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| **Theme Overview** |
| **Lead Subjects** | **Additional Subjects** | **English** |
| * Science
* Design and Technology
* Music
 | * Mathematics
* PSHE
* Computing
 | * Explanation
* Fantasy
* Film and playscript
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| **Visits** | **Visitors** | **Experiences** | **Events** |
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| **Getting Started…** |
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| **Be Curious** |  | **Be Knowledgeable** |  | **Be Adventurous** |  | **Be Ambitious** |  | **Be Creative** |  | **Be Collaborative** |  | **Be Reflective** |  | **Be Positive** |
| * Engage in first-hand experiences
* Embrace experiences which are remarkable to the individual
* Invoke a sense of awe and wonder
* Develop an appreciation of and responsibility for the environment
* Engage in multi -sensory learning
* Experience contrasts (polluted/unspoilt, light/dark, urban/rural, loud/quiet)
 |  | * Secure strong Literacy/Numeracy Skills
* Develop subject specific language
* Manage, receive, record and apply information
* Nurture a thirst for knowledge
* Apply cross -curricular skills
* Develop Information processing skills
 |  | * Work within one's own comfort zone and outside it
* Work in the real world with first-hand experiences
* Work practically
* Work on a large scale
* Experience exhilaration, challenge and achievement
* Develop problem-solving skills
 |  | * Develop responsibility for one's own learning
* Link with experts
* See possibilities
* Strive for improvement
* Seek opportunities
* Develop an open outlook
* Develop a 'Growth Mindset'
* Develop relevant attributes of learning
 |  | * Choose how to use free time
* Developing hobbies and interests
* Apply skills to new situations
* Explore alternatives in problem solving situations
* Question 'What if...?' 'Why not....?', etc.
* Develop creative thinking skills
 |  | * Work with others in an interactive learning process
* Respect the opinions and differences of others
* Value one's own perceptions and those of others
* Challenging one's own perceptions and those of others
* Work as a team
* Develop empathy
* Develop social skills
 |  | * Make lifestyle choices in response to thoughts
* Identify and use one's aptitudes and interests as a vehicle for learning
* Move towards the understanding of a wide range of feelings (success/failure, apprehension, anticipation)
* Develop awareness of individual strengths and areas of development
* Develop reasoning skills
 |  | * Listen and respond to advice
* Value pupil voice
* Develop self-esteem
* Be listened to
* Manage one's own behaviour
* Develop own opinions
* Secure and articulate preferences
* Consider one's place in the world
* Foster intrinsic motivation
* Develop relevant attributes of learning
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| **Science** |
| **Key Learning** |
| **Electricity*** Identify common appliances that run on electricity.
* Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
* 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.
* Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
* Recognise some common conductors and insulators, and associate metals with being good conductors.
* Know that electricity can be dangerous.
* Recognise electricity sources can be mains or battery.
* Know that batteries ‘push’ electricity round a circuit and can make bulbs, buzzers and motors work.
* Recognise that faults in circuits can be found by methodically testing connections.
* Know that drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until upper KS2).

***Notes and Guidance (Non-statutory)****Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in Year Six.* ***Note:*** *Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.* **Pupils Might Work Scientifically*** By observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.
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| **Science** |
| **Creative Learning Opportunities and Outcomes** |
| **Thinking activity / Launch*** What if we had no electricity? Can the children come up with ten things they would miss in a power cut? Encourage the children to rank their choices from ‘most missed to least missed’. To provide an opportunity for more discussion and justification, encourage them to rank their ideas in a diamond shape rather than a straight line. Reword the question: What if we never had electricity again? How would they rank their choices now? Would they like to replace some of their ideas with new ones? Although this is a group activity, the children can summarise their reasons for the different rankings individually.

**Questioning / Thinking*** What do we use electricity for? Provide the children with a list of the letters A to Z. Can they make an A to Z list of things that use electricity (make it more difficult by specifying a particular location e.g. kitchen, school, etc)? How many of the letters can they find appropriate words for? Alternatively use short videos from Teachers Media - ([here](http://www.teachersmedia.co.uk/videos/how-electricity-is-used)) which shows electricity being used in different ways in a theatre or ([here](http://www.teachersmedia.co.uk/videos/things-that-use-electricity)) which shows electricity being used in different ways in the home. Whilst watching the video can the children collect a list of all the different uses of electricity? The A-Z writing frame can be used for them to collect their ideas on. Children could work in groups of four, two watching the theatre video and two watching the home video. They could then share their ideas and answer the question ‘Why is electricity so important?’ They could present their findings as a poster or an illustrated list.

**Sort / Group / Classify / Compare*** Sort the A to Z list into things which use electricity for heating or cooling, for movement, for light, for sound. Do any objects use electricity for more than one function? Perhaps more able children could be encouraged to come up with their own criteria for sorting – do they arrive at the different uses for electricity independently?
* If you could only have six items in your home that use electricity, what six items would you choose and why. Rank the items in a triangle. Which item(s) do you think is (are) the most important and why?

**Research*** Search ‘Electrical safety KS2’ in an internet search engine to locate various organisations which provide useful resources to support this unit. Why do we need to be careful with electricity? Children could work in groups of six. Each pair could be given a different resource to explore for a set amount of time (each resource could be differentiated for the different pairs). Resources could include posters, a diagram identifying common dangers in the home, a video about electrical safety, books/text. Once the set amount of time has lapsed, the children can return to their ‘home’ group of six and share ideas to make a group leaflet. These could be distributed to other children in the school or perhaps even from another school.

**Modelling*** Visit the Teachers Media website ([here](http://www.teachersmedia.co.uk/videos/great-primary-lesson-ideas-electricity-activities)) for a video about modelling electrical circuits with lower KS2 children. The activities on Electric Rope and Pass the Squeeze, Floating Questions and Ball Buzzers are particularly useful for children in this age phase. The question ‘What do you think is inside the ball buzzer?’ is a great way to get children to use their creative thinking and their prior knowledge to begin to explain circuits and identify any misconceptions.
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Science and technology in the world around us*** This unit provides an excellent opportunity for the children to explore ways of saving electricity around the home and school. They could design posters and find out why using less electricity helps the planet. Search ‘Energy Saving’ on the internet to find numerous organisations and companies providing information and resources.
* Other tasks could include:
* Investigate how a torch works. Does it matter which way around the batteries go? Try this with other devices that use batteries. Get the children to explain to younger children how to put batteries in devices properly. They could also tell other children about safety with mains electricity.
* Mains electricity v battery electricity – what things use mains electricity and what use batteries? What are the dangers of mains electricity? Design a poster to warn of the dangers of mains electricity. Challenge: Can the children say whether the device uses electricity to make heat, sound, movement or light?
* What if we had no electricity for a day, a week or a month? What would you miss and why? What things could you use, what would you not be able to use?
* Interview a real electrician to find out how they stay safe in their job.

**The junior apprentice electrician*** View the following Teachers Media video([here](http://www.teachersmedia.co.uk/series/lesson-planning-pack-electricity)) whichfeatures videos about teaching electricity in lower juniors, including:
* Things that use electricity (in the home).
* How electricity is used (in the theatre) - Which special effects could you make with your electricity components in the classroom?
* The Apprentice Electrician - complete timed tasks and solve a problem to gain their Junior Electrician’s Apprentice Certificate.
* To view the Apprentice Electrician video only, use this link ([here](http://www.teachersmedia.co.uk/videos/the-apprentice-electrician)). In this lesson the teacher describes how she uses the context of applying for an electrician apprentice certificate as a stimulus to assessing the children’s understanding from a lower junior electricity unit. Ideas from this lesson along with other challenges have been provided below. These can be adapted to suit the class, time available and the resources.

