

Y7 'Design'

Tealight Holder – 2D Card Modelling to represent one material – scale 1:1. Models manufactured using scissors. Consideration given to dimensions and holding the tealight securely, symmetry of design, thinking forward to actual manufacturing methods in metal. Couple of different designs.

Consideration given to surface finish of copper - colour through annealing process and stamping/punching the metal.

Structures – Bridge design/problem solving using a fixed number of component parts to bridge a fixed distance and support a load.

Creative Creature – Use of scruffitti to avoid stereotypical responses and generate a range of non-standard shapes.

Y8 'Design'

Pewter Casting – Using CAD '2D Design' software. Consideration given to technical aspects of mould design for pewter casting (e.g. width of runner and tracks for metal to flow through), and aesthetics based on Art Deco styling. One final refined design, justified form and function through annotation.

Textiles Bag – Initial research, consideration given to aesthetics based on a Kandinsky painting. Folded paper modelling of bag casing and layered appliqué designs. Isometric drawing scale 1:2 and appropriate design annotation.

Nightlight/Stand – design for vac forming mould (technical and aesthetic). Styrofoam 3D modelling design for a structure suitable to hold nightlight circuit and vac formed plastic.

Levers & Linkages – Problem solving using a fixed number of components to design an extending grab arm.

Y9 'Design'

Storage Device – 3D sketch modelling scale 1:2. Models manufactured using hand tools and powered machinery. Modelling in mixed materials representing real materials. Generating numerous different ideas, with a consideration of function though visual creativity paramount. 3D rendered colour drawing of main design with additional B&W construction sketches. Annotation justifies form, function and manufacturing.

Slot Together Product – design to be created from a limited size piece of material. Therefore pattern/template parts need to be well tessellated in order to be efficient in use of material. 3D design needs to be visualised and simplified into flattened sections that will work aesthetically and functionally when reassembled. Consideration needs to be given to location of slots, avoiding creating weakness in the individual parts and assembled product.

Y10 'Design'

Coathook Design and Make – 3D precision modelling from card nets scale 1:1. Manufactured using scissors/craft knives. Models allow for removal and/or shaping of material only, like the metal they represent (no addition). Models to illustrate full detail e.g. edge shape, form of cut and bent parts. Numerous models required demonstrating significantly different ideas for solving the same design brief. 3D isometric drawing scale 1:1 of final design, showing all detail e.g. thickness of tube, and therefore the thickness of cut edge, drilled holes. Colour used to enhance design.

Automata – Combining mechanical movement (function) with creative ideas (form) – through a combination of research, drawing and modelling leading up to making.

Y11 'Design'

Knowledge/skills applied to own Project

Y7 'Make'

Health & Safety

Work through H&S booklet at appropriate times – on-going booklet runs into Y8.

Blockhead

Settling in project. Measuring and marking out. Sawing straight lines in wood/pine. Drilling holes part way into material. Sanding to correct dimension and to improve quality of finish.

Tealight

Sawing curves in wood for a wooden base. Cutting copper by shearing, filing and sanding to finish. Use of gas and air torch to heat metal to alter properties. Assembly of mixed materials using dowel PVA glue and pins.

Textiles - Creative Creature

Use of hand stitching techniques to assemble creative creature manufactured from felt.

Y8 'Make'

Pewter Casting

Use of CAM (laser cutter) to cut acrylic part of mould. Construction of mould (acrylic/MDF) and pouring of pewter. Finishing of casting – clean up, drilling, polishing pewter. Manufacture of wooden box with opening lid to hold the casting - reusing parts of the mould.

Textiles - Bag

Use of sewing machine. Technical knowledge required to thread and operate correctly. Looking for accurate and rapid sewing of calico bag, along with correct stitch selection and control on decorative appliqué design - manufactured from recycled materials.

Nightlight/Stand – Soldering components to PCB. Manufacturing layered MDF mould for plastics forming, use of scroll saw to cut, and sander to form draft angle on mould. Cutting/shaping styrofoam for 3D model of nightlight stand, before manufacturing in wood.

Y9 'Make'

Storage Device

Technical bent plywood construction and use of mortising machinery, combined with previously learned wood construction skills. Plywood is more difficult to cut and shape than solid wood. Should be looking to make a product that can be assembled and disassembled to take up less space when stored. Surfaces to be finished appropriately so as to take an applied finish.

Slot Together Product

Parts need to be cut to slot together accurately as no glue is permitted. Multiple slots looking for consistent skills for the whole to work well.

