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General Certificate of Secondary Education
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Design and Technology:
Product Design 45551

Final

Mark Scheme

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Question 1

(a) Any sensible design criteria identified appropriate to identified product and chosen target user, supported by appropriate reason such as colour to attract target user / fit with current fashion / activity; material; weight; dimensions; ergonomics; taste; texture etc.
Give credit for reason where appropriate even if design criteria incorrect and vice versa.

Design criteria identified	1 mark
Appropriate reason	1 mark
A reason that is not relevant or incorrect or inappropriate to the product or user	0 mark
	Max of 6 marks

(b) Responses should be marked holistically and a best fit to the criteria applied.

Creative response which is a clear pattern and links to the image board. Pattern makes use of colour which may be present in image board or may be a creative and complimentary substitution. Response clearly shows how the pattern would be repeated e.g. using crop marks or drawing full or partial pattern repeat.	5-6 marks
Response is a pattern and links to the image board but may not make creative use of shapes and colours or pattern, may not have colour or may make use of colours which do not blend together well. Response has some information about how pattern might repeat but may be lacking in detail or repeat might not work.	3-4 marks
Response may not be a clear pattern or may not link to the image board in terms of shape or colour. Limited or poor use of colour.	2 marks
Simplistic response which may not be a pattern or link to the image board. Little or no colour used.	1 mark

(c) Responses should be marked holistically and a best fit to the criteria applied.

Creative response to brief, inclusion of innovative features. Clear links to image board (use of form, texture, colour) and design solution creatively and appropriately incorporates pattern from 1(b) but may only use part of the pattern. Innovative product idea which compliments some aspect of identified target user's lifestyle. Design has been significantly developed and includes detail of materials or ingredients, construction techniques. Designs are well drawn with a good use of colour, texture and form. Designs well annotated. Design work is concise, easy to understand and well laid out in the space available. Design could be manufactured by a third party.	9-12 marks
A reasonably creative response to brief and inclusion of some innovative design features. Some link to leaf image board (use of form, texture, colour). Design solution incorporates the pattern from 1(b) but it may not be fully appropriate/ feasible or may lack some detail. Product idea compliments some aspect of identified target user's lifestyle. Design is developed and includes detail of some appropriate materials or ingredients, construction techniques, designs are quite well drawn, colour and or texture has been used appropriately although there may be limited application. Designs are annotated although there may be some missing	

	details. Work is fairly well laid out in the space provided.	5-8 marks
	Limited response to brief, little or no link to leaf image board (use of form, texture, colour). Some evidence of pattern from 1(b) but it may not be appropriate/ feasible or may lack sufficient detail. Product idea may not compliment leisure activity or some aspect of identified target user's lifestyle. Design may not be fully developed and may lack detail of materials, ingredients, construction techniques. Designs may not be very well drawn and there may be no or limited application of colour or texture. Annotation may be limited or missing.	1-4 marks
	No response to brief, absence of design and annotation, no evidence of pattern.	0 marks
d)	Concise evaluation with several well reasoned points clearly linked to original design criteria. Opportunities for improvement or further development to design may also have been identified. Response well structured with good use of appropriate design and technology terminology and showing a good grasp of grammar, punctuation and spelling.	5 – 6 marks
	Some well reasoned points linked to original design criteria although response may be lacking in some detail or reference to further development opportunities. Response fairly well structured with some use of design and technology terminology with small number of errors in grammar, punctuation and spelling.	3 – 4 marks
	One point fairly well reasoned or some vague points which might not be linked to original design criteria. Little or no reference to further development opportunities. Response poorly structured with little or no use of design and technology terminology and with numerous errors in grammar, punctuation and spelling.	1 – 2 marks
	No relevant evaluation presented.	0 marks

TOTAL FOR QUESTION 1: 30 Marks

Question 2

(a) (i) Any **named** paper or board e.g. sugar paper, cartridge paper, tracing paper, corrugated card, mounting board, solid white board, layout paper, foil lined board, tissue paper, crepe paper, carton board. Duplex board, newsprint, recycled paper and board. 3 x 1 mark

Do **not** accept wallpaper, paper (any sizes given) or card/cardboard, laminated card. Do not accept processed finishes, e.g. waxed card.

(ii) Any named specific material such as:

Non-ferrous metals	Aluminium; copper; tin; zinc; brass; pewter; casting alloy (LM4), gold, silver.
Synthetic textile fibres	Polyamide/nylon, Tactel, Polyester, Acrylic, Elastane/Lycra, Aramid/Kevlar
Hardwoods	Beech; oak; ash; maple; balsa; teak; mahogany; ebony, jelutong
Mechanical components	Spur gears; rack and pinion; cam and follower; cranks; pulleys; linkages; levers; worm and worm wheel; bevel gears; chain and sprocket; pneumatic cylinders
Ceramics	Earthenware clays; stoneware clays; porcelain; slip; plaster of Paris, concrete, glass
Manufactured boards	MDF (medium density fibreboard) HDF, LDF; plywood; chipboard; blockboard; hardboard, lamin-board.
Carbohydrate foods	Bread; pasta; rice; noodles; beans; pulses (lentils, potatoes, oats, flour, breakfast cereals)
Thermoplastics	Polythene (High Density) HDPE; Polythene (Low Density) LDPE; Polypropylene (PP); High Impact Polystyrene (HIPS); Nylon; PVC (polyvinyl chloride); Acrylic (polymethyl-methacrylate), PET/PETE

3 x 1 mark

(b) (i) