

GCE

Design and Technology

Unit **F524/01**: Product Design: Component 1

Advanced GCE

Mark Scheme for June 2016

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Question	Answer	Mark	Guidance
<p>1 (a)</p>	<p>Four justified design requirements for the pile foundation shown in Fig 1.</p> <ul style="list-style-type: none"> • The foundation must provide a level base on which the building can be built. • The foundation must satisfy the requirements of the Building Regulations (Approved Document A - Structure). • The foundation must resist dead loads eg. the constant weight of the structure eg. walls, floors, roof etc. • The foundation must resist live or imposed loads eg. furniture, goods, people etc. • The foundation must resist variable loads caused by the weather eg. snow, rain etc. • The foundation must resist any contaminants that may be present in the sub-soil. • The foundation must be sufficiently below ground level to overcome soil volume changes due to a freeze/thaw action. • The thickness/depth of the foundation must be greater than the projection of the wall unless it is reinforced. 	<p>4</p>	<p>Clear statement and justification required for a mark</p> <p>Must be related to the foundation – no marks for generic responses</p> <p>Must be a full response – no marks for identification only.</p> <p>Four justified design requirements.</p> <p>Give one mark if two valid points given but not fully justified.</p>
<p>(b)</p>	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • A culture of continuous improvement. • A reduction in project time and cost due to the minimisation of errors and subsequent corrective work. • The increased efficiency of workers with activities being focused on customer satisfaction. • An improved flow of information between all participants in the project through an ethos of team-building. 		<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>

Question	Answer	Mark	Guidance
	<ul style="list-style-type: none"> • Every employee is accountable for their own performance. • A commitment to training by the company for its employees. 	4	
(c)	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • Safer - as it removes the risk of operatives working in deep excavations, coming into contact with wet concrete and manual handling of heavy materials. • Quality assured by the manufacturers of the pile foundation. • Speeds up the construction process ie. traditionally there would be a delay until the in-situ concrete for the foundation cured/reached its designed strength before the external walls could be built. • Can be used when extreme hot/cold temperatures would not permit in situ concrete to be used. 	4	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>
(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	4	<p>Level 2 (3 - 4 marks)</p> <p>Detailed explanation, demonstrating clear understanding of Trade Description Act. Must have two ways in which consumers are protected</p> <p>Level 1 (0 – 2 marks)</p> <p>Brief description/statements of features of Trade Description Act. limited explanation</p>
(e)	<p style="text-align: center;">(i)</p> <p>Individual materials required to produce the pile foundation</p> <ul style="list-style-type: none"> • Portland cement or sulphate resistant cement • Coarse aggregate 		<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p>

Question	Answer	Mark	Guidance
	<ul style="list-style-type: none"> • Fine aggregate or sand • Steel reinforcement bars • Water <p>Properties or characteristics</p> <p>Concrete</p> <ul style="list-style-type: none"> • Strength – gains compressive strength over time • Strength - tensile strength when reinforced with steel • Versatility – easily formed to the required shape • Frost resistant when at an appropriate depth • Fire resistant • Durability – long lasting and resistant to wear • Impermeable to water • Low coefficient of expansion <p>Properties or characteristics</p> <p>Steel</p> <ul style="list-style-type: none"> • High tensile strength when used as reinforcement • Malleability – can be rolled into the correct form • Durability – long lasting and resistant to wear • Ductility – can be stretched, drawn out or pressed into different shapes • Accepts a coating eg. zinc. 	3	<p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>
(ii)	<p>Temporary support of the sides of a foundation trench to prevent collapse.</p> <p>The type of temporary support would depend on some or all of the following:</p> <ul style="list-style-type: none"> • The nature of the soil ie. sand or silt soils need more 		<p>Level 3 (5-6 marks)</p> <p>Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p>

Question	Answer	Mark	Guidance
	<p>support that clay soils.</p> <ul style="list-style-type: none"> • The depth of the excavation. • The width of the excavation. • The amount of working space required for a bricklayer to build up the external walls from the foundation.. • The moisture content of the ground. • The length of time the excavation will be open. • The method of excavation ie. hand dug or by a machine. • The support system used. • The removal of the support system. • Moving materials into the excavation. • The proximity of existing buildings. • Vibration of soils from adjacent machine operations or vehicles using adjacent roads. <p>Methods of temporary support include:</p> <ul style="list-style-type: none"> • Timber in firm soil component parts would include: poling boards, puncheons, waling boards, struts, sole pieces and wedges. • Timber in loose or wet soil component parts would include: close timber sheeting, puncheons, waling boards, struts, sole pieces and wedges. • Steel trench sheets component parts would include: profiled interlocking steel sheets, waling boards and steel adjustable struts. • Trench/Drag box is a complete unit that is constructed and placed into the excavation by an excavator. The box(es) are dragged by the excavator along the open excavation as the work proceeds. 		<p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p>

Question	Answer	Mark	Guidance
	<p>Sketches/description for any of the methods should include</p> <ul style="list-style-type: none"> • a ladder or some means of access/egress to/from the excavation • side supports should extend above ground level to prevent workers/machinery falling into the excavation 	9	
(f)	<p>There should be some recognition that the fashions and trends that have an impact on the built environment and construction sector can be on a large scale with products such as:</p> <ul style="list-style-type: none"> • The proliferation of high-risel buildings for residential rather than commercial use in major cities such as London. • Pedestrianisation of town centres. • Construction of deep basements in existing houses where planning authorities will not allow extensions above ground ie. the London districts of Westminster, Kensington etc. • Eco-friendly homes • Creation of Science Parks. <p>Also, in terms of the built environment and construction trends are often influenced by the location where the construction is taking place and the unique local factors. Trends usually include the incorporation of security, luxury, technology and conservation products/features into the design of the project.</p>	8	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>

Question	Answer	Mark	Guidance
	<p>examples</p> <ul style="list-style-type: none"> • A district where security is an issue – gates for a gated community, panic rooms in houses, solid metal doors etc. • Luxury – expensive/ornate kitchens and bathrooms etc. • Technology – solar photovoltaic panels, ground source heat pumps, computer systems that remotely monitor energy consumption in a building. • Conservation – re-creating/restoring features that would be found in Georgian/Victorian houses eg. period doors, windows, fireplaces, cornices, paints, wallpaper etc. <p>The generic answers produced for Q6 could also be relevant depending on the context they are used in by the candidate ie.</p> <ul style="list-style-type: none"> • Batch/quantity production implications • Seasonal products • Speed from design to sale to meet fashion demand • Awareness of market • Awareness of local/national/global trends 		
			Q1 Total Mark 36

2	(a)	<ul style="list-style-type: none"> • The system must be strong enough to withstand the weight of the rising water levels. • The system must be fully sealed when erected to prevent water leaking through it. • Individual parts of the system should be of easily managed weight to allow quick assembly. • Materials used should be corrosion resistant for use in adverse weather conditions over long periods. • Parts must be accurately made to ensure quick and easy assembly. • The system should be able to be adjusted to deal with rising water levels. • The individual parts of the system should be designed to allow for easy storage in limited space. • Parts of the system must fit securely together to prevent collapse/failure. • Assembly of the system should not be too complex or need special skills to complete. • The system should take up minimal ground space in order to avoid unnecessary obstruction in the area. 	4	<p>Four justified design requirements.</p> <p>Clear statement and justification required for a mark</p> <p>Must be related to product – no marks for generic responses</p> <p>Must be a full response - no marks for identification only.</p> <p>Give one mark if two valid points given but not justified.</p>
	(b)	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • Continually seeking improvement • Whole process involved from delivery of resources to roll out. • Every employee has a responsibility • Faults identified and corrected at first possible opportunity 	4	<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>

	(c)	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • No need for storage space • Quality assured by providers • Speeds up process-no need to make them • Choice of providers 	4	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>
	(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	4	<p>Level 2 (3 - 4 marks)</p> <p>Detailed explanation, demonstrating clear understanding</p> <p>Level 1 (0 – 2 marks)</p> <p>Brief description/statements; limited explanation</p>
	(e)	<p>(i) Materials: Mild (low carbon) steel Aluminium alloy Stainless steel</p> <p>Properties/characteristics: Easy to form into shape required Relatively inexpensive material Easily fabricated/welded Comparatively heavy for stability Readily recyclable at end-of-life Corrosion resistance / readily takes surface finish Good machinability</p>	3	<p>Award mark for other <i>appropriate</i> metal not listed</p> <p>1 x 1 mark</p> <p>Award mark for other appropriate property/characteristic. Must relate to the specific material given. eg: not 'comparatively heavy' if aluminium alloy. not 'easy to form', relatively inexpensive' or 'good machinability' if stainless steel.</p> <p>2 x 1 mark</p>

	<p>(ii) Top section: Lengths of channel section produced by hot rolling (steel) or extrusion (aluminium alloy). Channel section cut to required length – mechanical or circular saw. *Accept producing individual sections by hot forging (steel) QC – check length of cut section. Remove sharp edges from cut sections. Drill Ø12 holes in sides – jig on drilling machine or CNC machining centre. QC – hole size and position. Remove burrs from ends of drilled holes.</p> <p>Ground spike: Lengths of tubing for spike – seam welded steel tubing or extruded aluminium alloy. (accept extruded steel) Tubes cut to required length - mechanical or circular saw. Tube ends prepared for attaching to top section.</p> <p>Assembly: Top section and tube assembled into positioning jig for welding. Top and tube welded together – MIG or TIG manual or robot welding. QC – check weld quality (destructive and/or non-destructive tests carried out on first assembly done)</p> <p>Finishing: Final QC check before surface finishing to prevent corrosion. Mild Steel – galvanized Aluminium alloy – anodized Stainless steel – no finish required. QC - check complete coverage of applied surface finish.</p>	<p>9</p>	<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p> <p>Award maximum 6 marks if the answer does not take into account the required quantity of production, e.g. the answer relates to a one-off process rather than a batch.</p>
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(f)		<p>Issues could be:</p> <ul style="list-style-type: none"> • Batch/quantity production implications • Seasonal products • Speed from design to sale to meet fashion demand • Awareness of market • Awareness of local/national/global trends <p>examples</p> <ul style="list-style-type: none"> • Specific seasonal products, sunglasses / clothing • Specific fashion product • Specific markets • Sporting/event specific opportunities 	8	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>
		Q2 Total Mark 36		

Question	Answer	Mark	Guidance
<p>3 (a)</p>	<ul style="list-style-type: none"> • The pizza should be have four portions to be big enough to serve an average family • The pizza should include some vegetables to help to contribute to the 5/7 a day requirement • The pizza should include the herb Basil/Oregano to add flavour /reflect the Italian influence. • The pizza should have a crispy bread base to improve the organoleptic qualities • The pizza should be topped with a cheese layer to give an appealing finish/improve flavor • The pizza should have added ingredients such as pepperoni to increase the protein/flavour in the product 	<p>4</p>	<p>Clear statement and justification required for a mark</p> <p>Must be related to the product – no marks for generic responses</p> <p>Must be a full response – - no marks for identification only.</p> <p>Four justified design requirements.</p> <p>Give one mark if two valid points given but not fully justified. Do not accept the same reason twice eg ‘flavour’</p>
<p>(b)</p>	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • Continually seeking improvement • Whole process involved from delivery of resources to roll out. • Every employee has a responsibility • Faults identified and corrected at first possible opportunity 	<p>4</p>	<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>
<p>(c)</p>	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • No need for storage space • Quality assured by providers • Speeds up process-no need to make them • Choice of providers 	<p>4</p>	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>

Question	Answer	Mark	Guidance
(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	4	<p>Level 2 (3 - 4 marks)</p> <p>Detailed explanation, demonstrating clear understanding of Trade Description Act. Must have two ways in which consumers are protected</p> <p>Level 1 (0 – 2 marks)</p> <p>Brief description/statements of features of Trade Description Act. limited explanation</p>
(e)	<p>(i) Material for packaging the pizza Properties or characteristics</p> <p>Plastic/PVC</p> <ul style="list-style-type: none"> • Some are biodegradable • Cheap to produce • Available in different thicknesses • Can be used in a microwave • Easy to print on • Lightweight • Waterproof • Does not react with foods • Is transparent <p>Paper/Card</p> <ul style="list-style-type: none"> • Recyclable • Biodegradable • Cheap to produce • Can be from recycled /sustainable sources • Easy to print on • Can be laminated • Lightweight 	3	<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>

Question	Answer	Mark	Guidance
	<p>(ii) Ingredients measured for batch</p> <p>Dough for crust (flour, salt, water, dried yeast and oil.) Mixed for 4 mins Mechanically kneaded Rises for 30 mins Mechanically cut into smaller even chunks Rolled in sheeting machine then with quick reducing rollers to required thickness and consistency - regular dusting with flour dough spiked to prevent air pockets forming die cut into circular shapes – left over dough used in next batch Oven bake for 2 mins between 200⁰ – 310⁰ C</p> <p>Toppings Tomato sauce applied via hopper and scraped for even level – excess collected and reused Shredded cheese fed from hopper – even layer Additional toppings added Inspected / sampled</p> <p>Freezing Spiral freezer/blast chill for 20 mins at – 25⁰ F</p> <p>Packaging Over wrapped - plastic sealed cover, Styrofoam base inserted Fitted into prepared card packaging or label applied.</p>	<p>9</p>	<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Answer must include detail of ingredients and principles underlying the process for full marks.</p>

Question	Answer	Mark	Guidance
(f)	<p>Issues could be:</p> <ul style="list-style-type: none"> • Batch/quantity production implications • Seasonal products • Speed from design to sale to meet fashion demand • Awareness of market • Awareness of local/national/global trends • Responding to changing nutritional claims/guidelines <p>examples</p> <ul style="list-style-type: none"> • Specific seasonal products, sunglasses / clothing • Specific fashion product • Specific markets • Sporting/event specific opportunities 	8	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>
Q3 Total Mark			36

Question	Answer	Mark	Guidance
<p>4 (a)</p>	<ul style="list-style-type: none"> • The holder must be stable with leaflets in it, won't blow away. • The holder must be durable as it will be used by a wide range of people. • The holder should be cost effective as it is distributed freely. • The material should allow the cutting of complex shapes to promote products by the manufacturer/supplier. • The product should be flat pack for ease of transportation and storage. • 	<p>4</p>	<p>Clear statement and justification required for a mark</p> <p>Must be related to the product – no marks for generic responses</p> <p>Must be a full response – - no marks for identification only.</p> <p>Four justified design requirements.</p> <p>Give one mark if two valid points given but not fully justified.</p>
<p>(b)</p>	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • Continually seeking improvement • Whole process involved from delivery of resources to roll out. • Every employee has a responsibility • Faults identified and corrected at first possible opportunity 	<p>4</p>	<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>
<p>(c)</p>	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • No need for storage space • Quality assured by providers • Speeds up process-no need to make them • Choice of providers 	<p>4</p>	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>

Question	Answer	Mark	Guidance
(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	4	<p>Level 2 (3 - 4 marks)</p> <p>Detailed explanation, demonstrating clear understanding of Trade Description Act. Must have two ways in which consumers are protected</p> <p>Level 1 (0 – 2 marks)</p> <p>Brief description/statements of features of Trade Description Act. limited explanation</p>
(e)	<p>(i)</p> <p>Material for main body</p> <ul style="list-style-type: none"> • 2000 micron white cardboard • Corrugated cardboard (fluted card) • Duplex board • Corriflute • Polypropylene sheet <p>Properties or characteristics (appropriate to manufacturing process used)</p> <ul style="list-style-type: none"> • High quality finish (white cardboard) • Recyclable • Quick to manufacture/ ease of manufacture • Easy to store, before and after 	3	<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>NOT 'card' or 'cardboard' unless a weight is also given (e.g. a gsm figure)</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>

Question	Answer	Mark	Guidance
	<p>(ii)</p> <p>Main Body</p> <p>Full colour print first – Offset lithography – Digital is not acceptable due to the weight of the board.</p> <p>Finalise artwork Produce CMYK Plates look for CTP (computer to plate) or direct to plate Approve low res proof for trimming etc Approve high res proof Use a sheet fed press Load inks Print Allow to dry</p> <p>Die Cut</p> <ul style="list-style-type: none"> • The design is finalised • Tessellated for cost effectiveness. If appropriate • A press former/die cutter is manufactured to press these shapes out of the board using MDF. • This is made up of cutting and creasing knives dependent upon the design (Sketches to show where the knives should be placed). • Foam is placed around these knives • The dies are placed in a flat bed machine for this type of production run and the process is automated. • Pressure is applied to each ‘box and released • The template drops out and the process carries on. • This can also be completed by hand • The final product is checked to assure QA 	<p>9</p>	<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p> <p>Award maximum 6 marks if the answer does not take into account the required quantity of production, e.g. the answer relates to a one-off process rather than a batch.</p>

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(f)	<p>Issues could be:</p> <ul style="list-style-type: none"> • Batch/quantity production implications • Seasonal products • Speed from design to sale to meet fashion demand • Awareness of market • Awareness of local/national/global trends <p>examples</p> <ul style="list-style-type: none"> • Specific seasonal products, sunglasses / clothing • Specific fashion product • Specific markets • Sporting/event specific opportunities 	8	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>
Q4 Total Mark			36

5	(a)	<ul style="list-style-type: none"> • The tray should use a minimum amount of material in order to cut down cost and wastage. • Tray should be designed to be stackable to reduce space needed for storage and transportation. • The material used for the tray must be readily recyclable as it may be thrown away after use. • Corners and edges of the tray must be smooth to avoid injury/damage as it is made from thin material. • The base of the tray should be flat to allow it to be freestanding if required when in use. • The tray must be made of a material that is resistant to any substance that might be mixed in it. • The tray should be easy to clean after use in order that it might be re-used if necessary. • The shape of the tray should enable it to be made by suitably inexpensive manufacturing methods. • The tray should be easy to hold when in use in order to avoid spillage of its contents. • The tray should be fairly rigid to prevent distortion or collapse when in use. 	4	<p>Clear statement and justification required for a mark</p> <p>Must be related to product – no marks for generic responses</p> <p>Must be a full response - no marks for identification only.</p> <p>Four justified design requirements.</p> <p>Give one mark if two valid points given but not justified.</p>
	(b)	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • Continually seeking improvement • Whole process involved from delivery of resources to roll out. • Every employee has a responsibility • Faults identified and corrected at first possible opportunity 	4	<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>