Textiles

Numerous techniques – printing, dyeing, constructed textiles – need to work together to create whole.

Y10 'Make'

Coathook Design and Make

Using reclaimed mild steel from old table legs. A literally 'harder' material to work with than previously, though has properties that can be ideally utilised for this project. Material only allowed to be sawn/drilled/bent etc., no fabrication (joining) allowed in this project. Relatively small object, looking for precise work as mistakes easily show up. Judgement required whether to work the metal cold or hot – with regard to stress fracturing and ease of manipulation of the material. Spray painting or plastic dip coating at the end to enhance material and also prevent rusting – either process requiring the development of specialist technical skills.

Automata – Combining mechanical movement (function) with creative ideas (form) – required making skills to develop/refine.

Mini Tasks

Practical tasks to refine previously learned skills and develop some new capabilities e.g. joining mixed materials, further work with plastics.

Y11 'Make'

Knowledge/skills applied to own Project

Y7 'Evaluate'

Blockhead – Recognise success of own work in terms of accuracy and quality of finish. Make a suggestion for improvement naming the equipment required to do so.

Tealight – Product analysis - evaluation of different tealight holders, advantages, disadvantages and justify best product out of those chosen.

Structures – Evaluation of real world bridge design -notable success and failure examples.

Y8 'Evaluate'

Pewter Casting – Final design is evaluated and justified through annotation, with a focus on two specific aspects. Firstly aesthetic with regard to art deco design features, secondly technical with regard to a functioning mould design for pewter casting. Consider the impact of plastics on the environment. Consider the impact of CAD/CAM on employment.

Textiles – Initial evaluation of an existing product. Final evaluation of manufactured product based on given specification points – dimensional accuracy, aesthetic, quality of finish.

Robotics LEGO EV3 – Consider real world examples of the use of robots as a new/emerging technology.

Y9 'Evaluate'

Storage Device – Evaluation of the design models: scale, materials, quantity, durability, finish, creativity. Evaluate the work of past professionals working in plywood construction e.g. Alvar Aalto, Charles & Ray Eames.

Textiles – Evaluation of impact of textile production on the world in terms of sustainability – looking at fast fashion, 6Rs, negative and positive examples. Consider batik and traditional Indonesian design and textile dyeing.

Product Analysis - Chronological time line of Apple products linking technological development to function and user needs. (Part of Storage Device Project)

Y10 'Evaluate'

Coathook Design and Make – Evaluation of initial ideas/card models. Consideration of form and function, with emphasis on transferability of the card model to a real version in mild steel. Anticipation of difficulties and possible solutions. Evaluation of final design – annotation describes and justifies design features whether functional or decorative. Materials (mild steel and applied finish whether paint or plastic coating) are also justified.

Automata - Product analysis / evaluation of existing products e.g. online at www.mechanical-toys.com. Used as an inspiration source. Evaluation of the accuracy of the manufactured frame/carcass – dimensions in millimetres and corner angles. Evaluation of function of basic mechanism. Evaluation of whole product with regard to design modification (if it was to be redone how would it change and why).

Y11 'Evaluate'

Knowledge/skills applied to own Project

Y7 'Technical Knowledge'

Blockhead – Natural timbers, grain = cell structure of tree.

Tealight – Ferrous/non-ferrous metals, annealing copper to increase malleability. Hard/softwood categorisation.

LED Torch Electronics – Simple circuits, positive and negative polarity of LED.

Textiles – Natural & synthetic fibres. Yarns. Woven Construction – warp/weft.

Structures – Bridge construction, tubular structural components.

Mechanical Systems LEGO Gears –Transmission of motion, change of direction of rotation, gear ratios.

Y8 'Technical Knowledge'

Pewter Casting – Thermoplastics, acrylic laser cutting. Plastics recycling. MDF – composite material used for part of mould. Melting metals to pour/cast into 3D form.

Nightlight Electronics – PCBs, types of resistor, transistors, sensing circuit responding to light input.

Nightlight Forming Thermoplastics – Vacuum forming of HIPS to create part of nightlight. Appropriate mould design for vac forming.

Robotics LEGO EV3 - Programming of microcontroller to control motors, and respond to sensors.

Textiles – Fibres properties, and mixed fibres properties.

Levers/Linkages – Creating moving and extending scissor structures for a purpose. Lever classes.

Y9 'Technical Knowledge'

Storage Device – Plywood manufacturing, construction and properties. Lamination of bent plywood structural component parts. How plywood properties affects manufacturing techniques (e.g. drilling).

Textiles – Using various methods to resist or transfer ink or dye e.g. relief printing, wax resist when dyeing.

Trebuchet – Thinking about an ideal structure to hold a lever that is used to throw an object. A lever used as an amplifier of movement.

LEGO Systems & Control – Use of model kits to investigate more advanced mechanisms, including pneumatics.

Y10 'Technical Knowledge'

Coathook Design and Make – awareness of stress fracturing through excessive or repeated bending cycles (tension, compression, malleability). Appropriate choice of technique (cold bending, annealing, hot bending) depending on design required. Carbon content of steel affecting properties e.g. hardness - high carbon cuts low carbon. Applying a finish to a ferrous metal – reasons and methods. Knowledge of priming & top coat painting and plastic dip coating using a fluidising bath and LDPE coating.

Automata – Manufacturing & testing a range of mechanisms e.g. different cam types e.g. pear, snail, eccentric and their effect on the motion of the follower.

Mini Tasks - Use of wood joints to hold a natural timber in position (subject to expansion and contraction) – compared to a composite material e.g. manufactured board containing glue where jointing can be done differently. Use of different joining methods permanent/non-permanent/semi-permanent to join mixed materials.

Y11 'Technical Knowledge'

Knowledge/skills applied to own Project

Y7

Theory

Health and safety in the kitchen.
Healthy eating and nutrition.
The Eatwell guide.
Seasonality and advantages of using ingredients that are locally sourced or in season.
Recording practical skills
Food safety and hygiene.
Adapting recipes considering taste, texture and nutritional value.

Practical

Fruit salad – preparation of fruit, bridge and claw method.
Fruit crumble-Preparing a hot dessert and using the oven safely.
Pasta salad- Preparation of vegetables and using the hob safely.
Macaroni cheese- Making a sauce.
Scones – Making a baked product.
Goujons – Preparation of raw meat, coating, food hygiene and cross contamination.
Stir fry – Preparation of vegetables and a main meal.
Cereal bar – Adapting recipes to make them healthier.
Fajitas – Presentation of multicultural dishes.
Cake investigation – To gain knowledge about investigations and the function of ingredients.

Y8

Theory

Health and safety recap.
Recording practical skills.
Food issues and food labelling – The effect of food on the environment.
Economic, social and cultural issues.
Sustainability and seasonality.
Healthy eating and nutrition – analyse recipes/dishes, and justify some changes in terms of nutrition.
Meat cookery, food safety and hygiene.

Practical

Chunky soup – Vegetable preparation and cooking.
Fish cakes- Binding ingredients together and coating.
Rice salad- cooking rice and safe use of hob.
Savoury muffins- Baked product/ adapting recipes.
Pizza pinwheels- Preparation of bread dough, forming and shaping, gluten and yeast.
Pasta bolognaise – safe meat cookery, preparing main meals.
Making fresh pasta- use of pasta machine.
Chow mein- safe use of chicken, cross contamination, main meals.
Scone investigation- solving problems, function of ingredients.

Y9

Meatballs and sauce.
Time planning and nutrition.
Sweet and sour.
The eat well guide, sauces and gelatinisation.
Lasagne.
Mini pies.
Shortcrust pastry, rubbing in method, the function of ingredients.
Cheesecake.
Modifying recipes, gelation, high risk food, presentation.
Focaccia bread.
Yeast investigation.
Bread making, modifying recipes, functions of ingredients.
Enchiladas.
Food hygiene and safety.
Planning and making own
Multicultural savoury main course dish.
Evaluation of dish.
Potato Investigation (rosti cakes).

Y10

Focussing on and understanding different commodities each half term.
Understanding how they are made, grown, reared.
Considering food processes.
Storage of the commodities.
Food safety and hygiene.
Relating commodities to special dietary considerations, dietary need and reference values.
Investigations are completed on each commodity studied.

Commodities

Fruit and vegetables.
Milk, cheese and yoghurt.
Cereals, flour, bread and pasta.
Meat, fish, poultry and eggs.
Butter, oils, margarine, sugar and syrup.
Soya, tofu, beans, nuts and seeds.
Planning and making a dish at the end of every half term based on the commodities.
Making various dishes involving the commodities to develop skills further.

Y11

Knowledge/skills applied to own Project

D&T Sequencing – GCSE into A'Level

	GCSE Assessment Objectives – AQA Art & Design Three-dimensional Design	%	Portfolio	Final Assignment
AO1	Develop ideas through investigations, demonstrating critical understanding of sources.	25	15	10
AO2	Refine work by exploring ideas, selecting and experimenting with appropriate media, materials, techniques and processes.	25	15	10
AO3	Record ideas, observations and insights relevant to intentions as work progresses.	25	15	10
AO4	Present a personal and meaningful response that realises intentions and demonstrates understanding of visual language	25	15	10

	GCSE Assessment Objectives - Edexcel GCSE Design & Technology	%	Written Exam	Final Project/NEA
AO1	identify, investigate and outline design possibilities to address needs and wants	10	-	10
AO2	Design and make prototypes that are fit for purpose	30	-	30
AO3	Analyse and evaluate <ul style="list-style-type: none"> design decisions and outcomes, including for prototypes made by themselves and others wider issues in design and technology 	20	10	10
AO4	Demonstrate and apply knowledge and understanding of <ul style="list-style-type: none"> technical principles design and making principles 	40	40	-

	A' Level Assessment Objectives – Edexcel A'Level Design & Technology (Product Design)	%	Written Exam	Final Project/NEA
AO1	identify, investigate and outline design possibilities to address needs and wants	15	-	15
AO2	Design and make prototypes that are fit for purpose	25	-	25
AO3	Analyse and evaluate <ul style="list-style-type: none"> design decisions and outcomes, including for prototypes made by themselves and others wider issues in design and technology 	25	15	10
AO4	Demonstrate and apply knowledge and understanding of <ul style="list-style-type: none"> technical principles design and making principles 	35	35	



Sample pages from A'Level Content

Highlighted text indicates content recently covered at GCSE - for recap.

Non-highlighted text is not on the specification at GCSE – though some may have been introduced then or earlier. For example 'annealing' is discussed and carried out at KS3 as part of the Tealight Holder Project, then reappears at KS5.

Content	
Topic	What students need to learn:
1 Materials	To apply a knowledge and understanding of working properties, characteristics, applications, advantages and disadvantages of the following types of materials in order to discriminate between them and select appropriately.
	1.1 Woods: a) hardwoods – oak, mahogany, beech, jelutong b) softwoods – pine, cedar, larch, redwood.
	1.2 Metals: a) ferrous metals – mild steel, carbon steels, cast iron b) non-ferrous metals – aluminium, copper, zinc, tin, lead, magnesium c) alloys (ferrous and non-ferrous) – stainless steel, duralumin, brass.
	1.3 Polymers: a) thermoplastics – acrylic, polyethylene, polyethylene terephthalate (PET), polyvinyl chloride (PVC), polypropylene (PP), acrylonitrile butadiene styrene (ABS) b) thermosetting plastics – epoxy resins (ER), polyurethane (PU), formaldehyde (UF), polyester resin (PR). c) elastomers – rubber.
	1.4 Composites: a) composites – carbon fibre (CFRP), glass fibre reinforced plastic (GFRP), Medium Density Fibre Board (MDF), hardboard, chipboard, plywood.
	1.5 Papers and boards: a) drawing papers – layout, tracing, copier, calligraphic b) commercial printing papers – bond, coated c) boards – mounting board, corrugated board, folding box board, foil-lined board.
	1.6 Textiles: a) natural fibres – cotton, linen, wool b) manmade fibres – nylon, polypropylene, polyester c) textile treatments – flame resistant, polytetrafluoroethylene (PTFE).
3 Processes, techniques and specialist tools	3.1 Processes, applications, characteristics, advantages and disadvantages of the following, in order to discriminate between them and select appropriately including the selection of specific and relevant tools to be used for domestic, commercial and industrial products and systems, and use safely when experimenting, improving and refining in order to realise a design: a) heat treatments – hardening and tempering, case hardening, annealing, normalising (including use of specialist tools) b) alloying (including use of specialist tools) c) printing – offset lithology, flexography, screen-printing, gravure (including use of specialist tools) d) casting – sand (to include investment), die, resin, plaster of Paris (including use of specialist tools) e) machining – milling/routing, drilling, turning, stamping, pressing (including use of specialist tools) f) moulding – blow moulding, injection moulding, vacuum forming, extrusion, rotational moulding (including use of specialist tools) g) lamination (including use of specialist tools) h) marking out techniques – woods, metals, polymers, paper and boards (including use of specialist tools).
	3.2 Application of specialist measuring tools and equipment to determine and apply the accuracy and precision required for products to perform as intended. a) marking, cutting and mortise gauges b) odd leg, internal and external callipers c) squares (set, try, engineers and mitre) d) micrometer and vernier callipers e) densitometer f) dividers g) jigs and fixtures h) go and no-go gauges