



Number of weeks 18	Content of the unit	Assumed prior learning (tested at the beginning of the unit)
<p>This unit is focused on understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs]</p> <p>And the selection and use of specialist tools, techniques, processes, equipment and machinery including computer-aided manufacture</p>	<p>Standard Components Circuits Manufacturing Processes Plastic Packaging Sustainability Issues</p>	<p>Pupils will have learnt about mechanisms and paper and timbers. They will have designed and made a clock from plastic and timbers and a card mechanism</p>
Assessment points and tasks	Written feedback points	Learning Outcomes (tested at the end and related to subject competences)
<p>Week 5, phase test on electronics Week 10, phase test on manufacturing processes Week 18 end of year exam Homework to be peer assessed each week</p>	<p>Week 6 and 12 formative evaluation on:</p> <ul style="list-style-type: none"> quality of written response and use of key words use of diagrams and annotation quality drawing and use of colour 	<p>Technical knowledge</p> <ul style="list-style-type: none"> understand and use the properties of materials and the performance of structural elements to achieve functioning solutions understand how more advanced mechanical systems used in their products enable changes in movement and force understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs] <p>Make</p> <ul style="list-style-type: none"> select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties

Week	Clear learning intentions	Clear success criteria	Hook	Presentation of content	Guided practice	Independent practice (homework)	Closure
1	Pre-manufactured standard components can be found in many products, these components are mass produced by specialist manufacturers	Understand what a standard component is	Where do buttons come from?	Discuss the definition of a component with a focus on electrical and control components and fixings	Look at the advantages and disadvantages of using standard components	Make a list of 30 standard components used in everyday products	In a sentence describe what a component is
2	Electronic components are used to control the operation of a product	Identify a range of electronic components	Identify different electronic components from their circuit symbols	Discuss homework Why do electronic components have symbols	Define and draw the symbol <ul style="list-style-type: none"> A resistor A switch A battery A transistor And an LED 	What is a capacitor, what does it do and can you draw the symbol for one	Mini whiteboard, identify these components
3	A system is made up of 3 main parts, an input, a process and an output. Systems often have sub systems which control the system by using feedback loops	Understand the elements of a closed loop system	What makes your central heating system work at home?	Describe the input, process and output of a central heating system and then discuss what would happen if the system did not receive feedback	Draw and label a diagram of a closed loop system	What is an integrated circuit and can you draw one	Exit pass 1 thing I understand about a closed loop system



Week	Clear learning intentions	Clear success criteria	Hook	Presentation of content	Guided practice	Independent practice (homework)	Closure
4	Electronic circuits are usually built from a wide collection of individual components all working together	Understand how, by combining components in a circuit they can give their products a level of control	Name 3 electrical components	Discuss homework Components are combined in a system to perform a specific task for example at night it gets dark and the street lights come on in the morning it gets light and the street lights go off	Draw the circuit diagram for a light sensitive switch as used in street lights	Draw a circuit diagram for the bulb in your bedroom	Show and tell describing what is going on in this circuit
5		Phase test marked and logged on go 4 schools		Recap subject content to date		What is meant by the term primary processing	
6	Secondary processes turn standard stock materials into manufactured products or components	Understand what secondary processes are	What's going on here https://youtu.be/_Gtca7OLAmY	Discuss homework Describe how a chair is made	Produce a flow chart showing the various stages of making a chair	Explain how you made your clock in year 7	In a sentence describe what secondary processes are
7	There are 6 types of secondary processing and they apply to all material groups	Be able to identify and explain the 6 main types of secondary processes	Link the tool to the process <ul style="list-style-type: none"> • Saw • Line bender • Vacuum former • Soldering iron • Kiln • Paint brush 	Discuss <ul style="list-style-type: none"> • Wasting • Forming • Moulding • Assembling • Conditioning • Finishing 	Write definitions for each secondary process	Describe 3 different types of wasting and draw the tools you would use for each	Q&A on the 6 processes
8	Manufacturing products is a form of closed loop system, materials are the input, secondary processes and the output is the finished product	Understand how, by combining processes they can manufacture complex products	Draw a closed loop system diagram	Discuss how products can be made using a sequence of different processes https://youtu.be/HiAfP1PBcoo	Draw a system diagram for making a chair	Draw a system diagram for making a box	Exit pass 1 thing I do not understand about secondary processes
9	Products can be made in different quantities from a single one off to many millions	Be able to identify and explain different scales of production	How many drinks cans are produced each year 475 billion	Discuss home work Describe <ul style="list-style-type: none"> • One off production • Batch production • Mass production • Continues production 	Write definition and give example for each type of production	Revision for phase test Secondary processes and scales of production	Mini white boards, give scale of production for the following products
10		Phase test marked and logged on go 4 schools		Recap subject content to date		Draw 2 products made from plastic in your home	
11	Plastics are the most widely used material for commercial products. Different plastics have different properties	Be able to describe the primary processes used to manufacture plastic	Name ten products made from plastic	Discuss homework Describe the difference between natural and synthetic plastics and what polymerisation is	Natural plastics Synthetic plastics Annotate the diagram which explains polymerisation	In words describe the process of polymerisation	Learning triangle on plastics
12	Plastics can be divided into two groups, those that will change shape when heated and those that will not	Understand the difference between thermos and thermos-setting plastics and be able to identify common types of plastic	Can you describe what plastic is	Discuss homework Describe the difference between thermo-plastics and thermo-setting plastics	Complete table on thermo and thermo-setting plastics	What are the main differences between thermosetting plastic and thermo plastic	Exit pass 2 things I learnt today



