

Design Technology: Key stage 3 Curriculum overview

In every scheme of work students develop the skills of:

Year Group	Topic Theme	Subject specialism	Student activity	Skills/Practical
7	Health and Safety	Resistant Materials	- Pupils are to understand the health and safety rules when in a workshop. - To be aware of PPE and why it is necessary. - To understand a basic understanding of extraction within the workshop and links to industry. - To produce a shape cut from acrylic, developing an understanding on how to cut out using the coping saw, using files, abrasive papers and using vices.	Developing skills during the module: - Using hand tools, cutting with a coping saw, using a range of files, tenon saw, bench hook and hammer. - Modelling skills using clay. 3D drawing techniques, using isometric projection. - Use a heat press to create their design onto the wood. - Use the vacuum forming machine to create the base. - Applying a surface finish using wax. - Using the fret saws to create their puzzle.
7	Toys through the ages	Resistant Materials	- Pupils are to develop an understanding on the history of toys before the 20th century, exploring toys that Egyptian, Ancient Greece and Roman children played with. - Pupils are to study English philosopher John Locke about learning the alphabet via toys, John Spilsbury made the first jigsaw puzzle in 1767. He intended to teach geography by cutting maps into pieces but soon people began making jigsaws for entertainment, 1882 Adeline Whitney patented alphabet blocks, 1900 Frank Hornby invented a toy called meccano and Lines Brothers Limited- Tri-ang Toys from 1924 - Pupils are to develop an understanding how the industrial revolution allowed toys to be mass produced and the gradually became cheaper and also the impact on the toy industry from the first and second world war.	
7	Materials	Resistant Materials	Pupils are to explore early materials used to make toys such as Ceramics (clay- terracotta), wax, bone and ivory. Links to GCSE with composite materials.	

			- To develop an overview of different natural woods, looking at hard and soft woods. - To develop an overview of different metals, looking at ferrous and non-ferrous. - To develop an overview of different plastics, looking at thermo and thermoset. Links to GCSE with materials.	
7	Tools	Resistant Materials	- Pupils are to explore early tools and equipment that has been used such as stone cutting tool, wood carving and wood turning. - To develop an overview of metal casting and injection moulding. Links to GCSE tools/equipment and processes, wasting/deforming/reforming.	
7	Designing	Resistant Materials	- Pupils are to explore artist reference from MC Escher and produce a design using a tessellating pattern. Links to Maths - To develop an understanding of how to draw in isometric to produce their final design. - To develop rendering skills using pencils crayons and demonstrate - Pupils are encouraged to use the colour wheel and understand complementary colours and contrasting colours. Links to Art Links to GCSE with 3D sketches isometric	
7	Techniques	Resistant Materials	- Pupils are to produce a puzzle box using MC Escher as inspiration. - To develop an understanding how different properties of materials are used in the chosen area. Plywood is used to create the wood joints. MDF is used to create the jigsaw puzzle. Links to GCSE with material properties - To develop an understanding on forming and reforming thermo plastics to create a tray for their puzzle using vacuum forming. - To understand how to heat press a design onto wood. Links to Textiles	

			To understand different finishing techniques that can be applied to wood and add a finish to their jigsaw box using wax. Links to GCSE with surface finishes	
8	Health and Safety	Resistant Materials	Pupils to recap on health and safety in the classroom as they learnt in year 7.	Developing skills during the module: - Using cardboard to model a design from a brief. - Using hand tools, introduction of chisels and mallets to create the wood joints and reinforcing the hand tools used from year 7. - Drawing techniques via an engineering drawing using Third angle orthographic drawing. - Annotation of designs that explain the development stages of designing. - Use appropriate marking out methods when creating the wood joints. Marking gauges, ruler, try square.
8	Modelling a design from a brief	Resistant Materials	- Pupils will create a design from a brief and understand the importance of following a brief. - To model their design using card and then test the structure of the model. Links to GCSE with modelling materials	
8	Structural Engineering	Resistant Materials	- To investigate the First Iron Bridge which was built. It was built in Telford in 1779 by Abraham Darby (the third) materials used iron. - To investigate the work of Isambard Kingdom Brunel, looking at: bridges, rail lines and ships. To incorporate information about the Clifton Suspension Bridge across the River Avon and the 'Great Western', launched in 1837. - Pupils are to study bio mimicry with regards to links of different structures using Gaudi Sagrada Familia Cathedral as an example. - Pupils are to explore shell and frame structure and be able to understand the selection of use.	
8	Architects	Resistant materials	Antoni Gaudí Le Corbusier Walter Gropius Frank Lloyd Wright Zaha Hadid Norman Foster Links to GCSE with regards to studying the work of others Students should investigate, analyse and evaluate the work of one of the past and present designers for the above list.	

8	Mechanical devices	Resistant materials	- Students will investigate different functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements. - To develop an understanding changing magnitude and direction of force looking at Crank and slider, bell crank, reverse motion linkage, parallel motion and ratchet and pawl. Student will produce the linkages via using meccano. Link to maths and science. Link to GCSE mechanical devices.	
8	Forces and loads	Resistant materials	- To develop an understanding of the different forces and loads looking at Static/ Dynamic loads, Compression, Tension, Torsion, Shear and Bending. - To understand that structures can be reinforced and strengthen looking into triangulation, struts and ties. Links to GCSE forces and stresses. Links to maths and science	
8	Materials	Resistant Materials	- Understand how different properties of materials are used and how the properties influence their performance looking at Natural- Manmade timbers- seasoning-strength along the grain-quarter/slab swan- compare natural verses manmade. - To develop further understanding of how materials and be reinforced and strengthened looking at reinforced concrete- expansion gabs for weathering due concrete expansion from the weather and toughen steel. Links to GCSE composite materials, fibre and particle based composites. Links to GCSE modifications of properties for specific purposes.	
8	Designing	Resistant materials	- Pupils are to use different strengthening ideas and use waste minimisation to create their drawings. - To annotate and develop their designs further by looking at the forces that would impact on their initial designs.	

			- To develop an understanding of how to draw in orthographic - To develop a third angle orthographic working drawing to include dimensions and scale. Links to GCSE with Orthographic drawing Links to GCSE communicating ideas, creating a working drawing using dimensions and drawn to scale.	
8	Techniques	Resistant materials	Different wood joints tests looking for the strongest Orthographic drawing with correct materials and scale Manufacturing and designing a structure to hold a weight - Pupils are to produce a structure that will hold a weight. - To develop an understanding of different joining techniques and be selective with a variety of wood joints for their application. - Understanding the importance of planning when cutting and shaping to minimise waste and know about the different stock forms of wood. Links to GCSE with material efficiency	
9	Health and Safety	Resistant Materials	Pupils to recap on health and safety in the classroom as they learnt in year 7 and 8.	Developing skills during the module: - Using hand tools, using drills and creating a drilling jig reinforcing the hand tools used from year 7 and 8. - Drawing techniques via an isometric drawing, using the crating method. - Rendering techniques using thick and think lines. - Drawing techniques developing net designs of their lamps. - Annotation of designs using Product analysis.
9	Research using primary and secondary data	Resistant Materials	- Pupils are to understand how to extract information from a design brief. - To develop a task analysis of the main areas from the design brief. - Understand and how the following techniques are used and apply them to their product: market research, product analysis, anthropometric and ergonomic data. - Using the information from the research to produce a design specification for their product. Links to GCSE with primary and secondary data.	
9	Work of past and present designers	Resistant Materials	Pupils are to understand how new designs have evolved over time and introduce the most influential stages in the history of product design: - The machine age - The product age - Arts and craft movement- William Morris - Art nouveau- Rennie Mackintosh	

			• Bauhaus and modernism- Walter Gropius • Art Deco- Clarice Cliff • 1940s utility- second world war • Post war design K3 kettle • Post Modernism-Memphis group- Ettore Sottsass Biomimicry- Pupils will understand how designs that have been found in the natural world has been used to inspire new designs: • Anglepoise lamp- George Carwardine • Velcro-Geroge de Mestral • Catseye-Percy shaw • Pupils are to understand the Pupils are to analyse and evaluate the work of past and present designers to inform their own design. Links to GCSE with the work of other designers	• Use appropriate marking out methods when creating the box wood joints. Marking gauges, ruler, try square. • Using 2d design to create a net for their lamp, understand how to contour a bitmap, add finger joints and change line colour. • Use the laser cutter to produce their lamp design. • Use soldering equipment correctly, wire cutters, solder, soldering iron. • Use abrasive papers correctly. • To apply a surface finish.
9	Technological advancements	Resistant Materials	To develop an understanding of how the design and manufacture of the telephones and radios have considerably changed overtime due to advancements in technology including changes in materials and manufacturing processes: • Radios 1930s-handcrafed looking to materials, design eras and manufacture. 1940s-50s Bakelite introduction of transistor and miniaturisation. 1960s bending wood/ mock leather. 1970s thermo plastics, injection moulding. Onwards microchip introduction and MP3 players • Telephone-Samuel Morse - Morse code. Graham Bell 1876 harmonic telephone 1877 wall-mounted. Thomas Edison 1900. 1920s Bakelite.1970s Trimphone-rotary dial. 1980s microelectronics-cordless phone. 1990s digital technology. • Looking at Technology push market pull	
9	Research	Resistant Materials	• Pupils are to explore the physical properties of the main natural and manufactured timbers. • Pupils are to explore the physical properties of the main types of metals and alloys.	

			• Pupils are to explore the physical properties of the main types of polymers. • To develop further understanding of commercially available types and sizes of materials. • Pupils will know and understand working properties such as hardness, strength, toughness, malleability, ductility and elasticity. • Pupils will know and understand how to analyse products using ACCESS FM. • Pupils will understand: Functionality, application of use and ease of working. Aesthetics surface finish, texture and colour. Sustainability, environmental factors, recyclable or reused materials and 6Rs. Cost, bulk buying, source of material. Ergonomics and anthropometrics data and percentiles. • To develop an understanding of different box joining techniques and be selective with a variety of wood joints for their application. Looking at finger joints, lap joints, dowel joints and butt joints. • To produce a questionnaire which will help influence their design decisions based on market research. • To summarise all areas and develop a clear outline of the design specifics. • To write and produce a design specification based on all the research. Links to GCSE nature and manufactured timbers, metals and alloys, polymers. Links to GCSE Material properties Links to GCSE modifications of properties for specific purposes. Link to GCSE primary and secondary data	
9	CAD/CAM	Resistant Materials	• To understand how products are produced in different volumes looking at scales of production for prototype, batch, mass and continuous. • Develop an understanding of quality control and tolerances.	

			Explore production techniques using CAD and CAM and produce a design that will be manufactured using these techniques. Link to GCSE production techniques/scales of production. Links to GCSE tools and equipment. Links to GCSE with the communication of design ideas. Links to GCSE tolerances	
9	Electronics	Resistant Materials	- To develop a circuit to provide functionality to their lamp using soldering equipment safely. - To produce a schematic diagram of the circuit for their lamp and recognise the main circuit symbols. - To recognise the correct electronic components and their use. Link to GCSE electronic systems. Links to GCSE tools and equipment. Cross curricular links to science.	
9	Designing	Resistant materials	- To annotate and develop their designs further by using accessfm. - To produce a net design of their product. - To develop an understanding of how to draw in isometric using the crating technique. - To develop rendering techniques by using thick and thin lines. - To produce a final isometric drawing of their lamp, with artistic reference. - To develop an understanding of 2D design and produce a final design that can be used for their finished product. Links to GCSE with isometric drawing Links to GCSE communicating ideas, 2D sketches, 3D sketches and computer based tools. Cross curricular links to Art and Design	
9	Techniques	Resistant Materials	Different wood joints tests looking for the strongest Isometric drawing with thick and thin lines and rendering techniques	

			Manufacturing and designing a lamp based on a design era. • Pupils will develop an understanding of transferring net designs onto 2d design, and be able to produce a lamp that will be created on 2d design. • To develop an understanding on how to manufacture using the laser cutter. The lamp will then be constructed using nails and glue. • Pupils will develop an understanding of how to create a basic circuit and produce a circuit for their lamp which they have soldered. • Pupils will understand why a surface finish is applied and decide which finish they will apply to their lamp.	
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