

Key Stage 3 Overview – Technology

	Unit 1 – Night Light: Electronics	Unit 2 – Identity Tag: Working with Materials	Unit 3 – Computer Control: Technology	Unit 4 – Windmill: Mechanisms
Year 8	<p>With emphasis on <u>communication, ICT, managing information, being creative, self-management, thinking, problem solving and decision making.</u></p> <p>Pupils will: carry out research on lights/types of lighting; use the ICT package Crocodile Clips to model an electrical circuit; identify the advantages of modelling; learn how to solder safely and identify the parts of the soldering station; identify electrical components and respective symbols (battery, bulb, wire and switch); construct circuit diagrams; investigate the design process and explore the necessity of following a step by step procedure; have the opportunity to design some form of light for a toddler’s study; have the opportunity to model various design ideas; develop awareness of the Tech Soft software and create a Tech Soft drawing to represent their chosen idea; design a method of holding a light and a battery; demonstrate ability to use appropriate tools and equipment safely (and components) with some regard for the quality and accuracy required; describe the success of the outcome and explore the reasoning and decision making during manufacture.</p>	<p>With attention to <u>working with others, self-management, being creative, managing information, thinking, problem solving and decision making.</u></p> <p>Pupils will: be introduced to safety in the workshop and the necessity for wearing proper clothing, safety glasses, and other safety wear as appropriate; learn how technology helps us and identify the ways in which modern technology has improved our lives; appreciate the adverse effect of technological advances; be introduced to the classification of materials (metals, woods and plastics); investigate a range of familiar/everyday objects found around the home and identify five materials used on that product; investigate and discuss the impact of technological advances within manufacturing and provide an opportunity to use this technology in the classroom, initially through animation; develop an understanding of manufacturing, planning and use of tools and equipment appropriate to materials; describe success of outcome and explain the choice of materials and procedures.</p>	<p>Focusing on <u>working with others, managing information, thinking, problem solving and decision making.</u></p> <p>Pupils will: recognise that control systems are widely used in familiar situations (washing machines, burglar alarms etc); recognise the parts of a control system (inputs, processes, outputs) learn the computer control system (pc, monitor, mouse, keyboard) and the interface we use in technology; be introduced to software package for control called Logicator; learn how to access and use Logicator and explore the role of smart box interface; learn the basics of flow sheet control including programming output; discuss the sequence of traffic lights including order and time delays; learn how to program a computer to control traffic light sequence on smart box; review traffic lights flowsheet and use software packages to compile a summary explaining the important aspects of computer control.</p>	<p>With attention to <u>communication, being creative, self-management, ICT, managing information, working with others, thinking, problem-solving and decision making.</u></p> <p>Pupils will: understand what a mechanism is and know the shape, function and application for basic mechanisms (lever, gear, pulley, cam, chain and sprocket); carry out research on the internet for levers and forces; research, sketch and explain 4 types of motion and recognise where each is used; receive an introduction to the windmill project and explore conventional and alternative energy sources; appreciate the importance of wind energy and how it is harnessed; research new and old windmills; using freehand sketching create ideas for a device which turns wind into energy; draw up a plan of action for making a windmill and discuss success criteria for the manufacturing project; discover how to work with wood (plane, mark, cut, shape and smooth); learn how to join 2 pieces of wood whilst harnessing energy through 2 planes; learn how to drill and mark interference and tolerance holes allowing for movement; mark and drill holes for rotating parts (using callipers for circle gauge; discuss success of the project and what was learnt; reflect on what was learnt and identify areas for improvement.</p>
Year 9	Unit 1 – Water Sensor Project: Technology	Unit 2 – Energy/Environment	Unit 3 – CAD Solidworks	Unit 4 - Metal: tack puller
	<p>With attention to <u>self-management, being creative, ICT, managing information, working with others, thinking, problem-solving and decision making.</u></p> <p>Pupils will: understand systems and how sub systems are related (input, output and control); understand the basic principles of what a pcb is and how it is made; recognise electronic components such as resistor and transistor; inspect pcb and record the processes which took place; learn how to solder components (e.g. transistor) onto a pcb circuit board and understand that some components are sensitive to heat and therefore learn how to use a heat sink; generate design ideas for a thermoplastic holder to contain/utilise/display the circuit they have made; learn what a thermoplastic is and how it is shaped in a vacuum former and/or strip heater; learn how to safely use thermoforming equipment to shape thermoplastics in the workshop; mark, cut, shape wood for vacuum forming; mark and strip heat acrylic holder; vacuum form polystyrene over wood; assemble and install circuit by drilling holes and fixing the acrylic to the wooden back; test and evaluate the product and make suggestions for improvement.</p>	<p>With attention to <u>managing information, working with others, self-management, being creative, ICT, thinking, problem solving and decision making.</u></p> <p>Pupils will: appreciate how we use a disproportionate amount of earth’s resources; log onto www.earthday.net and produce their own ecological footprint; compare footprints, calculate average and discuss global significance; learn how household appliances can use varying amounts of energy; use excel to draw bar graph to establish which appliances are the most/least efficient; learn how electricity is measured for costing i.e. what is a ‘unit’?; compare different levels of usage by different households and discuss what the reasons may be; construct tables and excel graphs of class energy use; recognise we consume energy from a number of sources especially heating and travel; develop ICT skills using Publisher to compile a leaflet showing main outcomes from work on energy so far (6 faces with title, sub titles, names etc.)</p>	<p>With attention to <u>self-management, being creative, making connections, working with others, thinking, problem-solving and decision making.</u></p> <p>Pupils will: learn how to access Solidworks software and open a new document, use sketching tools to draw shapes, dimensions, and produce a 3-D drawing; acquire additional skills to enhance basic drawing, change dimensions, add annotation, delete lines etc; draw an artefact which students have manufactured in the workshop (metal tack puller); close and open drawing to give 2-D orthographic views, modify position and scale to give best presentation, import 3-D isometric view; develop CAD skills by drawing another artefact from direct observation or from images e.g. water sensor project.</p>	<p>With emphasis on <u>being creative, information management, working with others, self-management, ICT, thinking, problem-solving and decision making.</u></p> <p>Pupils will: be introduced to metal project – a tack puller to be made of mild steel; consider some of the properties of mild steel; explore where metals come from, what forms they exist in especially carbon steel; observe mild steel (possible hazards and how to make safe), file, mark, cut, reduce, smooth and finish metal; use letter stamps to stamp initials on metal pieces using a ball peen hammer and metal base/anvil; begin cleaning metal using finer files and emery cloth with oil; draw out final shape on solidworks CAD – orthographic views with some colour/tone; bend the tack to enable the tool to lever out the tack/staple; try out the device on tacks in classroom notice board; file the jaws to an angle to enable it to slip underneath the edge of the tack; learn soft soldering/welding and brazing as methods of joining metals – pupils should always be aware of soldering being used to join electrical components; evaluate the project in relation to the suitability of steel as a material.</p>
	Unit 5 – Mechanisms investigation			
Year 9	<p>With emphasis on <u>managing information, self-management, ICT, communication, thinking, problem solving and decision making.</u></p> <p>Pupils will: be introduced to mechanisms, learn what they are and where they have seen them; research and manage information to investigate design issues of more basic mechanisms (gear trains, pulley systems, linkages); carry out an investigative project on a mechanical device, name and sketch the device, note what mechanical parts are used in it, describe what it does and who uses it; use freehand sketches and annotation to explain how this device works and how different parts work together to accomplish a task; show deeper understanding, be more critical, think flexibly and make reasoned judgements; communicate effectively in oral, written, graphic and ICT formats showing clear awareness of the audience and purpose.</p>			

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	Unit 1 – Light Sensor: Electronics	Unit 2 – Pneumatic control	Unit 3 – CAD Solidworks	Unit 4 – Product analysis
Year 10	<p>With emphasis on <u>working with others, managing information, self-management, communication, ICT, thinking, problem solving</u> and <u>decision making</u>.</p> <p>Pupils will: research and identify the components used in the light sensing circuit and familiarise themselves with component symbols and their function; use the ICT package (Livewire) to model the light sensing and use (PCB wizard) to generate a printed circuit board design; have the opportunity to amend the original computer generated PCB design and present their work via a storyboard on Publisher; have the opportunity to manufacture a circuit, identify location of components, drill holes, clean PCB, solder in components using correct procedures and add heat shrink where needed; investigate the function of a transistor; test and experiment with the circuit and appreciate how the light sensing circuit can be adjusted to set sensitivity to light; have the opportunity to reverse engineer and investigate how circuitry is located and mounted in products that we use in our everyday lives; model their own design ideas for mounting their circuit and battery using a card; demonstrate an ability to use appropriate tools and machines safely to make their chosen design.</p>	<p>Focusing on <u>communication, ICT, managing information, self-management, working with others, risk assessment, thinking, problem solving</u> and <u>decision making</u>.</p> <p>Pupils will: discuss what pneumatics is, where it is used in the world and contrast to mechanical and electrical control; recognise the components (compressor and receiver) and how to connect them; sketch a piston and valve; describe dangers associated with compressed air and the need for safety precautions; connect up 3-p valve switching DAC piston; draw the circuit and explain instroke, outstroke and exhaust; connect up 3-p valve and SAC and consider why SAC returns and describe potential uses; use two 3-p valves to switch DAC positive and negative; consider route of air through 3-p valve; explain how air is controlled by a 3-p valve and how this is related to its symbol; learn symbols for cylinders; review valves and cylinders and establish what a flow regulator does and how it can be used.</p>	<p>With attention to <u>art & design, ICT, self-management, being creative, working with others, thinking, problem solving</u> and <u>decision making</u>.</p> <p>Pupils will: review Solidworks; use the sketching tools to draw shapes, dimensions, extrude, cut, build up into 3-D form; recognise where CAD is used in the work place; acquire additional skills to enhance basic drawing (amend dimensions, lines, features etc); draw an artefact which students have manufactured in the workshop e.g. windmill, but as two different parts; mate the two parts together using the CAD software and animate them; include materials in the drawings and place the drawing in an environment (scene); save work in another format and view in 2-D orthographic mode; present on an A4 page with selected 3-D (possibly colour) view; develop CAD skills by drawing another artefact from direct observation or from images.</p>	<p>With emphasis on <u>ethical awareness, communication, ICT, managing information, self-management, working with others, thinking, problem solving</u> and <u>decision making</u>.</p> <p>Pupils will: realise that product analysis is looking at, disassembling and working out how a product is made; using an A4 size portfolio, choose an everyday household item for analysis and graphically research the cost of making the product and evolution of the product; using Excel present the results of a peer survey identifying the main target markets for the product; study the suitability of the product by researching the relationship between the product and the user; analyse the main materials used in manufacture and assess which material properties were important; explore manufacturing methods for casing such as blow moulding; appreciate the impact of manufacturing on the environment and explore the potential for recycling; analyse the safety of the product (CE, BSI, Kitemark); recognise the strategies for marketing the product (displays and media); produce sketches of possible changes that would improve the product e.g. integral handle.</p>