	(c)	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • No need for storage space • Quality assured by providers • Speeds up process-no need to make them • Choice of providers 	4	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>
	(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	4	<p>Level 2 (3 - 4 marks)</p> <p>Detailed explanation, demonstrating clear understanding of Trade Description Act. Must have two ways in which consumers are protected</p> <p>Level 1 (0 – 2 marks)</p> <p>Brief description/statements of features of Trade Description Act. limited explanation</p>
	(e)	<p>(i) Materials:</p> <p>ABS; PET(G); Polystyrene (HIPS); HDPE; Polypropylene; PVC Aluminium alloy Mild steel</p> <p>Properties/characteristics:</p> <p>Easy to form into shape required Relatively inexpensive material Readily recyclable at end-of-life Resistant to many substances Produces suitably rigid structure</p>	3	<p>Award mark for other <i>appropriate thermoplastic</i> material not listed. NOT 'expanded polystyrene' NOT 'acrylic'</p> <p>1 x 1 mark</p> <p>Award mark for other appropriate property/characteristic.</p> <p>Must relate to the specific material given.</p> <p>2 x 1 mark</p>

	<p>(ii) Plastic moulding:</p> <p>CAD software used to produce mould design for vacuum forming. CNC router/milling machine used to make multi-impression mould from MDF/aluminium alloy. Multi-impression mould given smooth surface finish.</p> <p>Vacuum forming: Place mould in machine. Fit plastic sheet and heat until softened. QC – ensure plastic sheet is at correct temperature. Turn on vacuum (maybe ‘blow’ before vacuuming) and raise mould into softened plastic sheet. Turn off heat when shape fully formed. Turn off vacuum. Lower mould. Remove moulding from machine. QC – check completeness of mouldings on sheet.</p> <p>Remove individual tray mouldings from plastic sheet using punch / die cutter; allow use of gerbil/profile cutter. QC – check for correct/complete outer form</p> <p>Produce hanging hole using punch/die cutter. *Accept drilling using jig or laser cutting.</p> <p>Final QC check of completed tray.</p> <p>*Accept Injection Moulding, but higher marks only given if details of mould design <i>and</i> process description is provided.</p>	<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn’t link to chosen material.</p> <p>Award maximum 6 marks if the answer does not take into account the required quantity of production, e.g. the answer relates to a one-off process rather than a batch.</p>
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		<p>Metal pressing:</p> <p>CAD software used to produce designs for punch and die (single impression). **Details of punch and die required for higher marks** Punch and die assembled into press die set. Die set fitted to mechanical press. (allow use of hydraulic press) Material fed into press from coil by roller feed. One tray produced per blow of press and material indexed forward by roller feed. **Allow making by individual 'blanks' manually or robot fed into tooling** Finished tray needs no further machining operations.</p> <p>Finishing: Edges smoothed by rotary barreling or fine finishing. Clear lacquer applied to prevent corrosion; aluminium alloy may be anodized; Stainless steel no finish required</p>	<p>9</p>	
	<p>(f)</p>	<p>Issues could be:</p> <ul style="list-style-type: none"> • Batch/quantity production implications • Seasonal products • Speed from design to sale to meet fashion demand • Awareness of market • Awareness of local/national/global trends <p>examples</p> <ul style="list-style-type: none"> • Specific seasonal products, sunglasses / clothing • Specific fashion product • Specific markets • Sporting/event specific opportunities 	<p>8</p>	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>
<p>Q5 Total Marks 36</p>				

Question	Answer	Mark	Guidance
<p>6 (a)</p>	<ul style="list-style-type: none"> • The gift box lid must fit tightly onto the main body so that it does not fall off easily • The gift box should be made to a high standard as it will contain a valuable piece of jewellery • The gift box lid should have sufficient grip/texture to enable the user to remove it easily • The finish/aesthetics of the gift box should reflect the quality of the product • The gift box should be easy to open and close to avoid jewellery falling out if too awkward to open. • The gift box should contain a system of holding and presenting the ring effectively, not just rolling around • The gift box should provide protection for the valuable piece of jewellery during transit or storage 	<p>4</p>	<p>Clear statement and justification required for a mark</p> <p>Must be related to the product – no marks for generic responses</p> <p>Must be a full response – - no marks for identification only.</p> <p>Four justified design requirements.</p> <p>Give one mark if two valid points given but not fully justified.</p>
<p>(b)</p>	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • Continually seeking improvement • Whole process involved from delivery of resources to roll out. • Every employee has a responsibility • Faults identified and corrected at first possible opportunity 	<p>4</p>	<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>
<p>(c)</p>	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • No need for storage space • Quality assured by providers • Speeds up process-no need to make them • Choice of providers 	<p>4</p>	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>

Question	Answer	Mark	Guidance
(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	4	<p>Level 2 (3 - 4 marks)</p> <p>Detailed explanation, demonstrating clear understanding of Trade Description Act. Must have two ways in which consumers are protected</p> <p>Level 1 (0 – 2 marks)</p> <p>Brief description/statements of features of Trade Description Act. limited explanation</p>
(e)	<p>(i)</p> <p>Material for main body</p> <ul style="list-style-type: none"> • Specified hardwood for turning – beech, mahogany, ebony, rosewood • Aluminium alloy • Copper/Brass/Gilding metal • ABS • Acrylic <p>Properties or characteristics (appropriate to manufacturing process used)</p> <ul style="list-style-type: none"> • easy to turn; • easy to press/form • high quality finish. 	3	<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>

Question	Answer	Mark	Guidance
	<p>(ii) Main Body</p> <p>Plastic Forming/heat</p> <ul style="list-style-type: none"> • Former created (perfect finish) slight draft angle • Place in vacuum former • Plastic heated • Vacuum applied • Trim and finish (rout or drill and cut for hole at back of seat) • Could be two part press former • Could be plug and yoke pressing <p>Metal pressing</p> <ul style="list-style-type: none"> • Mould/press tool designed / created • Material cut to exact size • Accurate locate in press • Guards in place • Press • Check edges <p>Metal shaping / joining</p> <ul style="list-style-type: none"> • Accurate size sheet (gilding/precious metal) • Form cylinder • Hard braze/silver solder joint • Cut base to fit • Hard braze/silver solder (lower temp) base to cylinder • File/fine abrade/polish/buff <p>Turning</p> <ul style="list-style-type: none"> • Outside diameter achieved, between centres or using 3-jaw chuck • Both ends faced off to high finish • 3 jaw or egg cup chuck used to drill/bore out • Apply appropriate finish 	<p>9</p>	<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p> <p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p> <p>Award maximum 6 marks if the answer does not take into account the required quantity of production, e.g. the answer relates to a one-off process rather than a batch.</p>

Question	Answer	Mark	Guidance
(f)	<p>Issues could be:</p> <ul style="list-style-type: none"> • Batch/quantity production implications • Seasonal products • Speed from design to sale to meet fashion demand • Awareness of market • Awareness of local/national/global trends <p>examples</p> <ul style="list-style-type: none"> • Specific seasonal products, sunglasses / clothing • Specific fashion product • Specific markets • Sporting/event specific opportunities 	8	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>
Q6 Total Mark			36

Question	Answer	Mark	Guidance
<p>7 (a)</p>	<p>Example specification points:</p> <ul style="list-style-type: none"> • The angle grinder must not be too heavy so it can be safely held by the operator • The hand holds must provide sufficient grip so the tool can be securely held during use • There must not be too much vibration through the hand grips to prevent the user being harmed • The tool must not make too much noise so the user's hearing is not damaged • The grinder should have warning labels to instruct the user how to use the tool safely • The length of the electric cord should be sufficient to allow the grinder to be used conveniently. 	<p>4</p>	<p>Clear statement and justification required for a mark</p> <p>Must be related to the product – no marks for generic responses</p> <p>Must be a full response – - no marks for identification only.</p> <p>Four justified design requirements.</p> <p>Give one mark if two valid points given but not fully justified.</p>
<p>(b)</p>	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • Continually seeking improvement • Whole process involved from delivery of resources to roll out. • Every employee has a responsibility • Faults identified and corrected at first possible opportunity 	<p>4</p>	<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>
<p>(c)</p>	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • No need for storage space • Quality assured by providers • Speeds up process-no need to make them • Choice of providers 	<p>4</p>	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>

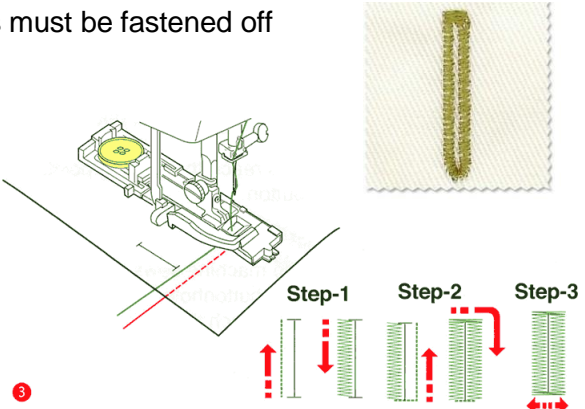
Question	Answer	Mark	Guidance
(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	<p>Level 2 (3 - 4 marks)</p> <p>Level 1 (0 – 2 marks)</p> <p>4</p>	<p>Detailed explanation, demonstrating clear understanding of Trade Description Act. Must have two ways in which consumers are protected</p> <p>Brief description/statements of features of Trade Description Act. limited explanation</p>
(e)	<p>(i) Diagram to show bevelled gears to transfer rotation through 90 degrees.</p>	<p>3</p> <p>3 marks total</p>	<p>Bevelled gears identified (1 mark) Indication that both gears are of identical size (1 mark) Indication of input and output shafts (1 mark)</p> <p>1 mark max if worm gear shown</p>
	<p>(ii) Candidates should produce a circuit diagram to provide a counting/displaying function. For full credit, it should be clear how input pulses are counted and how the counter output is displayed on 7-segment displays. It should be clear how a count of 99 can be achieved.</p> <p>Expected answers might include <u>some</u> of the following features:</p> <ul style="list-style-type: none"> • Binary/BCD counter IC (e.g. 4029/4026) • BCD to 7-segment decoder IC (e.g. 4511) • 7-segment displays connected to each counter IC • Common on 7-seg display to 0V • Resistors to limit current through display segments • Input pulses to clock connection on counter 		<p>Level 3 (5-6 marks) Clear and correctly functional circuit diagram with few errors. Operation of circuit correctly described and good use of technical vocabulary.</p> <p>Level 2 (3-4 marks) Clear circuit diagram containing some relevant functional features. Candidate has attempted to describe operation of circuit.</p> <p>Level 1 (0-2 marks) Attempt at a circuit diagram with little relevance to the application. Circuit operation not described.</p>

Question	Answer	Mark	Guidance
	<ul style="list-style-type: none"> • Carry out from first counter connected to clock of second counter • Power supply lines identified • Switch/pull-down resistor connected to RESET on counters • Use of a programmable microcontroller (e.g. PIC or GENIE) with input/output connections to switches and displays. An accompanying program flowchart must be given for full marks to be awarded. 	9	<p>Quality of description and communication</p> <p>Circuit diagram with some correct BSI symbols 1 mark</p> <p>Complete circuit diagram with mostly correct BSI symbols 2 marks</p> <p>Complete circuit diagram with correct BSI symbols and appropriate annotation (e.g. labelled power supply) 3 marks</p>
(f)	<p>Issues could be:</p> <ul style="list-style-type: none"> • Batch/quantity production implications • Seasonal products • Speed from design to sale to meet fashion demand • Awareness of market • Awareness of local/national/global trends <p>examples</p> <ul style="list-style-type: none"> • Specific seasonal products, sunglasses / clothing • Specific fashion product • Specific markets • Sporting/event specific opportunities 	8	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>
Q7 Total Mark 36			

Question	Answer	Mark	Guidance
<p>8 (a)</p>	<ul style="list-style-type: none"> • Must have buttons and buttonhole front fastening- to enable it to be taken on and off. • The shirt must have long sleeves to give maximum warmth • The sleeves must have button fastening to allow different sized hands to pass through • The cuffs must be able to fit tightly around the wrist to fit a range of different sized people • There must be a collar to enhance the design of the shirt • The shirt must have a luxury appeal to attract a wide range of buyers. • Must be washable so that it is an easy-care garment for frequent use • Any valid aesthetic point providing it is qualified 	<p>4</p>	<p>Clear statement and justification required for a mark</p> <p>Must be related to the product – no marks for generic responses</p> <p>Must be a full response – - no marks for identification only.</p> <p>Four justified design requirements.</p> <p>Give one mark if two valid points given but not fully justified.</p>
<p>(b)</p>	<p>Two key features of TQM:</p> <ul style="list-style-type: none"> • Continually seeking improvement • Whole process involved from delivery of resources to roll out. • Every employee has a responsibility • Faults identified and corrected at first possible opportunity 	<p>4</p>	<p>brief description 1 mark detailed description 2 mark</p> <p>Two features clearly described</p> <p>Credit candidates who realise that TQM may involve aspects of quality control checks during the manufacturing process. Allow a maximum of 2 marks if candidate only refers to quality control. For the extra 2 marks, candidates must make reference to the key features of TQM.</p>
<p>(c)</p>	<p>Two benefits of bought in components:</p> <ul style="list-style-type: none"> • No need for storage space • Quality assured by providers • Speeds up process-no need to make them • Choice of providers 	<p>4</p>	<p>brief description of benefits 1 mark detailed description of benefits 2 marks</p> <p>Two benefits described 1 x 2</p>

Question	Answer	Mark	Guidance
(d)	<p>Trade Description Act</p> <ul style="list-style-type: none"> • Prevent misleading claims/adverts • Consumer has legal protection, it is an offence to willingly mislead • Verbal/written or illustrative descriptions covered by the Act • Traders may lose their consumer credit license or receive up to £5000 fines 	4	<p>Level 2 (3 - 4 marks)</p> <p>Detailed explanation, demonstrating clear understanding of Trade Description Act. Must have two ways in which consumers are protected</p> <p>Level 1 (0 – 2 marks)</p> <p>Brief description/statements of features of Trade Description Act. limited explanation</p>
(e)	<p>(i)</p> <p>Fibres for the satin shirt</p> <ul style="list-style-type: none"> • Silk • Polyester • Cotton • Poly-cotton <p>Properties or characteristics</p> <p>Silk</p> <ul style="list-style-type: none"> • Hard wearing/durable/strong • Comfortable/soft/not irritating/good next to skin feel • Washable/easy care • Drapes well • Dyes well • Absorbent • Light to wear • Crease resistant • No electrostatic charges <p>Polyester</p> <ul style="list-style-type: none"> • Hard wearing/durable/strong • Comfortable/soft/not irritating/good next to skin feel • Washable/easy care 	3	<p>award mark for other appropriate material not listed</p> <p>1x1 mark</p> <p>Award mark for other appropriate property/characteristic</p> <p>2x1 mark</p>

Question	Answer	Mark	Guidance
	<ul style="list-style-type: none"> • Drapes well • Dyes well • Absorbent • Light to wear • Crease resistant • Resistant to acids/alkali/most solvents <p>Cotton</p> <ul style="list-style-type: none"> • Hard wearing/durable/strong • Comfortable/soft/not irritating/good next to skin feel • Washable but slow to dry • Good drape • Dyes well • Absorbent • Non static 		
(ii)	<p>Method for making the button holes should include the following points:</p> <ul style="list-style-type: none"> • Positioning of the buttonholes as indicated on the pattern. These should be parallel to the front edge and equally spaced • Tailor tacks/tailor's pencil used to mark the position of the button holes • Length of button hole should be the diameter of the button plus a couple of mm depending on the depth of buttons • Computer controlled machines can be programmed to remember the buttonhole settings and will produce identical buttonholes. • A close zig zag stitch should be used to satin stitch • A buttonhole foot should be used to allow for the smooth flowing of the fabric. • The fabric inside the buttonholes can cut using an unpicked or specialist button hole cutting scissors. 		<p>Level 3 (5-6 marks) Process fully described, key features and technical details identified, Answer must include detail of specialist tooling for full marks.</p> <p>Level 2 (3-4 marks) Key stages presented, reasonably well described with key features identified</p> <p>Level 1 (0-2 marks) Some stages outlined (up to 2), very limited description</p> <p>Quality of description and communication</p> <p>Basic sketch or chart with limited annotation 1 mark</p> <p>Good sketch/chart with main features identified and labelled 2 marks</p>

Question	Answer	Mark	Guidance
	<p>Method for attaching the buttons</p> <ul style="list-style-type: none"> Buttons attached after the buttonholes worked If hand stitching double thread should be used Some machine have specialist button sewing settings and feet. Diagrams could show the sequence for stitching through the buttons A 'shank' will allow for thickness of fabric. Threads must be fastened off securely. 	<p>9</p>	<p>Detailed sketch/chart with clear annotation 3 marks</p> <p>Max 1 if no sketch/chart used</p> <p>Award credit where possible if response doesn't link to chosen material.</p> <p>Award maximum 6 marks if the answer does not take into account the required quantity of production, e.g. the answer relates to a one-off process rather than a batch.</p>
<p>(f)</p>	<p>Issues could be:</p> <ul style="list-style-type: none"> Batch/quantity production implications Seasonal products Speed from design to sale to meet fashion demand Awareness of market Awareness of local/national/global trends <p>examples</p> <ul style="list-style-type: none"> Specific seasonal products, sunglasses / clothing Specific fashion product Specific markets Sporting/event specific opportunities 	<p>8</p>	<p>Level 3 (6-8 marks) Clear, cogent and well-structured response with two or three issues well explained. Good use of examples and additional evidence to support discussion. Good use of technical vocabulary</p> <p>Level 2 (3-5 marks) One or two issues described with some explanation. Appropriate use of technical vocabulary demonstrating a good understanding of concept. Introduction of one example or supporting evidence</p> <p>Level 1 (0-2 marks) Some issues outlined, bullet points (usually focussed on one issue) no further or very limited explanation, limited use of examples or supporting evidence</p>

Mark Scheme

June 2015

Question	Answer	Mark	Guidance
	<ul style="list-style-type: none"> • Capability of high street chains to produce 'copies' of designer wear rapidly • Implications to the industry of the 'throw away' / 'wear once' approach to buying clothes 		
			Q8 Total Mark 36

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