**Real outcome*** You are going to train as a Junior Apprentice Electrician but will be using bulbs and batteries rather than mains electricity. You have a series of challenges to complete. At the end of each challenge you will need to record what you have found out and hand this in to the ‘Apprentice Trainer’ (i.e. the teacher). If you have passed the task you will be given a stamp or sticker on your collector card. An award ceremony will take place at the end of the project where certificates will be presented. As part of the award ceremony you will need to reproduce one of the challenges as a table top exhibit to inform your audience about what you have found out and learned. They will visit your exhibition stand at the end of the ceremony. (You could replace this with the children designing/scripting/writing an assembly about what they have learned).
* The challenges are to be carried out over a few lessons to immerse the children in the learning.
* Each lesson you will be given a challenge to complete. Each challenge completed will be awarded a point towards achieving the Electrician’s Apprentice Certificate/Award. X points are required to achieve the certificate at the forthcoming award ceremony. Extra points can be gained by recording the circuits used to complete the tasks.
* Each group of four children is given a mini toolbox between them containing all the equipment for their problem solving tasks. It is their responsibility to keep their toolboxes tidy and check that all equipment is working at the end of each session. Extra points are awarded for maintaining a quality toolkit.
* The suggested challenges below will each require different amounts of time (they may not all need a whole lesson). After each task the children can draw their circuits in their ‘Junior Apprentice Electrician's Notepad’.
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Science challenge 1: Explore / Observe / First hand experiences*** Can you light the bulb? - Use the equipment to light the bulb (begin this activity being completely open ended - if children are struggling give them a photograph of the equipment they are to use e.g. two wires, bulb, bulb holder, battery/cell, battery holder, etc). Draw and label their circuit. What happens if you use two batteries?
* In pairs (or groups of four), each person makes a circuit. Whilst you are not looking someone else changes the circuit so that it doesn’t work. How quickly can the fault be found? Can you make the circuit work again? Try to think of a different fault each time. Be prepared to tell others how you stopped a circuit working.
* Extra challenge: Set a limit - What are the fewest items you need to make the bulb light? Can you light the bulb with one battery, one bulb and only one wire? How did you do it? (NB If children connect just a wire from one end of a battery to another without any other components they will create a short circuit. This will cause the wire to warm up creating a hazard. Warn the children against this).

**Science Challenge 2: Research*** What are the dangers of using electricity? Design a poster warning about the dangers of electricity. Ensure you include something about the dangers of water and electricity. Children could work in small groups of four or six. Each child or pair could be given a different resource to research for a maximum length of time. They would then return to their home group and share their findings to use to design their own poster. Different resources could include: safety video, variety of safety posters, ‘spot the dangers’ picture, reference books, etc.

**Science Challenge 3: Explore / Observe / First hand experiences*** What is inside a light bulb? Draw and label a large picture of a light bulb. How big can you draw it? Let the children use magnifying glasses and hand held microscopes to explore the details.

**Science Challenge 4: Explore / Observe / First hand experiences*** Can you make a motor turn? (Attach something to a motor so you can see it spin). How did you make the motor turn? Can you make a circuit with a motor and a bulb? Try the bulb and the motor in different places in the circuit. Does it make a difference?
* Challenge: Can you make a motor turn a different way? (Top tip: Attach the wires to the motor the opposite way or, even easier, turn the battery around). This helps children to learn that a battery/cell has two different ends.
* Challenge: Does turning the battery around affect a light bulb? What happens if you use two cells?

**Science Challenge 5: Does it work?** * Make two circuits, one that works and one that doesn’t. Photograph the two circuits. Join your photographs with those of other children to make a quiz game. Can other children say why your circuit does not work? At the end, make your collection of photographs into a large poster with a label to say something about each one.
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Science Challenge 6: Explore / Observe / First hand experiences*** Can you make a noise using the buzzer and other equipment in your tool kit? What happens if you use two cells?
* Can you turn the noise on and off? Imagine this is a doorbell buzzer - use two paperclips to make a switch for your doorbell.
* Challenge: Does it matter if you put a bulb before a switch in a circuit or after a switch? Test both and see if they are different in any way.
* Challenge: Can you make a switch out of anything else?
* Challenge: Will plastic covered paper clips make good switches?

**Science Challenge 7: Explore / Observe / First hand experiences*** Using masking tape, a 9-volt battery, buzzer, two lollipop sticks, aluminium foil, water, saltwater.
* A saltwater tester uses electricity to tell you if water is salty or not. Using these resources make a saltwater tester so that the buzzer will buzz to indicate the water is salty.
* Understanding the science for teachers: The buzzer buzzes in saltwater because the saltwater acts like an invisible wire to connect the circuit. That's because when you add salt to water, the salt molecules dissolve in the water and break into smaller parts called ions. The ions carry electricity through the water. Fresh water doesn't have these ions. So it's harder for the electricity to move through the water. It doesn't complete the circuit, and the buzzer doesn't buzz. What else besides saltwater will conduct electricity and make your buzzer buzz? Try sugar water, vinegar, or whatever else you can think of. *This can be found on the PBS Kids website* ([here](http://pbskids.org/zoom/activities/sci/saltwatertester.html))*.*

**Science challenge 8: Sort / Group / Compare / Classify*** Two minute challenge - Make a circuit with a bulb and a simple paperclip switch. The paperclip allows the electricity to travel through it. What else can you find in the classroom that allows the electricity to flow through it?
* Classify your objects as insulators or conductors (suggested conductors: cutlery, aluminium foil, ends of plastic paper clips, coins, pencil lead, etc).
* Extension challenge: Make a wire using aluminium foil and use it in your circuit. Does the light still work with short and longer pieces of foil? What is the longest piece of aluminium foil ‘wire’ you can use and still make the light work?

**Science Challenge 9: Set a limit (Assessment)*** What can you do in two minutes?
* You have…
* Two minutes to make a circuit with a bulb.
* Two minutes to make a circuit with a buzzer.
* Two minutes to make a circuit with two bulbs.
* Six minutes to make a circuit with a switch.
* After each mini challenge allow the children time to draw each circuit and write a couple of sentences to explain what happens each time. The time element is to add a bit of excitement and fun to the task – give extra time after each challenge for some children to support others if required.
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Science Challenge 10: Create/ invent / design*** (This is an activity which could be added as an extension activity).
* You have shown you can design a circuit with a switch now see how many different switch designs can you come up with? Three points awarded for each different design. (Children could explore different switches obtained from an educational supplier – e.g. tilt switch, click on/click off switch, push on and hold/release to stop, simple slide switch, pressure pad, etc.) Provide a selection of resources: wires, battery, bulb, bulb holder, motor, buzzer, aluminium foil, paperclips, split pin paper fasteners, spring type wooden clothes peg, marbles, film canisters or similar small containers/boxes, insulation tape (a few ‘red herring’ resource options could also be included to add to the challenge).
* Each time encourage the children to draw their circuit and explain how it works.

**Switch 1*** Design a switch for a bedside lamp. You can switch the light on and it stays on until you switch it off. (NB - A simple paper clip switch would work here. Once it is on, you have to do something to turn it off again).

**Switch 2*** A hairdryer company is having complaints that teenagers using the hairdryers are putting them down on surfaces whilst they are switched on and this is causing the hairdryer’s motor to heat up and burn out. They are trialling a new design with a switch that has to be held on for the hair dryer to work (similar to lawn mower switches). Design a switch that would work in this way and present your ideas to the hairdryer company. (NB – a simple pressure pad would work for this with aluminium foil between a folded piece of card/plastic. It only works if pressed on but when you take your hand of it, it springs back open).

**Switch 3*** A company who makes camping stoves has heard of a number of incidents recently where camping stoves have been knocked over whilst they are still warm, setting fire to dry land and causing huge fires. They want to add a device to their stoves that signals a warning sound if the stove is knocked over. Design a switch that, when tilted, sets off an alarm. (NB – a simple tilt switch can be made with a metal ball bearing or a marble/modelling clay ball covered in aluminium foil in a card tube. When tilted one way it make a connection in the circuit, when tilting the other way it breaks the connection. The wires can be inserted in one end of the card board tube).
* Does it matter where a switch is in a circuit? (Explore / observe / first hand experiences).
* More able: design a circuit with a switch or switches that will change the direction of a motor.

**Science Challenge: Have a go/ Focused investigation*** Get the children to think of as many ‘What if questions to investigate, e.g. Does a knot in a wire stop a circuit working? What do you think? Have a go to find out? Is the electrolycra a better conductor than a wire?
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Real life outcome will enable children to transfer their learning from the ‘immersion stage’ into a context*** See Design Technology for guidance on the principles of ‘User Purpose Product.’
* The creator has sent a list of projects that you may want to include in the gadget:
* How many ways can you make a light work? (Be able to show a minimum of three different ways to make a light work. Tips – try one wire, no wire, bulb holder, no bulb holder, alternatives to wires).
* How to make a simple switch. (It must turn something on and keep it on until the switch is turned off).
* How to make a safety switch. This switch must only work when held on. If the operator lets go of the switch, the device stops working. Think of some real life scenarios for when this switch would be useful to add to your instruction booklet).
* How to make a tilt switch (This switch is useful as it can switch on a device if it is knocked over. Think of some real life scenarios for when this switch would be useful to add to your instruction booklet).
* How to make a conductor tester. (This section needs to show children how to test materials to see if they are good conductors of electricity or bad conductors. It will need an explanation of these terms along with information about making a conductor tester).
* What happens if you put more things in a circuit? Explore what happens if you have more than one object in a circuit. (Two bulbs, two batteries, a buzzer and bulb, two motors, a buzzer and a motor, etc. In your instructions be sure to say how two things in a circuit differ to only having one thing in a circuit. Choose four suggestions to include in the instruction manual).
* If you have any other suggestions for extra tasks to be included in the design you may add these. This will provide extra credits at the judging stage.
* At the end of the project, present your gadget with the circuit attached or then an annotated diagram of your gadget stating what has been added with a circuit diagram (non-standard) to show how it is put together.
* The final product or design must:
* be well presented with both accurate circuit pictures along with photographic images of the solutions described.
* provide a full list of the minimum resources required for each of the solutions and a circuit diagram clearly drawn to show how it is constructed.
* NB - Most of the tasks above are Explore / Observe / First hand experiences where children also have the opportunity to record their findings and Create / Invent / Design where they apply the learning with some degree of creativity. Activities linking to identifying insulators and conductors would be classed as Sort / group / compare / classify skill).
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Key questions*** What do we use electricity for?
* What if we had no electricity? / Could we survive without electricity?
* Why can electricity be dangerous?
* How can we make a light bulb work?
* Can you make a simple switch to turn a light on and off?
* Are all switches the same?
* Can we design different switches for different purposes?
* What materials allow electricity to flow through them?
* Why should we try not to waste electricity?
* Can you design a circuit for a particular purpose?
* Why does this circuit not work?

**Key vocabulary*** Circuit components: cell (battery), wire, bulb, bulb holder, buzzer, motor, switch (open/closed), circuit, electrical conductor, electrical insulator, connection, component, break.
* Electrical equipment: devices, appliances, mains electricity, safety.
* Connectivity terms: connection, mains, wire, break.
* Common materials: metal, wood, plastic, etc.
* Expressions for making suggestions: if, might, could.
* Comparative expressions: brighter, less bright (bulbs); faster, slower (motors), etc.

*Note words which have a different meaning in other contexts e.g. circuit, break, bulb.* |
| **Design and Technology** |
| **Key Learning** |
| **Project Focus: Electrical Systems (A Product, for a Stated Purpose and a Stated User) Through an *Iterative* Process****Evaluation of Existing Products*** Investigate similar products to the one to be made to give starting points for a design.
* Draw/sketch products to help analyse and understand how products are made.
* Investigate key events and individuals in Design and Technology.

**Focused Tasks*** Use electrical systems such as switches, bulbs and buzzers.
* Develop vocabulary related to the project.
* Use ICT to control products.

**Design*** Develop more than one design or adaptation of an initial design – research needs of user.
* Plan a sequence of actions to make a product.
* Use prototypes to develop and share ideas – identify the strengths/weaknesses of their design ideas in relation to purpose/user.
* Think ahead about the order of their work.
* Decide which design idea to develop; propose realistic suggestions as to how they can achieve their design ideas.
* Consider aesthetic qualities of materials chosen.
* Use CAD where appropriate.

**Make*** Select from techniques for different parts of the process.
* Select from materials according to their functional properties.
* Use appropriate finishing techniques.

**Evaluation (of Their Finished Product)*** Consider and explain how the finished product could be improved.
* Discuss how well the finished product meets the design criteria of the user.
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| **Design and Technology** |
| **Creative Learning Opportunities and Outcomes** |
| **Develop a challenge around product / purpose / user*** This will engage the class and/or fit with other contexts of learning such as:
* A quiz board (individual A4 sized) to show responses to questions - link to other subject areas.
* A display (larger scale) to show answers to questions – link to other subject areas e.g. places on a map, examples of groups of musical instruments such as percussion / wind / brass / strings.
* A buzzer for visitors to the staffroom door.
* A light board to show when the Headteacher is busy/available.
* Stop/go lights for small world vehicles.
* Desk lamp for teachers working late.
* Vacant/engaged sign for adult toilet.
* Counter for sand play – to indicate area full with (number of) children.
* Attractive display lights to draw attention – e.g. around a display of new acquisitions in library.
* Buzzers/lights on display board to show when the kitchen staff are ready to serve the next class.

**Process for planning a project for your class*** Think:
* Product (what could we make?)
* Purpose (what is it for?)
* User (who is going to use it?)

this will make the 'Challenge' for the project, e.g. Design Make and Evaluate a **(product)** to **(purpose)** for **(user)**.* What context will this project be set in?
* Plan what products for evaluation / resources / tools / materials you are going to offer the children, taking account of previous experiences and current learning readiness. Ensure all appropriate risk assessments have been undertaken. Make sure prior learning from design and technology and other subject areas is in place. If not, plan specific learning opportunities prior to the project – focus tasks.
* Plan for inclusion of vocabulary development. Are you going to teach this before beginning the project or during the course of the project?
* Plan the questions you will ask the children to encourage the iterative process.
* Complete a 'D&T Essentials' web - available from The Design and Technology Association web page ([here](https://www.data.org.uk/)). What is the balance for this project? Where are the children being encouraged to make their own choices and decisions? How much are they being encouraged to be innovative? Projects over the year/key stage should have a good balance.
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| **Design and Technology** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Project ideas:**

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| **Electrical Systems** |
| **Product:** | **Purpose:** | **User:** |
| **Evaluation of existing products*** Research existing products, investigating actual examples wherever possible.

**Questions*** Is the product appropriate for the intended user?
* Does the product fulfil its purpose?
* Is it functional? Does it have aesthetic appeal?
* How does the electrical system function? – make flow charts.
* What electrical components are used?
 | **Focused tasks*** Explore complete simple series circuits incorporating one working component (e.g. light bulb/buzzer/motor).
* Teach relevant vocabulary, understanding and knowledge.
* Explore methods of creating a switch (breaker) in the circuit.
* Teach relevant vocabulary, understanding and knowledge.
* Teach relevant ICT programming and incorporation of relevant ICT equipment into circuit.
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| **Design Make and Evaluate*** Discuss the context, product, purpose, user - set design brief. Develop **design criteria** with the pupils - use evaluation findings and translate to context/user.
* Consider size / function / components / incorporation of circuitry into container/panel.
* Pupils use discussion, drawings, mock-ups to explore their initial ideas (encourage more than one) then choose one.
* Pupils select materials, tools and techniques (using learning from focused tasks).
* Guide children through the iterative process, encouraging them at each step to explore their ideas through talk followed by action as they modify / adapt / attempt to complete their plans. Guide reflection with questions related to the design criteria – is your system achieving your design criteria? If not, is there a way you could modify your product?
* Evaluation of finished product – children try it out on other pupils, testing it against design criteria (e.g. Does the system fit the container/panel? does the circuit respond as desired to the programme? does the system function as it should?).
* Would their user be happy with the outcome? Is their product functional and appealing?
* Evaluation could be recorded as drawing of product with labels reflecting on design criteria.
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| **Science** |
| **Key Learning** |
| **Light and Astronomy – Light, Reflections and Shadows*** Recognise that they need light in order to see things and that dark is the absence of light.
* Notice that light is reflected from surfaces.
* Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.
* Recognise that shadows are formed when the light from a light source is blocked by a solid object.
* Find patterns in the way that the size of shadows can change.

***Notes and Guidance (Non-statutory)****Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights.**They should look for, and measure shadows and find out how they are formed and what might cause shadows to change.**Note: Pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses.***Pupils Might Work Scientifically*** By **looking for patterns** in what happens to shadows when the light source moves or the distance between the light source and the object changes.
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| **Science** |
| **Creative Learning Opportunities and Outcomes** |
| **Resources*** The 'Questions about Light' video on the Teachers Media website ([**here**](http://www.teachers-media.com/videos/questions-about-light)) could be used as a starter. The context provides a series of questions about light, shadows, torches and opaque, translucent and transparent materials.
* Science rocks on the PBS Kids website ([**here**](http://pbskids.org/zoom/activities/sci/mirrormaze.html)) is an activity which asks the children to use three mirrors to shine a light on a target – this could be set up in an investigation area in the classroom for children to visit over the course of the unit.
* The Science World website ([**here**](http://www.scienceworld.ca/resources/units/mirrors)) offers a collection of starting points for exploring mirrors and includes key questions to encourage thinking.
* The BBC Bitesize website ([**here**](http://www.bbc.co.uk/education/topics/zbssgk7)) has a variety of short video clips to support learning about light and dark.

**Real outcome*** Explain to the children that their class is going to become a team of curators. They have been asked to create a science exhibition that explains the science of light. It must include some information about different light sources; how shadows are formed; and how mirrors work. Alongside their display, they must include two practical examples to share with their visitors. Children will need to decide who they will invite to the exhibition: parents, another class, another school or other teachers etc. They can work in teams of three and should have the exhibition prepared by the scheduled date. After each session exploring light, shadow or mirrors, they must produce a summary to display in the exhibition. They should remember to impress their audience with clear explanations, the use of scientific words and appropriate presentation.
* It will be easier to manage this outcome if the children make a contribution to their final display each session rather than waiting until the end to make their display.
* How the children share their learning and talk about it to their visitors can act as a useful assessment tool.

**Exploring light****Wow Launch*** Have a disco in the dark. Sit in the middle of a darkened room – what can the children see? Turn on disco lamps, spotlights and snap glow sticks. Are the ‘disco lights’ better to see if the room lights are on or off? Let children explore making their own light effects with different light sources and reflective materials.
* Children can make little people made from card (about 10 centimetres tall) to represent dancers at the disco. Some can be made from silver card, some from a luminous colour card, some from yellow / orange card, some from white card and the majority from dark coloured or black card. Scatter the ‘people’ on the floor of the darkened disco room (i.e. hall).
* Working in teams of three, challenge the first child in the group to collect as many ‘people’ as they can in one minute. After collecting one person, they must bring it back to the ‘DJ Stand’ before getting another. Place these people in box one. Now challenge the second child in each group to do the same, placing the ‘people’ in box two and finally the third child, placing their ‘people’ in box three. As a safety point, ensure children walk rather than run as a dark room will make it difficult to see.
* After the challenge, ask children what they notice about the colours that were collected first. (Brighter colours should be easier to see so they should have more of these in the first box). Can the children write a couple of sentences on why some boxes had more brightly coloured people in than others? Why are some colours easier to see than others? Do the children notice that some objects give out light (light sources) and some reflect light (reflectors)? Make a class collection of some of each and allow the children to sort them if some children need this concept reinforcing.
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Thinking task / initial assessment*** Ask children what they know about light and what they would like to find out. Allow the children to watch the 'Questions about Light' video on the Teachers Media website ([**here**](http://www.teachers-media.com/videos/questions-about-light)). After the viewing, ask them to complete their own KWHL grid: What they know about light (**k**), what they would like to know (**w**), how they could find out (**h**). The last section, what they have learned (**l**), can be added to during the unit, summarising their learning and using scientific vocabulary more effectively as the unit progresses. Challenge the children to put scientific vocabulary learned in a lesson into a couple of sentences to describe their learning/understanding. This section can then be completed at the end of the unit to enable children to reflect on their understanding.

**Explore / Observe / First Hand Experiences*** Pose the challenge: can you see a white cat in a dark room?
* What can people see in the dark? Give children a piece of paper of about five square centimetres and ask them to make a small shape from it, such as a white cat, white car etc. Using tin foil, they can make something shiny e.g. eyes or collar for the cat or wheels or a stripe on the body for the car to add to their object. Ask the children if they will be able to see their object at night. They can test this out by either:
* Standing the object inside one end of a lidded shoe box then cutting a small hole at the opposite end and pushing their eye right up to the hole, ensuring they use their face to block any light from entering.

or* Making a tube with a diameter of approximately eight to ten centimetres from black sugar paper and placing one end of this over their object on a desk. By pushing their face down against the ‘top’ end of the tube, the children can look down it at their object, ensuring that no light can get in, thus creating true darkness.

The children can gradually let some light into the box / tube by moving their face away from the hole a little and by cutting a hole in the side of the box / tube. What happens when they let daylight in? What happens if they shine in more light from a torch? (For safety reasons, ensure that children shine this through the hole in the tube rather than directly into the eye).**Communicating using everyday language and scientific vocabulary*** Can children draw and explain what is happening? Challenge the children to **use their own words** to try and explain. Arrows on a diagram may also help. This task is not about getting a perfect scientific explanation but rather an understanding of what the children do and do not understand. (Light needs to enter the tube for us to see the white object. The white object does not produce light so we cannot see it in the dark. We need light from the torch (or daylight / sun) to reflect / bounce off the object and travel into our eye so we can see it. This can link to wearing reflective clothes on dark nights and the reflective paint used on road signs. As a homework activity, children could look for reflective safety clothing / items whilst they are out with parents during dark evenings.)
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Exploring shadows****Explore / Observe / First hand experiences*** Choose one or two of the examples below to ensure that children are immersed in the concept of light and shadow in creative ways. Collect, on a science working wall, examples of everyday words and scientific words that the children use when discussing their observations.
* **A light 'explore box'**

- Resources: Different types of torches and light sources (have plenty available for a whole class); ready-made simple shadow puppets; card dowel and masking tape to  make own shadow puppets; items to create shadows – coloured card, silver paper, coloured acetates, Lego blocks with holes in, fabric netting, tracing paper, thick card,  corrugated card.- Questions: Can you make your shadow bigger? Can you make the light from the torch dimmer? What happens if you put the torch close to the wall and then far from  the wall? What happens if you turn the cardboard puppet upside down? Can you make a shadow puppet that is smiling? Are the bigger torches the brightest? Can you  make a coloured shadow (other than black) – is this really a shadow? What is a shadow? The questions are stuck around the room. Each small group takes a question and explores it using the resources from the ‘explore box’. Once they have found something out, they write their ideas on a sticky note, initial it and stick the question back in the original place with their sticky note below. This activity is more about general exploring than setting up fair test investigations.* **Outdoor science: Explore / Observe / First hand experiences**

