WHAT ARE THE BIG AIMS OF YEAR 8 Electronics?

To de-mystify electronics. Complex concepts will be de-constructed into chunks that can be assimilated by pupils based on their existing understanding of the world. Identify and address misconceptions by getting pupils to build and analyse relatively simple circuits. Pupils will program microcontrollers to simulate how these are used in microwaves, cars, alarms etc. Using computerised machines to manufacture products pupils have developed.

WHAT WILL EXCELLENCE LOOK LIKE IN YEAR 8

Pupils identify insulators and conductors using test procedures.
They can identify energy converters with everyday examples.
There are different ways of storing energy.
They understand the concepts of voltage, resistance current and current flow.
Pupils can build systems using a sensing processing output model.
They are able to program a microcontroller and successfully manufacture a completed USB circuit.
Pupils can use CAD/CAM to create developments/nets.
Pupils successfully manufacture a lamp using a rainbow LED.

WHAT KNOWLEDGE DO THE PUPILS NEED TO ACQUIRE?

- Electrical insulators and conductors
- What voltage, current and resistance are and their relationship
- Names, symbols and uses of a range of components
- Some components are polarised some not
- There are two ways of controlling the amount of current
- The use of CAD software to create and evaluate nets/developments

WHAT SKILLS DO THE PUPILS NEED TO DEVELOP?

- How to assemble circuits using computer simulation
- How to assemble circuits on a prototype board
- How to use a PCB drill accurately and safely
- How to solder components – build/test approach
- A systematic approach to fault finding on a PCB
- How to load materials set and run a CNC machine
- Assembly techniques for nets/developments

WHAT MISCONCEPTIONS MAY THEY HAVE FROM PREVIOUS LEARNING?

Electronics is 'hard'. All components are polarised. Because a light is on it is working, because it is off, it's not working. Electrical insulation and heat insulation are the same thing. Products produced using machines are better than those that are hand-made.

WHAT ASSESSMENTS WILL BE USED ACROSS THE YEAR TO DEMONSTRATE HOW THE PUPILS HAVE ACQUIRED THE KNOWLEDGE AND DEVELOPED THE SKILLS?

Pupils will be asked to draw five progressively more complex circuit diagrams in a 20 minute session. Pupils are allowed to help each other during the soldering of the USB project, on completion they will solder two resistors independently – 10 minutes. The ability to construct a prototype board requires knowledge and skill, several prototyping challenges will be set each with varying levels of support, ranging from a circuit diagram to verbal description, PowerPoint presentation to a video clip. Knowledge of the CAD software (2dDesign) will be assessed using short two-dimensional drawing exercises. Pupils' skills setting machines and manipulating materials will be assessed at specific points during the lamp project, loading material into the CNC machine, hand finishing the net and the final assembly of the lamp.