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

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| 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 effectivebusiness 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 newways of working driven by technological change. |
|  | Culture | Changes in fashion and trends in relation to new andemergent technologies.Respecting people of different faiths and beliefs. |
|  | Society | How products are designed and made to avoidhaving a negative impact on others:• design for disabled• elderly• different religious groups. |
|  | Environment | Positive and negative impacts new products have onthe 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 fromdifferent perspectives and considering: | • planned obsolescence• design for maintenance• ethics• the environment.Ethical factors and consideration ofecological and social footprint. |
| Energy generation and storage | Fossil fuels | How power is generated from:• coal• gas• oil.Arguments for and against the selection of fossilfuels. |
|  | Nuclear power | How nuclear power is generated.Arguments for and against the selection of nuclearpower. |
|  | Renewable energy | How power is generated from:• wind• solar• tidal | • hydro-electrical• biomass.Arguments for and against the selection ofrenewable 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 orimproved processes eg Graphene, Metal foams andTitanium.Alterations to perform a particular function egCoated metals, Liquid Crystal Displays (LCDs) andNanomaterials. |
|  | Smart materials | That materials can have one or more properties thatcan be significantly changed in a controlled fashionby external stimuli, such as stress, temperature,moisture, or PH eg shape memory alloys,thermochromic pigments and photochromicpigments |
|  | Composite materials | That composite materials are produced bycombining two or more different materials to createan enhanced material eg glass reinforced plastic(GRP) and carbonfibre reinforced plastic (CRP). |
|  | Technical textiles | How fibres can be spun to make enhanced fabricseg conductive fabrics, fire resistant fabrics, kevlarand 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 ascounters, timers and for decision making, to providefunctionality to products and processes. |
|  | Outputs | The use of buzzers, speakers and lamps, to providefunctionality to products and processes. |
| Mechanical devices | Different types of movement | The functions of mechanical devices to producelinear, rotary, reciprocating and oscillating movements. |
|  | Changing magnitude and direction of force | Levers:• first order• second order• third orderLinkages:• 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 maincategories 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 maincategories and types of natural and manufacturedtimbers:hardwoods including:• ash• beech• mahogany• oak• balsa | softwoods including:• larch• pine• sprucemanufactured boards including:• medium density fibreboard (MDF)• plywood• chipboard. |
|  | **Metals and alloys** | Students should have an overview of the maincategories and types of metals and alloys:ferrous metals including:• low carbon steel• cast Iron• high carbon/tool steelnon ferrous metals including:• aluminum | • copper• tin• zincalloys including:• brass• stainless steel• high speed steel. |
|  | **Polymers** | Students should have an overview of the maincategories 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 maincategories and types of textiles:natural fibres including:• cotton• wool• silksynthetic fibres including:• polyester• polyamide (nylon)• elastane (lycra) | blended and mixed fibres including:• cotton/polyesterwoven including:• plain weavenon-woven including:• bonded fabrics• felted fabricsknitted textiles including:• knitted fabrics. |
|  | **Material properties** | In relation to the main categories outlined above (notthe specific materials identified), students shouldknow 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 shouldknow 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.
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| Forces and stressesTension, compression, bending, torsion and shear |
| Materials can be enhanced to resist and work with forces and stresses to improve functionalityHow materials can be reinforced, stiffened or mademore flexible: eg lamination, bending, folding,webbing, fabric interfacing. |
| Ecological and social footprintEcological 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.
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| The six RsReduce, refuse, re-use, repair, recycle and rethink. |
| Social issues in the design and manufacture of productsSafe working conditions; reducing oceanic/atmospheric pollution and reducing the detrimental(negative) impact on others. |
| Sources and originsPrimary sources of materials and the mainprocesses involved in converting into workableforms for at least one material area.Timber based materials (Seasoning, conversionand creation of manufactured timbers).Polymers (refining crude oil, fractional distillationand cracking). |
| Using and working with materialsProperties of materialsStudents must know and understand how differentproperties of materials and components are used incommercial products, how properties influence useand how properties affect performance.Students must know and understand the physicaland mechanical properties relevant to commercialproducts in their chosen area as follows:Timber based materials (traditional timberchildren’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 additionTimber based materials (how to cut, drill, chisel,sand and plane).Polymers (how to cut, drill, cast, deform, print andweld). |
| Stock forms, types and sizesCommercially available types and sizes of materialsand 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 productionHow products are produced in different volumes.The reasons why different manufacturing methodsare used for different production volumes: | • prototype• batch• mass• continuous. |
| The use of production aidsHow to use measurement/reference points,templates, jigs and patterns where suitable. |
| Tools, equipment and processeswastage, such as:• die cutting• perforation• turning• sawing• milling• drilling• cutting and shearingaddition, such as:• brazing• welding• lamination• soldering• 3D printing• batik | • sewing• bonding• printingdeforming 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 toleranceThe manufacture to minimum and maximummeasurements. |
| Commercial processesTimber 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 manufactureTimber based materials (dimensional accuracyusing go/no go fixture).Polymers (dimensional accuracy by selectingcorrect laser settings). |
| Surface treatments and finishesThe preparation and application of treatments andfinishes to enhance functional and aestheticproperties.Timber based materials (painting, varnishing andtanalising).Polymers (polishing, printing and vinyl decals). |
| The work of othersStudents should investigate, analyse and evaluatethe work of past and present designers andcompanies to inform their own designing.Students should investigate the work of a minimumof 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 minimumof two of the following companies:• Alessi• Apple• Braun• Dyson• Gap• Primark• Under Armour• Zara. |