- Investigating shadows created by the sun. Where will their shadow be? Draw a picture of the sun and a picture of themselves standing on the school playground. Ask  children to draw where they think their shadow will be then go outside and investigate. Children can take photographs and then decide whether they want to change  their original drawing in any way? Does their shadow have a face? Does their shadow have any details? Does the length of their shadow match their height? This activity  can be repeated at a different time of the day. Is anything different? (Their initial drawings and then their improved / adapted drawings can be used as an assessment of  their learning.- Put toys or furniture in the sunlight and trace the shadows. How do the shadows change during the day? Make a shadow monster using different equipment outdoors.  Photograph it during the course of a day and then annotate the photographs to describe how the shape of the monster changed? They could measure a change in the  height and length of their monster. Why do they think it changed? - Make a permanent shadow using Sun Print paper. Collect objects that will block light and lay them outdoors on the Sun Print paper. Following the instructions on the  product, leave this for a while and the sun will cause the paper to lighten around the objects creating images without details which look like shadows. This links with the  idea of blocking light.When children are describing their observations on shadows draw out the importance of talking about where and how the light is blocked when a shadow is produced. **Modelling*** What will the shadow look like? Provide children with a picture of a simple object, such as a cup. This would work well as it has a handle on one side and not on the other so provides more of a challenge than a symmetrical object. Ask the children to add the shadow to the object’s image as if a torch was shining on it from one side (the torch image could also be provided in the picture) What shape of shadow do different children draw? Can the children draw the correct orientation of the shadow, shade it correctly and even provide some elongation as if the torch is shining at a slight angle? Once the children have had a go at drawing the shadow, let them experiment with
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| the real object and a torch. Can they draw the shadow again on another sheet? What did they notice that they missed the first time? This would work as a mini assessment activity. *(Adapted from original idea from ‘Assessing Progress in Science’ 2003 QCA publications).***Practical investigations*** Possible fair tests that link to this theme:
* Are bigger torches brighter?
* How can we make a shadow bigger? Investigate changing the position of the object (from the light source) or changing the position of the light (from the object) – let the children decide which they will do after an initial explore. Encourage them to mark and measure positions accurately and measure the size of the shadow produced. Can they say something else about the quality of the shadow each time? Note: children should carry out at least one experiment looking at how a shadow can be altered.

Although the learning within this unit is about opaque materials blocking light to produce shadows, children should also be made aware that transparent materials can produce faint shadows. This could provide an excellent discussion on ‘What makes the best quality shadow?’ Testing the translucency of papers is not essential key learning but it can help children have a better understand of the term opaque.**Exploring mirrors*** The Science World website ([**here**](http://www.scienceworld.ca/resources/units/mirrors)) provides a number of starting points for exploring mirrors and key questions to encourage thinking. The key activities include:
* Ask children to make a list of ten surfaces that they can see their reflection in (spoon, mirror, shop window, saucepan, pond/water surface, puddles, car mirrors, chrome surfaces, etc.) What is different about their reflection in each of these surfaces? Get the children to look at themselves in a mirror. If they lift their hand up, which hand does their reflection lift up? If they touch their left ear, which ear does their reflection touch? What do they think would happen if the mirror surface was dull? What do they think would happen if the mirror surface was bumpy, curved or rippled? (Reflections are mirror images. Light reflects in predictable ways if the surface is very shiny and smooth).
* Disorientation Maze: the activity ([**here**](http://www.scienceworld.ca/resources/activities/disorientation-maze)) has a ready-made maze for the children to try and navigate as a reflection. Use the key questions provided to encourage thinking skills and to assess children’s understanding so far.
* Multiple Images: the activity ([**here**](http://www.scienceworld.ca/resources/activities/multiple-images)) involves children making multiple images with two mirrors and exploring the relationship between mirror angles and the number of images seen.
* Alphabet symmetry: the activity ([**here**](http://www.scienceworld.ca/resources/activities/alphabet-symmetry)) has challenges linked to vertical and horizontal symmetry using letters and can develop children's thinking further by exploring symmetrical words.
* Kaleidoscopes: the activity ([**here**](http://www.scienceworld.ca/resources/activities/kaleidoscopes)) has instructions for how to make a simple kaleidoscope using three small mirrors to create multiple reflections. Can the children explain how it works?

Note: The activities on periscopes are better left until Year Six as they provide a great opportunity to record light being reflected and travelling in straight lines.**Additional mirror ideas**(these can be used to extend learning further, provide additional support or for a class investigation / challenge table)**Explore / Observe / First hand experiences*** Ask the children what they can see behind them? Can they use the mirrors to see behind them? Can they set up a path in the school grounds and move through it
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| backwards using a mirror in each hand to see the objects. Can they avoid the objects? The course should be checked in advance for potential hazards.* Children can put letters (or scientific vocabulary) on each other’s backs using sticky notes then try and read the letter or word using a mirror. How many mirrors do they need?
* Science Challenge: A secret message has been put underneath the centre of a desk (the teacher could set these up before the lesson). Without putting their eyes below the height of the desk, can they read the message? Use mirrors to help them. They can describe to others how they solved the challenge.

**Moving light with mirrors****Explore / Observe / First hand experiences*** Let groups of children use a torch in a darkened room, taking it in turns to explore. Shine the torch somewhere in the room. Where is the light shining? How do they know?
* Then let them use a mirror to shine the torch onto. What did they notice when they shone the light in the mirror? Where is the light shining? Can they use the mirror to make the light move in different directions?
* What happens if they add a second mirror? Where is the light now? Can they trace the path of the light and where it is reflected?
* Ask children to make a drawing to represent the path of the light beams and the position of the torch and mirrors.
* What happens if you reflect the light from the torch off other shiny objects? Ask children to try moving light using a CD. What else could they try? (Dull or rough surfaces also reflect light, but the reflected light is scattered in many different directions so is often more difficult to trace the path).

**Create / Invent / Design - Science challenge*** Make a game using three mirrors, a torch and a target board. Can children make the light from the torch hit the target? Are all three mirrors being used? Can they draw the path of the light? This would provide a good assessment opportunity to see if the children can apply their learning and talk about their game using scientific vocabulary.

**Alternative real outcome: theatre lights*** Explain to children that they are going to investigate light and shadow and how lighting effects are created in a theatre. They are going to use what they have found out to create their own theatre style production based around shadow puppets. They can have a theatre show afternoon and invite guests to see their work. Provide an interval between shows so children can talk with their audience about what they have learned.
* Some of the activities above could be replaced with those below which link more closely with a theatre theme.

**Wow launch*** How are lights used to create special effects and shadows? The Theatre Lights resource from the Teachers Media website ([**here**](http://www.teachers-media.com/videos/theatre-lights)) is a three minute lesson starter which shows how theatre lights create different shadows to create different moods.
* Alternatively, the class could visit a local secondary school, college or university with a theatre department or even a local theatre, and ask the lighting technician to demonstrate some effects they produce on stage.
* Show the video ‘Hand Shadow - Raymond Crowe at Royal Variety Show’ on YouTube ([**here**](https://www.youtube.com/watch?v=EAQxNVQF_I0)). Challenge the children to recreate the baby and adult hand scene using their own hands and explain how they did it.
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| **Science** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| **Explore / Observe / First hand experiences*** What makes the best shadow effect – opaque, translucent or transparent materials? Ask children to make a double shadow as in the video, explaining how they made it.
* What effects can children create using torches and shadows? Ask them to identify a maximum of three different effects. They can photograph, video or draw the effect and explain how they made it.
* In the storytelling clips 'Raja's Secret' ([**here**](http://www.teachers-media.com/videos/storytelling-raja-secret)) and 'Miserly Farmer' ([**here**](http://www.teachers-media.com/videos/storytelling-miserly-farmer)) on the Teachers Media website, shadow puppets are used to tell a story. Ask the children if they can describe how the different effects were created? Can they produce similar effects for their own shadow theatre?
* Add a table top exhibit for the ‘audience’ to visit during the interval, or at the end of, the show. This could link either to making a shadow, or to one of the activities children explored with mirrors. Children should explain the science involved to the visitors. Is it about blocked light or reflected light?

**Design and technology link*** Children can design and make a character which has controllable moving parts for a shadow puppet theatre.
* It would be useful to have a skills based lesson on using stick guides/handles to move joints. More challenging linkages include moving mouths (e.g. fish, monster); moving wings (birds, dragons); moving body (snake, monster); making a moving part to create an eye that blinks. How will children attach the guide sticks? How will the sticks be moved to create the correct movement?

**Outdoor science*** If children are solely investigating light and shadow within the theatre as a real outcome, opportunities will need to be provided that link to the key learning about shadows created by the sun. This could be linked to outdoor theatres in the past. Children can create a monster from shadows to advertise an outdoor theatre production, or investigate how people told the time without clocks. Children can then make a sundial (after exploring how a shadow changes during the day) so people will know the time the production starts using only shadows from the sun.

**Key questions*** What are shadows?
* How are shadows formed?
* Can shadows change?
* Where will the shadow be?
* What will the shadow be like?
* How does light travel?
* How do mirrors work? / What can mirrors do?

**Key vocabulary** * See, seen, light, light source, eyes, travel, torch, shadow, opaque, transparent, translucent, block, reflect, reflection, reflective, mirror, direction, light travels, straight lines.
* Comparisons e.g. shortest, highest, furthest, closest.
* Words which have different meanings in other contexts e.g. test, fair, conclude.
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| **Music** |
| **Key Learning** |
| * Improvise and compose music for a specific purpose.

**Performing*** Play and perform in solo and ensemble contexts, using their voices and playing musical instruments with increasing accuracy, fluency, control and expression.

**Listening*** Listen with attention to detail and recall sounds with increasing aural memory.
* Appreciate and understand a wide range of high quality live and recorded music drawn from different traditions and from great composers and musicians.

**Creating*** Improvise and compose music for a range of purposes using the interrelated dimensions of music.

**Understanding*** Use and understand staff and other musical notations.
* Develop an understanding of the history of music.
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| **Music** |
| **Creative Learning Opportunities and Outcomes** |
| * Can you learn a song about electricity?
* How can musical instruments be used to recreate sounds pertaining to the topic of electricity?
* Can you use the sounds from one of the electrical appliances?
* Can you identify a range of sounds made by electrical appliances in the classroom/school in the environment?
* Can you suggest instruments that could be used to recreate the sounds of a thunderstorm?
* Can you represent making and lighting a circuit in a musical composition?

**Improvise and compose music for a specific purpose*** Exploring sounds that are generated by electronic devices.
* Exploring the sound and structure of pop songs that using electronic sounds.
 | Children learn to sing the song Electricityfrom Sing Up Magazine or via the Singup website ([here](http://www.singup.org/)). Explore a range of sounds made by electronic devices and find instrumental and vocal sounds to match these? Play rhythm games relating to these sounds.Make a series of audio and/or video recordings of the sounds made by electrical devices in the environment, for example using an mp3 recorder or Audacity. The Soungle website is a useful source for sounds ([here](http://www.soungle.com/)).Play a game where the children identify a range of pre-recorded sounds made by electrical devices.In groups plan a composition with the title *Thunderstorm* encouraging the pupils to think about the structure of the piece and what instruments could be used to reflect the sounds of a thunderstorm.Produce a graphic score to illustrate the processes followed and represent this in a group percussion piece.As a follow on from previous work, pupils explore a range of devices that can produce sound electronically i.e. keyboards, computers or mobile devices – iPads. They learn that some of these devices can replicate ‘real’ instruments and also discrete ‘electronic’ sounds that cannot be produced in a traditional way.Listen to a range of songs that highlight the use of electronic instruments rather than traditional/acoustic ones. Examples of songs could be sourced from Audio Network via the Lancashire Grid for Learning, iTunes or a music streaming service such as Spotify. Specific example – Oxygene via the Pop music section of the Lancashire Interactive Music Service. |
| **Music** |
| **Creative Learning Opportunities and Outcomes (contd.)** |
| * Composing a short electronic composition for a specific purpose.
* Compose a song or rap using electronic sounds.
 | An activity where pupils compose a short piece that can be used for a warm up activity in a PE or dance lesson. An ideal App for this activity is RJ Voyager or Apple’s Garageband which can be used on iPads and iPhones, although any appropriate music software program could be used for this. Other Apps for electronic music include Bloom.Continuing on from the above, pupils listen to and discuss the structure of a pop song and compose their own piece of music using the theme of ‘Electricity’. |

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| **Additional Curriculum Links** |
| **Subject** | **Key Learning** | **Creative Learning Opportunities and Outcomes** |
| **Mathematics** | **Statistics*** Use a variety of sorting diagrams to compare and classify.
* Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.
* Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

**Fractions*** Understand that a fraction is a whole number divided by another (e.g. $\frac{3}{4}$ can be interpreted as 3 ÷ 4).
* Recognise and show, using diagrams, families of common equivalent fractions.

**Geometry*** Continue to identify horizontal and vertical lines and pairs of perpendicular and parallel lines.

**Measurement*** Estimate, compare and calculate different measures.
* Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.
* Know area is a measure of surface within a given boundary and
* Find the area of rectilinear shapes by counting squares.
* Convert between different units of measure.
 | Children can sort and classify different items according to different criteria e.g. materials into conductors and insulators; items that use electricity, items that don’t and items that use it sometimes. The focus should be for children to identify the most appropriate diagram to use for sorting and classifying and say why e.g. if using a Venn diagram to sort conductors and insulators, thinking of objects or materials that will fit into each section (pencil in the intersection as the graphite is a conductor but the wood is an insulator).When researching energy use and how we can reduce the use of electricity to save our planet, children can compare data presented in different ways and look at the impact of switching off lights when not in a room, cutting the amount of time watching television down by a given amount etc.Using a generalisation e.g. bulbs get brighter if more cells are added can be a good way to explore fractions. One battery giving power to two bulbs can be thought of as $\frac{1}{2}$ (each bulb is receiving $\frac{1}{2}$ of the power). One battery giving power to three bulbs, each bulb receives $\frac{1}{3}$ of the power, so the bulb is less bright than the earlier example. Two batteries lighting four bulbs gives the same ‘brightness’ as one battery lighting two bulbs, an equivalent fraction. Three batteries lighting four bulbs means that each bulb is receiving $\frac{3}{4}$ of the power of one battery. This shows that a fraction can be thought of as one whole number (the number of batteries) divided by another whole number (the number of bulbs). If drawing circuit diagrams, the mathematical language of horizontal, vertical, parallel and perpendicular can also be used.Mathematical learning is dependent on the choice of product for the DT outcome. There may be further opportunities to explore mathematical learning e.g. if creating a display to draw attention to the new additions to the library, the learning could include perimeter work, using the number of light bulbs on each side of the rectilinear shape as the ‘unit’. How many different rectilinear shapes could you create that require twenty four light bulbs? |

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| **Additional Curriculum Links** |
| **Subject** | **Key Learning** | **Creative Learning Opportunities and Outcomes** |
| **PSHE** | * Pupils should understand emotions and feelings and begin to understand that sometimes we have difficult emotions and feelings to manage.
 | Make links with music to explore extra creative visualisations as a means of distressing.Discuss managing feelings and looking for triggers to warn before the sparks fly. Read the book ‘A Volcano in my tummy’ by Whitehouse and Pudney. |
| **Computing** | **Programming****Skills*** Write programs that accomplish specific goals.
* Read what a sequence in a program does.
* Work with various forms of input.
* Work with various forms of output.
* Use logical reasoning to predict outputs.
* Design programs, showing skills needed to plan and implement a task / problem that accomplish specific goals.
* Create programs that implement algorithms to achieve specific goals.
* Debug programs that accomplish specific goals through self and peer assessment.
* Use sequence, repetition and selection in programs
* Use sequences of commands to control physical devices using outputs.
* Demonstrate and develop a sense of audience when appropriate.
* Use logical reasoning to detect and correct errors in programs.
 | This topic reviews the programming skills used in Year Three and develops pupils’ understanding of programming by introducing new ones. It provides another opportunity to discuss inputs and outputs and allows the teacher to link it to this context and discuss sensors and how programs can be used to control physical devices such as sensors and robots. It also provides pupils with another opportunity to develop their logical reasoning and develop their debugging skills. Some of this work may take place within small groups allowing for peer assessment of the work. One of the key new concepts covered in this topic is selection. There are many good programming tools to choose from. Ones that are suitable for this project include the free tool Scratch and commercial products such as Lego Wedo, Lego Mindstorms NXT or Flowol/Flowgo. The project design is dependent on which tool the school chooses to use. Some schools may choose to use a combination of them. A possible overview could be:* Introduction and review of inputs, outputs, the programming concepts and the key design elements of the project (planning, implementing and evaluating).
* Pupils are shown and create programs to control external devices such as robots. Scratch code can be used to run many external devices and robots such as Lego (Scratch 1.4) and the Moway robot. Scratch can also be used to run the webcam or connected camera of a computer (e.g. the bubbles game on the Scratch website).
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| **Additional Curriculum Links** |
| **Subject** | **Key Learning** | **Creative Learning Opportunities and Outcomes** |
| **Computing****(contd.)** | **Programming****Knowledge*** Understand how to plan and write programs that accomplish specific goals.
* Know a range of input devices and how they can be used.
* Know a range of output devices and how they can be used.
* Know the difference between an input and an output.
* Understand that computers can collect data from various inputs.
* Know what debugging is and how it can be used to achieve specific goals.
* Understand that planning is a vital part of designing programs.
* Understand that evaluation is a vital part of the design process.
* Understand what the terms sequence, repetition and selection mean and know how to use them in programs.
* Understand how to control physical devices.
* Be aware that everyday devices use sensors and outputs, e.g. automatic doors, traffic lights, intruder alarms.
* Understand how to use logical reasoning to detect errors in programs.
* Understand how to use logical reasoning to correct errors in programs.
* Understand that computers can collect data from various inputs.
 | Electrical circuit project with Scratch:* Looking at the new curriculum areas e.g. selection.
* Planning the project.
* Making the project resources (e.g. creating/sourcing the graphics for the circuit program).
* Creating the program (importing the graphics and writing the script).
* Debugging/evaluating the code.
* Self and peer assessment of project.
* Review of key skills.

Some schools may choose to use an online software tool to cover or support the programming element of their computing curriculum. Espresso coding and 2Simple’s 2Code are two of the online tools that schools choose to use. |

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| **English** |
| **Key Learning** |
| **Unit** | **Explanation**  | **Fantasy** | **Film and Playscript**  |
| **Outcome** | * Oral explanation of a process.
* Written explanation of a process.
 | * Innovated narrative based on a model.
 | * Script based on a short film.
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| **Possible Duration**  | * 1-2 weeks.
 | * 3-4 weeks.
 | * 2-3 weeks.
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| **Key Learning****Reading**  | * Listen to, read and discuss a range of explanation texts.
* Analyse and evaluate texts looking at language, structure and presentation.
* Analyse and evaluate how specific information is organised within an explanation text.
* Explain how paragraphs are used to order an explanation text.
 | * Regularly listen to whole novels read aloud by the teacher.
* Identify, discuss and collect effective words and phrases which capture the reader’s interest and imagination e.g. metaphors, similes.
* Make predictions based on information stated and implied.
* Demonstrate active reading strategies e.g. generate questions, find answers, refine thinking, modify questions, construct images.
* Draw inferences around characters’ thoughts, feelings, actions and motives, and justify with evidence from the text using point and evidence.
* Make and respond to contributions in a variety of group situations e.g. whole class, independent reading groups, book circles.

  | * Listening to, reading and discussing a range of plays.
* Analysing and evaluate texts looking at language, structure and presentation.
* Preparing playscripts to read aloud, showing understanding through intonation, tone, volume and action.
* Use punctuation to determine intonation and expression when reading aloud to a range of audiences.
* Drawing inferences around characters’ thoughts, feelings, actions and motives, and justify with evidence from the text using point and evidence.
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| **English** |
| **Key Learning (contd.)** |
| **Key Learning****Writing**  | * Explore, identify and create complex sentences using a range of conjunctions e.g. if, so, because, when.
* Discussing and recording ideas for planning e.g. *text map, non-fiction bridge, boxing-up text types to create a plan.*
* Organising paragraphs in non-fiction.
* Linking ideas within paragraphs.
* Generating and select from vocabulary banks e.g*. causal connectives (as a result, so, because, If, therefore, consequently), technical language* appropriate to explanations.
 | * Create sentences with fronted adverbials for when e.g. *As the clock struck twelve, the soldiers sprang into action.*
* Use inverted commas and other punctuation to indicate direct speech.
* Explore, identify, collect and use noun phrases e.g. *The crumbly cookie with tasty marshmallow pieces melted in my mouth.*
* Read and analyse narrative.
* Discuss and record ideas for planning e.g.  *story board, boxing-up text types to create a plan.*
* Organise paragraphs in narrative.
* Link ideas within paragraphs e.g. *fronted adverbials for when* e.g. *In the distance, a lone wolf howled.*
* Generate and select from vocabulary banks e.g*. powerful adverbs, adverbial phrases,* appropriate to text type.
 | * Develop characterisation using vocabulary to create emphasis, humour, atmosphere, suspense.
* Discuss and propose changes with partners and in small groups.
* Improve writing in light of evaluation.
* Perform own compositions for different audiences.
* Use appropriate intonation, tone and volume to present their writing to a range of audiences.
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| **Suggested Texts**  | * Cracking Contraptions by Nick Park (Aardman Animations).
* The Shirt Machine.
* Until I Met Dudley By Roger McGough.
* Heath Robinson pictures.

  | * The Firework Maker’s Daughter by Phillip Pullman.
 | * Short film - narrative e.g. Dangle by British Film Institute.
* The Switch.
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| **English** |
| **Explanation - Creative Learning Opportunities and Outcomes** |
| **Creating interest*** Model explaining how an object works using time connectives and causal e.g. chocolate fountain, or corkscrew. Provide a variety of familiar objects e.g. stapler, hole punch, clothes peg, scissors, garlic press etc. In pairs, explain how the object works.
* Introduce time connectives - first, next, after that, finally.
* Introduce causal connectives - so, because, as a result, if.
 | **Learning outcomes** * Children will be able to use simple time and causal connectives to give an oral explanation of how an object works.
 |
| **Reading** **Grammar:** Warm ups throughout the reading phase – focus on complex sentences with *if, so, because, when.***Reading and responding** * Shared read an explanation text which explains how something works e.g. one page from *Until I Met Dudley by Roger McGough.*
* Use talking groups to discuss the explanation focusing on ‘what’ and ‘how’ and record responses in writing.
* Read further explanation texts and demonstrate comprehension through oral explanations in role as an expert.
* ‘Learn’ a text orally as a class focusing on time and causal connectives, using actions, props and images.

**Reading and analysing** * Model creating a flow chart/text map to plot a familiar explanation into key elements with time and causal connectives and ‘walk’ the map through.
* Children read an explanation text in pairs/groups, appropriate for their independent reading ability e.g. from *Until I Met Dudley by Roger McGough* plus other texts and create a flow chart/text map using time and causal connectives, actions, props and images.
* Create a whole class checklist of features of explanation texts and display.
 | **Learning outcomes** * Children will be able to demonstrate an understanding of the text/s they have read.
* Children will be able to identify key elements of a process and select appropriate connectives to link the stages.
* Children will know/understand the features of explanation texts.
 |
| **Gathering content** **Grammar:** Warm ups throughout the gathering content phase – focus on complex sentences with *if, so, because, when** Watch a film version of an explanation text, e.g. glass blowing, such as this one on Teachfind ([here](http://www.teachfind.com/teachers-tv/lesson-starters-different-writing-stylesglass-blowing)); The Shirt Machine - YouTube clip ([here](http://www.youtube.com/watch?v=rliGlp4ddXs)); Cracking Contraptions on the Wallace and Gromit website ([here](http://www.wallaceandgromit.com/films/crackingcontraptions/)).
* Using time and causal connectives, explain the process to a partner.
* Create a flow chart using screen shots.
* Children work in small groups to act out/mime the different stages of the process.
* Add time and causal connectives to the flow chart, plus appropriate technical vocabulary.
 | **Learning outcomes*** Children will be able to recreate an explanation through mime/dance.
* Children will be able to explain a process using time and causal connectives.
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| **English** |
| **Explanation - Creative Learning Opportunities and Outcomes (contd.)** |
| **Writing** * Use shared writing techniques to model a section at a time with the children. Focus on skills – complex sentences with *if, so, because, when;* time and causal connectives; technical vocabulary and sequenced steps.
* Use AFL, marking and feedback to adjust shared writing focus daily.
 | **Learning outcomes*** Children will be able to write an explanation text which includes:
* Complex sentences using *if, so, because, when.*
* Connectives – time and causal.
* Appropriate technical vocabulary.
* Sequenced steps.
 |
| **Outcome** * An explanation of a process/how something works or is made.
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| **Presentation** * Present explanations to an audience using a combination of reading aloud and mime/dance.
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| **English** |
| **Fantasy - Creative Learning Opportunities and Outcomes** |
| **Creating interest*** Use a film clip, object or image linked to the theme e.g. a firework.Provide a short writing opportunity to incorporate the use of verbs, adjectives and adverbs e.g. model creating a fast poem using two adjectives, three verbs and four adverbs using a thesaurus to support vocabulary development. Children create their own e.g. about a fire, firework.
 | **Learning outcomes** * Children will be able to identify and use verbs, adjectives and adverbs.
 |
| **Reading** **Grammar:** Warm ups throughout the reading phase – focus onfronted adverbials for when.**Reading and responding** * Read the selected text and use a range of active reading strategies to develop understanding, including point and evidence e.g. KWL grid, true and false statements, raising questions, Book Talk.
* Read further sections/chapters (use additional time outside of English sessions) and provide a range of drama strategies to deepen understanding e.g. hot seating, freeze frames, magic, mirror, magic microphone.
* Further develop understanding through linked short writing opportunities e.g. role on the wall, think, say, feel bubbles, diary extracts, summarising, writing in role, letters.
* Model the use of writing speech in role as a character and demarcating with inverted commas linked to drama. Children write interchanges of dialogue with inverted commas.
* Use film clips or author telling part of the story, if available, alongside reading the text.

**Reading and analysing** * Select key sections of text for further interrogation which include noun phrases e.g. *mighty trumpet, parched lips,* *bubbling, orange sulphur*.
* Analyse fronted adverbials for when e.g. *All at once…; It wasn’t long before…; Next morning…; When Lila returned…*
* Model creating a simplified plot structure based on the text e.g. *The Firework Maker’s Daughter.*

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| Lila wants to be a Firework Maker. | Character wants to be…  | Plot new story: |
| Father doesn’t want her to.  | Parent doesn’t want them to…  |  |
| Lila practises hard to create the most amazing firework.  | Character practises hard.  |  |
| Firework is selected to be the grand finale at the New Year Celebrations.  | Character’s creation is selected for use at a grand event.  |  |
| Father realises Lila is talented and should follow her dream!  | Parent decides child should follow their dream!  |  |

 | **Learning outcomes** * Children will be able to demonstrate understanding of a text using a range of active reading strategies and drama techniques.
* Children will be able to demarcate speech using inverted commas.
* Children will be able to analyse and evaluate use of noun phrases and fronted adverbials for when.
* Children will be able to discuss key events within a narrative.
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| **English** |
| **Fantasy - Creative Learning Opportunities and Outcomes (contd.)** |
| **Gathering content** **Grammar:** Warm ups throughout the gathering content phase - focus on noun phrases.* Innovate on the plot pattern, e.g. watch The Inventor’s Shed from The Literacy Shed website ([here](http://www.literacyshed.com/the-inventors-shed.html)).
* Model plotting new ideas, inspired from the clip, onto the grid referring closely to the originale.g. *Child wants to be a cloud maker but isn’t very successful at first.*
 | **Learning outcomes*** Children will be able to develop ideas for a new narrative and organise into a plot pattern structure.
 |
| **Writing** * Use the new plot pattern plan created. Use shared writing techniques to model a section at a time with the children. Focus on skills – noun phrases for description, fronted adverbials for when to open a paragraph, paragraphing throughout and use of inverted commas for speech.
* Children follow the modelling each day from the whole class focus and/or use their own plan to inform writing.
* Use AFL, marking and feedback to adjust shared writing focus daily.
 | **Learning outcomes*** Children will be able to write a narrative, organised into paragraphs, which includes:
* noun phrases.
* fronted adverbials for when.
* inverted commas to punctuate speech.
 |
| **Outcome** * Innovated narrative based on a plot inspired by a novel.
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| **Presentation** * Publish narrative using ICT and place in school or class library.
* Share the completed narrative with peer/s to enjoy.
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| **English** |
| **Film and Playscript - Creative Learning Opportunities and Outcomes** |
| **Creating interest*** Provide the children with a very short piece of dialogue written as a playscript. This needs to have a corresponding film clip. Ask them to read the script aloud in pairs. View the corresponding short film. Explain that films and TV are scripted and we will be creating a script and film outcome.
 | **Learning outcomes** * Children will be able to compare film and script versions of a text.
 |
| **Reading** **Reading and responding** * Explore a play script through shared reading and book talk.
* Involve children in reading play scripts in small groups to rehearse and perform to the whole class.
* Draw inferences around characters’ thoughts and feelings based on the speech used.
* Select specific lines of speech and explore saying them in different ways based on an adverb bank e.g. *softly, noisily.*

**Reading and analysing** * Evaluate how we read a play script when we read it alone and then when we take on a role as a character and demonstrate action and characterisation.
* Use intonation and expression when reading and acting. Use actions to show how a character is feeling, and respond to stage directions.
* Identify specific features of play scripts to create a whole class checklist for use when writing.
 | **Learning outcomes** * Children will be able to read play scripts and discuss what characters are thinking and feeling.
* Children will be able to use appropriate intonation and expression when performing a script.
* Children will be able to identify the specific features of play scripts.
 |
| **Gathering content** * Use a familiar text, and analyse the use of dialogue.
* Select one piece of dialogue and develop it into a two person interchange. Colour code the words spoken by the characters.
* Model the writing of the coloured dialogue using play script conventions.
* Children repeat the process independently, in pairs.
* Pairs of children rehearse, perform, evaluate and improve their scripts.
* Show a short narrative film which has no speech. Use start, stop and discuss techniques to clarify events.
* Model the creation of a storyboard, adding thought bubbles for each character through thought tracking.
* Model and develop dialogue through paired, improvised role play. Add speech bubbles to story board.
 | **Learning outcomes*** Children will be able to convert dialogue from a story in to a play script.
* Children will be able to identify key events from a story.
* Children will be able to draw inferences from text, justifying their opinions.
 |
|  **Writing** * Use shared writing techniques to model a section at a time with the children. Focus on skills – showing characterisation through speech and vocabulary choice, and use of play script conventions.
* Use AFL, marking and feedback to adjust shared writing focus daily.
 | **Learning outcomes*** Children will be able to show characterisation through their choice of speech.
* Children will be able to use appropriate conventions to write their play script.
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| **English** |
| **Film and Playscript - Creative Learning Opportunities and Outcomes (contd.)** |
| **Outcome** * Play script based on a film narrative.
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| **Presentation** * Watch how actors use action, facial expression and intonation to make a play script come to life (perhaps use the clip from the Creating Interest Phase).
* Assign roles in small groups, e.g. director, camera man and two actors.
* Perform play script and record using iPad or flip cameras.
* Evaluate own and others’ performances. Suggest and make improvements.
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