GCSE Subject: Design and Technology – Resistant Materials

What revision is expected and where can revision resources be located:

See attached revision schedule

Exam dates:

18th July 2024– 2 hours

Help sessions available:

Students can attend after school clubs on most Mondays, Wednesdays and Thursdays. Sessions will run in normal DT rooms.

Recommended revision guides:

My Revision Notes: WJEC Eduqas GCSE (9-1) Design and Technology

https://www.amazon.co.uk/My-Revision-Notes-Eduqas-Technology/dp/1510471693

Available from DT department - £7

Recommended revision sites:

BBC Bitesize

https://www.bbc.co.uk/bitesize/examspecs/z4nfwty

Technology student

https://technologystudent.com/designpro/despro1.htm

GCSE Revision Schedule 2024 – 19 WEEKS TO BE READY TO SUCCEED!

Week beginning	Topic	Area to cover	Revised ? (tick)	Knowledge test score	Weeks left
January					
Monday 8th	**CAD/CAM**	• Advantages and disadvantages of using computer aided design (CAD). • Advantages and disadvantages of the use of computer aided manufacture (CAM). • How CAM equipment can be used in a variety of applications e.g. CNC embroidery, vinyl cutting, CNC routing, laser cutting and 3D printing			**19**
Monday 15th	**Sustainability**	• The importance of sustainability when designing and making. • The SIX R's of sustainability; rethink, reuse, recycle, repair, reduce and refuse. • Life Cycle Analysis to determine the environmental impact of a product. • Fair-trade policies and carbon footprint. • Ecological footprint.			**18**
Monday 22nd	**Energy**	Types of renewable and non-renewable energy sources: wind, solar, geothermal, hydroelectric, wood/biomass, wave, coal, gas, nuclear and oil. • Issues surrounding the use of fossil fuels: coal, oil and gas. • The advantages and disadvantages of renewable energy sources. • The use of renewable energy sources in modern manufacturing production systems: the use of solar panels and wind turbines in manufacturing sites. • Renewable energy sources for products: wind-up and photovoltaic cells. • Energy generation and storage (e.g. battery, solar, mains electricity).			**17**
Monday 29th	**Smart materials**	• Electroluminescent film or wire i.e. LCD. • Quantum Tunnelling Composite (QTC) - when used in circuits the resistance changes under compression. • SMA – shape memory alloys. • Polymorph. • photo-chromic; • thermo-chromic; • micro-encapsulation; • biometrics.			**16**
February					
Monday 5th	**Composites & technical textiles**	• Carbon Fibre, Kevlar and GRP. • Interactive textiles that function as electronic devices and sensors: circuits integrated into fabrics, such as heart rate monitors; wearable electronics such as mobile phones or music player, GPS, tracking systems and electronics integrated into the fabric itself. • Micro-fibres in clothing manufacture. • Phase changing materials: breathable materials; proactive heat and moisture management. • Sun protective clothing. • Nomex. • Geotextiles for landscaping. • Rhovyl as an antibacterial fibre.			**15**
Monday 12th (Half Term)	**Technology push/demand pull**	• market pull – responding to demands from the market; • technology push – development in materials and components, manufacturing methods; • The Product Life Cycle. • Global production and its effects on culture and people. • Legislation to which products are subject. • Consumer rights and protection for consumers when purchasing and using products. • Moral and ethical factors related to manufacturing products and the sale and use of products.			**14**

		• Sustainability; meeting today's needs without compromising the needs of future generations.			
Monday 19th	**Timbers**	• Hardwoods: beech, oak, mahogany, balsa and jelutong. • Softwoods: scots pine, western red cedar and parana pine. • The physical and working properties of hardwoods, softwoods and man-made boards: toughness, flexibility, grain structure, strength, absorbency, surface finish, colour and hardness. • Natural solid timber - strengths and weaknesses • Defects: shrinkage, splits, shakes, knots, fungial attack. • Strengths, weaknesses of the following manufactured boards: • plywood, MDF - medium density fibreboard, chipboard and hardboard. • The impact on the environment of deforestation. • Ecological and social footprint. • Changing society's view on waste, encourage recycling. • Life-cycle analysis of a material or product.			**13**
Monday 26th	**Timbers**	Aesthetic properties of natural and manufactured timbers. • Functional properties of natural and manufactured timbers. • Responsibilities of designers and manufacturers who design using timber with respect to: • the environment; • working conditions in third world countries, low labour costs and poverty; • exploitation of employees; • recyclability and waste. • Biodiversity and deforestation. • Estimating the true costs of a prototype or product. • Comparison costs of hardwoods, softwoods and manufactured board.			**12**
March					
Monday 4th	**Timbers**	The behaviour of natural and manufactured timber under forces or under stress. • The stiffness and a strength of natural timber will depend upon the wood, the cross sectional area and the depth of the section. • Reinforcement of natural timber by laminating. • The strength of plywood will depend upon the number of layers and the wood grain being at right angles. • The strength of a timber product will depend upon how the product is jointed or what fixing method is used.			**11**
Monday 11th	**Timbers**	• Natural timber is available in different sectional forms, various standard sizes and can have a different finish (sawn or planed). • Manufactured boards are commonly available in sheet form and in standard sizes and various thicknesses. • Calculate the costs involved in the design of products: fixtures, fittings, finishes required and the material cost. • Advantages and disadvantages of producing single, one off products. • The advantages and disadvantages of producing products in limited quantities (batch production). • The need to produce a number of identical products. • Jigs and devices to control repeat activities. • The advantages and disadvantages of high volume, continuous production. • Issues related to high volume production.			**10**
Monday 18th	**Timbers**	Wastage/Addition • Tools and equipment to mark out, hold, cut, shape, drill and form laminates of natural timbers and manufactured boards. • The pillar drill to drill holes to various diameters. • Jigs and formers to ensure accuracy as part of the process of drilling, bending, cutting wood materials. Deforming/Reforming • Material joining can be permanent or temporary. • Classification of wood joints as frame or box construction. • Frame: mitre, dowel, mortise and tenon, halving and bridle joint. • Box/carcass: butt, lap, housing, dovetail and comb joint. • Adhesives: PVA (wood to wood), contact adhesive and epoxy resin (wood to other materials).			**9**

		• Temporary: screw (countersunk and round head) and knock down fittings. • Lasers. • CAM machines.			
Monday 25th	**Timbers**	• Surface treatments of natural timber and manufactured boards to prolong life of a product: sealants and primers. • Finishes for aesthetic or functional reasons: varnish, wood stains, oils, polishes and preservative paints.			**8**
April					
Monday 1st (Easter Holidays)	**Electronics**	Graphical conventions for communicating concepts: circuit diagrams, block diagrams and flowcharts. • The 'systems' approach – input; process; output. • Principles of a control system: • input data from a sensor: light dependent resistor (LDR), thermistor; • processing by control devices: semi-conductor, IC, microprocessor or computer; • output where a signal is received that will perform a desired function: buzzer, light emitting diode (LED). • The importance of feedback within the system. • The methods of providing feedback in different systems. • Familiar products in terms of their control system. • Control devices that include counting, switching and timing • Analogue and digital sensors as input components.			**7**
Monday 8th (Easter Holidays)	**Electronics**	Sub routines or macros in control systems. • Programmable microcontrollers can be used to control a range of systems. • Programmable microcontrollers can interface with other devices. • Programmable microcontrollers can be reprogrammed repeatedly. • The benefits and limitations of programmable microcontrollers. • Programmable Interface Controllers (PIC) and how they can be used to control products or systems.			**6**
Monday 15th	**Mechanisms**	Principle of a mechanical device to transform input motion and force into a desired output motion and force. • Analyse everyday mechanical devices and how they function. • Consider mechanical systems in terms of input; process; output. • Mechanical systems which: • increase or decrease speed of movement/rotation; • change magnitude/direction of force/movement/rotation. • Simple calculations involving mechanical systems. • Analyse the function of mechanical products that have: • pulley systems, e.g. curtain rails, sewing machine; • gear systems, e.g. whisk, hand drill; • levers and linkages, e.g. scissors; • rack and pinion, e.g. chair lift; • cams, e.g. automata toys.			**5**
Monday 22nd	**Papers and boards**	• The categorisation and properties of paper, cards, boards and composite materials. Properties to be considered in terms of their strength, folding ability, surface finish and absorbency. • Papers, cards and boards can be laminated to improve strength, finish and appearance. • The standard ISO sizes of paper. • The use of grammage i.e. grams per square metre (gsm) to measure weight of paper. • The use of microns to measure thickness of card. • The use of recycled materials to manufacture papers and boards. • The aesthetic and functional properties of common papers, cards and boards: layout paper, tracing paper, copier paper, recycled paper, corrugated board, cartridge paper, mounting board and folding boxboard.			**4**
Monday 29th	**Metals**	Categorisation and working properties of ferrous metals, nonferrous metals and alloys. • Properties of metals: hardness, elasticity, conductivity, toughness, ductility, tensile strength and malleability. • Metals are sold as sheet, bar, rod, tube and angle. • Ferrous metals may require a protective finish and the finish is sometimes used to improve the aesthetic appeal.			**3**

		• Alloys of metals are a base metal mixed with other metals or non-metals to change their properties or appearance. • Non-ferrous metals may require a protective finish and the finish is sometimes used to improve the aesthetic appeal. • Ferrous metals: cast iron, mild steel, medium carbon steel and high carbon steel. • Non-ferrous metals: aluminium, copper, brass, bronze.			
May					
Monday 6th	**Polymers**	• Categorisation and physical properties of polymers. • Polymers can be made from both natural and synthetic resources. • Polymers are sold as sheet, film, bar, rod and tube. • The differences between a thermoforming (thermoplastic) and thermosetting material. • Properties of polymers: weight, hardness, elasticity, conductivity/insulation, toughness and strength. • The properties of thermoplastics: polythene, polystyrene, polypropylene and PVC. • The properties of the thermosetting plastics: UF (urea formaldehyde), MF (melamine formaldehyde), PR (polyester resin) and ER (epoxy resin).			**2**
Monday 13th	**Textiles**	• The categorisation and working properties of fibres and textiles. • The raw materials of textiles are classified according to their source. • Natural polymers: • Animal polymers: wool/fleece – mohair, cashmere, angora, alpaca, camel (hair). • Insect polymers: silk. • Plant polymers: cotton, linen hemp, jute, rayon, viscose. • Manufactured polymers: • Synthetic: polyester, polypropylene, nylon, acrylic, elastane, lycra, aramid fibres. • Microfibres – Tactel, Tencel (Lyocell). • The properties of textiles fibres: strength, elasticity, absorbency, durability, insulation, flammability, water-repellence, anti-static and resistance to acid, bleach and sunlight. • Blending and mixing fibres improves the properties and uses of yarns and materials.			**1**
Exam Dates: 18th July					