|  |  |
| --- | --- |
| **Year 6 Electrical Systems**  **Alarming Vehicles**  **More complex switches and circuits (including programming, monitoring and control)** | |
| **Prior Knowledge:**  Pupils understand the essential characteristics of a series circuit and experience of creating a battery-powered, functional, electrical product. Pupils will have experience of using computer control software. | **Prior Skills:**  • |
| Planned outcome: Design and make an alarming vehicle | |
| Learning Journey – small steps in learning to meet the planned outcome   1. **Explore**   Pupils explore and research a range of products with electrical components and consider how they might work. Discuss how many electrical products are monitored and controlled by computer systems which are embedded within them e.g. night lights, alarm systems, security lighting. Pupils consider e.g. Who have the products been designed for and what is their purpose? How and why is a computer control program used to operate the products? What input devices e.g. switches, and output devices, e.g. bulbs, have been used? Pupils could show their learning by writing algorithms for a chosen product using everyday language which explain how the electrical product might work. Pupils investigate electrical sensors such as light dependent resistors (LDRs) and a range of switches such as push-to-make, push-to-break, toggle, micro and reed switches. To develop pupils’ understanding of how they are operated by the user and how they work, provide opportunity for children to use each component to control a bulb in a simple circuit. Remind children about the dangers of mains electricity.   1. **Design**   Share a design brief with the children, e.g. to make a bulb light remotely. Model and allow opportunity for pupils to construct electrical circuits required for the product. Model and allow opportunity for pupils to write programmes to control their electrical circuits. Explore writing different programmes to achieve different outcomes – to make the bulb flash repeatedly, to make the bulb light when it becomes dark, to make the bulb light in response to movement.  Pupils communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams. Pupils indicate their design ideas in their drawings, including the location of the electrical components and how they work as a system with an input, process and output. Pupils produce detailed step-by-step plans and detailed lists of tools, equipment and materials needed.   1. **Make**   Give pupils the opportunity to revisit their design plans and recap the order in which the products will be made. Pupils collect the materials and tools required for their circuits. Pupils use knowledge from previous lessons and from science to construct their circuits. Once constructed, pupils should test their circuits to identify any faults. Pupils use their knowledge and skills from previous lessons to identify where a fault is and to correct it before completing their product. Pupils create and modify their control program to enable their product to work automatically in response to changes in the environment. Pupils should use problem solving skills when things go wrong. Encourage children to critically evaluate their ongoing work against the original design specification. Pupils make changes to their products as they work to overcome any problems that arise or to make improvements. Pupils record and changes made on their plans   1. **Evaluate**   Pupils evaluate their final products, comparing it to the original design specification. They should critically evaluate the quality of design, the manufacture, functionality, innovation and fitness for the intended user and for purpose. against the design criteria. They consider the extent to which the product meets the needs of the intended user and suits the intended purpose. Does the product suit the purpose? Does it suit the intended user? Are the materials suitable for the product? How well has the product been made? How well has it been finished? Could the product have been made more appealing? Where possible allow feedback from the intended user. Pupils complete an evaluation for their own product. | Tiered Vocabulary  push-to-make switch, push-to-break switch, toggle switch, Series circuit,  **3**  **2**  **1**  Function, functionality, design decisions, innovation, , input, output, switch, input device, output device, system, monitor, control, program, Intended user, criteria, design specification, design brief, series circuit, fault, connection, switch, battery, battery holder, bulb, bulb holder, crocodile clip, wire, program, control, sequence, selection, repetition, debug,  Switch, decisions, control, research. Purpose, product, evaluate, user, design, finish, improve, ideas |
| Scaffolds | Oracy Activities |
| Word Banks  Sentence stems | Know and use technical vocabulary relevant to the project. |