GCSE **DESIGN AND** **TECHNOLOGY** 8552 AQA Revision topics

The areas below are the content that could be on the final exam (50% of the overall grade) pupils should use their notes or revision guides to revise these areas. I recommend pupils also use the following websites:

https://www.bbc.com/bitesize/examspecs/zby2bdm

[www.technologystudent.com](http://www.technologystudent.com)

<http://www.focuselearning.co.uk/> Username: student@stchristophers3258 Password: fibcwonp2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| New and emerging technologies | Industry | The impact of new and emerging technologies on:  • the design and organisation of the workplace including automation and the use of robotics  • buildings and the place of work  • tools and equipment. | | |
|  | Enterprise | Enterprise based on the development of an effective  business innovation:  • crowd funding  • virtual marketing and retail  • co-operatives  • fair trade. | | |
|  | Sustainability | The impact of resource consumption on the planet:  • finite  • non–finite  • disposal of waste. | | |
|  | People | How technology push/market pull affects choice.  Changing job roles due to the emergence of new  ways of working driven by technological change. | | |
|  | Culture | Changes in fashion and trends in relation to new and  emergent technologies.  Respecting people of different faiths and beliefs. | | |
|  | Society | How products are designed and made to avoid  having a negative impact on others:  • design for disabled  • elderly  • different religious groups. | | |
|  | Environment | Positive and negative impacts new products have on  the environment:  • continuous improvement  • efficient working  • pollution  • global warming. | | |
| Production techniques and systems | The contemporary and potential future use of: | • automation  • computer aided design (CAD)  • computer aided manufacture (CAM)  • flexible manufacturing systems (FMS)  • just in time (JIT)  • lean manufacturing. | | |
| How the critical evaluation of new and emerging technologies informs design decisions | That it is important to consider scenarios from  different perspectives and considering: | • planned obsolescence  • design for maintenance  • ethics  • the environment.  Ethical factors and consideration of  ecological and social footprint. | | |
| Energy generation and storage | Fossil fuels | How power is generated from:  • coal  • gas  • oil.  Arguments for and against the selection of fossil  fuels. | | |
|  | Nuclear power | How nuclear power is generated.  Arguments for and against the selection of nuclear  power. | | |
|  | Renewable energy | How power is generated from:  • wind  • solar  • tidal | | • hydro-electrical  • biomass.  Arguments for and against the selection of  renewable energy. |
|  | Energy storage systems including batteries | Kinetic pumped storage systems.  Alkaline and re-chargeable batteries. | | |
| Developments in new materials | Modern materials | Developments made through the invention of new or  improved processes eg Graphene, Metal foams and  Titanium.  Alterations to perform a particular function eg  Coated metals, Liquid Crystal Displays (LCDs) and  Nanomaterials. | | |
|  | Smart materials | That materials can have one or more properties that  can be significantly changed in a controlled fashion  by external stimuli, such as stress, temperature,  moisture, or PH eg shape memory alloys,  thermochromic pigments and photochromic  pigments | | |
|  | Composite materials | That composite materials are produced by  combining two or more different materials to create  an enhanced material eg glass reinforced plastic  (GRP) and carbonfibre reinforced plastic (CRP). | | |
|  | Technical textiles | How fibres can be spun to make enhanced fabrics  eg conductive fabrics, fire resistant fabrics, kevlar  and microfibres incorporating micro encapsulation. | | |
| Systems approach to designing | Inputs | The use of light sensors, temperature sensors,  pressure sensors and switches. | | |
|  | Processes | The use of programming microcontrollers as  counters, timers and for decision making, to provide  functionality to products and processes. | | |
|  | Outputs | The use of buzzers, speakers and lamps, to provide  functionality to products and processes. | | |
| Mechanical devices | Different types of movement | The functions of mechanical devices to produce  linear, rotary, reciprocating and oscillating movements. | | |
|  | Changing magnitude and direction of force | Levers:  • first order  • second order  • third order  Linkages:  • bell cranks  • push/pull. | | Rotary systems:  • CAMs and followers  • simple gear trains  • pulleys and belts. |
| Materials and their working properties | **Papers and boards** | Students should have an overview of the main  categories and types of papers and boards:  papers including:  • bleed proof  • cartridge paper  • grid  • layout paper  • tracing paper | | boards including:  • corrugated card  • duplex board  • foil lined board  • foam core board  • ink jet card  • solid white board. |
|  | **Natural and manufactured timbers** | Students should have an overview of the main  categories and types of natural and manufactured  timbers:  hardwoods including:  • ash  • beech  • mahogany  • oak  • balsa | | softwoods including:  • larch  • pine  • spruce  manufactured boards including:  • medium density fibreboard (MDF)  • plywood  • chipboard. |
|  | **Metals and alloys** | Students should have an overview of the main  categories and types of metals and alloys:  ferrous metals including:  • low carbon steel  • cast Iron  • high carbon/tool steel  non ferrous metals including:  • aluminum | | • copper  • tin  • zinc  alloys including:  • brass  • stainless steel  • high speed steel. |
|  | **Polymers** | Students should have an overview of the main  categories and types of polymers:  thermoforming including:  • acrylic (PMMA)  • high impact polystyrene (HIPS  • high density polythene (HDPE)  • polypropylene (PP)  • polyvinyl chloride (PVC) | | • polyethylene terephthalate (PET)  thermosetting including:  • epoxy resin (ER)  • melamine-formaldehyde (MF)  • phenol formaldehyde (PF)  • polyester resin (PR)  • urea–formaldehyde (UF). |