Week	Clear learning intentions	Clear success criteria	Hook	Presentation of content	Guided practice	Independent practice (homework)	Closure
13	The design and manufacture of products has an impact on the environment. Sustainable design is about reducing that impact	Understand what is meant by the term sustainable design	What is more environmentally friendly A paper drinks carton or a plastic drinks bottle	Discuss renewable and non-renewable materials and how we can be sustainable designers	Describe how to be a sustainable designer <ul style="list-style-type: none"> Using resources carefully Avoid creating problems for someone else Design products that improve the environment 	Think of 2 products that damage the environment and two that improve the environment	Mini whiteboard name 1 renewable material and one non-renewable material
14	In order to minimise the environmental impact of using raw materials and manufacturing processes designers should consider the 6Rs	Be able to describe and discuss the 6Rs	Think of 2 words to do with the environment that begin with the letter 'R'	Describe the 6 Rs <ul style="list-style-type: none"> Reduce Recycle Re-use Repair Refuse Rethink 	Complete table on the 6Rs	How could you make a drinks carton more sustainable by using the 6Rs	Exit pass 1 thing I don't understand about the 6Rs
15	A carbon footprint is the total amount of carbon generated in the manufacture, use and disposal of a product How a product impacts on the environment throughout its life	Understand what is meant by the terms carbon footprint and product life cycle	Why is carbon dioxide bad for the environment	Discuss Carbon footprint and Product life cycle	Produce flowchart on the life cycle of a plastic drinks bottle	Can you find a flow chart for the life cycle of a paper drinks carton	Learning triangle for sustainable design
16	Most products have some form of packaging that is used for different reasons	Understand why products require packaging	Why do products have packaging	Discuss homework Explain <ul style="list-style-type: none"> Protection Information Display Containing Preservation 	Complete table on the different reasons why products need to be packaged	Revision for end of year test	Mini whiteboards Q&A on the need for packaging
17	Packaging symbols inform customers about hazards, storage and handling maintenance, disposal and design protection of a product	Understand the use of packaging symbols	What does the following symbols mean	Discuss homework Describe the different symbols on a sweet wrapper	Annotate a piece of packaging explaining what the different symbols mean	Revision for end of year test	Show and tell pupils will explain the information on their piece of packaging
18		Endo of year exam covering all elements of this unit		Class in rows sitting an unseen test set by one member of the department			



Key stage 3

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of domestic and local contexts [for example, the home, health, leisure and culture], and industrial contexts [for example, engineering, manufacturing, construction, food, energy, agriculture (including horticulture) and fashion].

When designing and making, pupils should be taught to:

Design

- use research and exploration, such as the study of different cultures, to identify and understand user needs
- identify and solve their own design problems and understand how to reformulate problems given to them
- develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
- use a variety of approaches [for example, biomimicry and user-centred design], to generate creative ideas and avoid stereotypical responses
- develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools

Make

- select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture
- select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties

Evaluate

- analyse the work of past and present professionals and others to develop and broaden their understanding
- investigate new and emerging technologies
- test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups
- understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists

Technical knowledge

- understand and use the properties of materials and the performance of structural elements to achieve functioning solutions
- understand how more advanced mechanical systems used in their products enable changes in movement and force
- understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs]
- apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers].