type: none"> <li>- Know and be able to talk about:                             <ul style="list-style-type: none"> <li>*The instruments used in class</li> <li>*How performing is sharing music with other people, an audience - it can be to one person or to each other.</li> <li>*how you need to know and have planned everything that will be performed.</li> <li>*How lyrics must be sung or rapped clearly and with confidence</li> <li>*How a performance can be a special occasion and involve an audience including of people you don't know</li> <li>*How a performance is planned and different for each occasion</li> <li>*How it involves communicating feelings, thoughts and ideas about the song/music.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Names of notes being played, names of instruments being played, solo, ensemble, audience, rehearse, leader, conductor, record, video, playback, clear feedback, perform</li> </ul>

**Creating and developing musical ideas (Improvisation and Composing)**

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<ul style="list-style-type: none"> <li>- Improvise and compose music for a range of purposes using the inter-related dimensions of music</li> <li>- Begin to use notation to record compositions in a small group or individually</li> </ul>	<ul style="list-style-type: none"> <li>- Improvise using instruments in the context of a song they are learning to perform.</li> <li>- Take it in turns to improvise using up to 3 different notes.</li> <li>- Help create at least one simple melody using one, three or five different notes.</li> <li>- Plan and create a section of music that can be performed within the context of the song.</li> <li>- Talk about how it was created.</li> <li>- Listen to and reflect upon the developing composition and make musical decisions about pulse, rhythm, pitch, dynamics and tempo.</li> <li>- Record the composition in any way appropriate that recognises the connection between sound and symbol (e.g. graphic/pictorial notation).</li> <li>- Compose and perform melodies using three or four notes.</li> </ul>	<ul style="list-style-type: none"> <li>- Know and be able to talk about:                             <ul style="list-style-type: none"> <li>*Improvisation - is making up your own tunes on the spot</li> <li>*When someone improvises, they make up their own tune that has never been heard before. It is not written down and belongs to them.</li> <li>- Know that using one or two notes confidently is better than using five</li> <li>- Know and be able to talk about:                                     <ul style="list-style-type: none"> <li>* A composition: music that is created by you and kept in some way. It's like writing a story. It can be played or performed again to your friends.</li> <li>- Know different ways of recording compositions (letter names, symbols, audio etc.)</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Names of notes being played, names of instruments being played, solo, ensemble, audience, rehearse, leader, conductor, improvisation, composition, tempo, dynamics, timbre, texture, pulse, rhythm, silent, musicians</li> <li>Notation: rhythm, melody, pause, rest symbol, stave, notation</li> </ul>

**Responding and reviewing (Appraising)**

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<ul style="list-style-type: none"> <li>- Appreciate and understand a range of high-quality live and recorded music drawn from different traditions and from great composers and musicians.</li> <li>- Explain why silence is often needed in music and explain what effect it has.</li> <li>- Identify and describe the different purposes of music</li> </ul>	<ul style="list-style-type: none"> <li>- Identify and describe the different purposes of music.</li> <li>- Confidently identify and move to the pulse.</li> <li>- Talk about the musical dimensions working together in the songs e.g. if the song gets louder in the chorus (dynamics).</li> <li>- Talk about the music and how it makes them feel.</li> <li>- Listen carefully and respectfully to other people's thoughts about the music.</li> <li>- When talking try to use musical words.</li> <li>- Listen to several layers of sound (texture) and talk about the effect on mood and feelings.</li> <li>- Identify orchestral family timbres.</li> <li>- Identify cyclic (repeated) patterns.</li> </ul>	<ul style="list-style-type: none"> <li>- Know 5 songs from memory and who sang them or wrote them (across the year).</li> <li>- Know the style of the 5 songs.</li> <li>- Choose one song and be able to talk about:                             <ul style="list-style-type: none"> <li>*Some of the style indicators of that song (musical characteristics that give the song its style)</li> <li>*The lyrics: what the song is about</li> <li>*Any musical dimensions featured in the song and where they are used (texture, dynamics, tempo, rhythm and pitch)</li> <li>*Identify the main sections of the song (introduction, verse, chorus etc.)</li> <li>*Name some of the instruments they heard in the song</li> <li>-Know how pulse stays the same but rhythm changes in a piece of music.</li> <li>-Use more musical dimensions vocabulary to describe music – duration, timbre, pitch, dynamics, tempo, texture, structure, rhythm, metre, riff, ostinato, melody, harmony.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Pulse, duration, timbre, pitch, dynamics, tempo, texture, structure, rhythm, melody, orchestral family timbres, cyclic patterns, repeating phrases, different pitches, fast moving, melodic phrases</li> </ul>

**Listening and applying knowledge and understanding (Theory)**

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<ul style="list-style-type: none"> <li>- Begin to develop an understanding of the history of music.</li> <li>- Understand and explore how music is created, produced and communicated, including through the inter-related dimensions: pitch, duration, dynamics, tempo, timbre, texture and structure.</li> <li>- Begin to use notation to record and interpret sequences and pitches.</li> </ul>	<ul style="list-style-type: none"> <li>- Combine sounds expressively (all dimensions).</li> </ul>	<ul style="list-style-type: none"> <li>- Know and be able to talk about:                             <ul style="list-style-type: none"> <li>*How pulse, rhythm and pitch work together</li> <li>*Pulse: Finding the pulse – the heartbeat of the music</li> <li>*Rhythm: the long and short patterns over the pulse</li> <li>*Pitch: High and low sounds that create melodies</li> <li>*How to keep the internal pulse</li> <li>- Know the difference between pulse and rhythm</li> <li>- Musical Leadership: create musical ideas for the group to copy or respond to</li> <li>- Know that sense of occasion affects performance.</li> <li>- Describe different purposes of music in history/ other cultures.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Names of some composers, long and short patterns, high, low, musical ideas, notation, notes, sequences, pulse, duration, timbre, pitch, dynamics, tempo, texture, structure, rhythm, melody, orchestral family timbres, cyclic patterns, repeating phrases, different pitches, fast moving, melodic phrases, syncopation, accents, call and response</li> </ul>

**Composers/Musicians/Artists/Styles**

**Electricity (Sing Up)**

**Genre of the half term – Disco**

School Value	Topic relevance: How/when/where/why is it needed?
<b>Resilience</b>	Should we give up if it doesn't work? In order to invent the filament to enhance Edison's lightbulb, Latimer needed to make mistakes and try, try again to get it right!
<b>Respect</b>	Can we show respect for our world and our environment by not wasting energy and doing the simple things...like turning off the lights or the TV when we don't need them?
<b>Responsibility</b>	Is it our responsibility to look after our world and be aware of what we can do to help the fight against global warming? How could we be responsible and save energy?
<b>Happiness</b>	Electricity plays a huge part in the modern world – how can it make us happy? Would we be happy without it?
<b>Kindness</b>	What role does electricity play in being kind to our planet?
<b>Pride</b>	What do you think makes scientists proud? The process? The end result?

Possible 'higher order' questioning	
<b>Remember</b>	Can you name some insulators and conductors?
<b>Understand</b>	Can you explain what might happen if electrical wires were exposed with no insulators?
<b>Apply</b>	How are conductors and insulators useful? How do they keep us safe?
<b>Analyse</b>	What is the best form of energy? Why do you think this?
<b>Evaluate</b>	Take a look at the circuit you have made. How could this be improved if used in your home?
<b>Create</b>	You have to walk through an electrical storm. What would you wear (or not wear) and why??