|  | **Textiles** | Students should have an overview of the main  categories and types of textiles:  natural fibres including:  • cotton  • wool  • silk  synthetic fibres including:  • polyester  • polyamide (nylon)  • elastane (lycra) | | blended and mixed fibres including:  • cotton/polyester  woven including:  • plain weave  non-woven including:  • bonded fabrics  • felted fabrics  knitted textiles including:  • knitted fabrics. |
|  | **Material properties** | In relation to the main categories outlined above (not  the specific materials identified), students should  know and understand physical properties such as:  • absorbency (resistance to moisture)  • density  • fusibility  • electrical and thermal conductivity.  In relation to the main categories outlined above (not the specific materials identified), | | students should  know and understand working properties such as:  • strength  • hardness  • toughness  • malleability  • ductility and elasticity. |
| In relation to at least one of the areas **Timbers and Polymers**, students should be able to select materials and components considering the factors listed below. | | | | |
| Selection of materials or components   * Functionality: application of use, ease of working. * Aesthetics: surface finish, texture and colour. * Environmental factors: recyclable or reused materials. * Availability: ease of sourcing and purchase. * Cost: bulk buying. * Social factors: social responsibility. * Cultural factors: sensitive to cultural influences. * Ethical factors: purchased from ethical sources such as FSC. | | | | |
| Forces and stresses  Tension, compression, bending, torsion and shear | | | | |
| Materials can be enhanced to resist and work with forces and stresses to improve functionality  How materials can be reinforced, stiffened or made  more flexible: eg lamination, bending, folding,  webbing, fabric interfacing. | | | | |
| Ecological and social footprint  Ecological issues in the design and manufacture of products   * Deforestation, mining, drilling and farming. * Mileage of product from raw material source, * manufacture, distribution, user location and final * disposal. * That carbon is produced during the manufacture of * products. | | | | |
| The six Rs  Reduce, refuse, re-use, repair, recycle and rethink. | | | | |
| Social issues in the design and manufacture of products  Safe working conditions; reducing oceanic/  atmospheric pollution and reducing the detrimental  (negative) impact on others. | | | | |
| Sources and origins  Primary sources of materials and the main  processes involved in converting into workable  forms for at least one material area.  Timber based materials (Seasoning, conversion  and creation of manufactured timbers).  Polymers (refining crude oil, fractional distillation  and cracking). | | | | |
| Using and working with materials  Properties of materials  Students must know and understand how different  properties of materials and components are used in  commercial products, how properties influence use  and how properties affect performance.  Students must know and understand the physical  and mechanical properties relevant to commercial  products in their chosen area as follows:  Timber based materials (traditional timber  children’s toys and flat pack furniture).  Polymers (polymer seating and electrical fittings). | | | | |
| The modification of properties for specific purposes  • Seasoning to reduce moisture content of timbers  (timber based materials).  • Stabilisers to resist UV degradation (polymers). | | | | |
| How to shape and form using cutting, abrasion and addition  Timber based materials (how to cut, drill, chisel,  sand and plane).  Polymers (how to cut, drill, cast, deform, print and  weld). | | | | |
| Stock forms, types and sizes  Commercially available types and sizes of materials  and components.  Timber based materials:  • planks, boards and standard moldings  • sold by length, width, thickness and diameter  • standard components eg woodscrews, hinges,  KD fittings.  Polymers:  • sheet, rod, powder, granules, foam and films  • sold by length, width, gauge and diameter  • standard components eg screws, nuts and bolts,  hinges. | | | | |
| Scales of production  How products are produced in different volumes.  The reasons why different manufacturing methods  are used for different production volumes: | | | • prototype  • batch  • mass  • continuous. | |
| The use of production aids  How to use measurement/reference points,  templates, jigs and patterns where suitable. | | | | |
| Tools, equipment and processes  wastage, such as:  • die cutting  • perforation  • turning  • sawing  • milling  • drilling  • cutting and shearing  addition, such as:  • brazing  • welding  • lamination  • soldering  • 3D printing  • batik | | | • sewing  • bonding  • printing  deforming and reforming such as:  • vacuum forming  • creasing  • pressing  • drape forming  • bending  • folding  • blow moulding  • casting  • injection moulding  • extrusion. | |
| How materials are cut shaped and formed to a tolerance  The manufacture to minimum and maximum  measurements. | | | | |
| Commercial processes  Timber based materials (routing and turning).  Polymers (injection molding and extrusion). | | | | |
| The application and use of Quality Control to include measurable and quantitative systems used during manufacture  Timber based materials (dimensional accuracy  using go/no go fixture).  Polymers (dimensional accuracy by selecting  correct laser settings). | | | | |
| Surface treatments and finishes  The preparation and application of treatments and  finishes to enhance functional and aesthetic  properties.  Timber based materials (painting, varnishing and  tanalising).  Polymers (polishing, printing and vinyl decals). | | | | |
| The work of others  Students should investigate, analyse and evaluate  the work of past and present designers and  companies to inform their own designing.  Students should investigate the work of a minimum  of two of the following designers:  • Harry Beck  • Marcel Breuer  • Coco Chanel  • Norman Foster  • Sir Alec Issigonis  • William Morris  • Alexander McQueen  • Mary Quant  • Louis Comfort Tiffany  • Raymond Templer | | | • Gerrit Reitveld  • Charles Rennie Macintosh  • Aldo Rossi  • Ettore Sottsass  • Philippe Starck  • Vivienne Westwood.  Students should investigate the work of a minimum  of two of the following companies:  • Alessi  • Apple  • Braun  • Dyson  • Gap  • Primark  • Under Armour  • Zara. | |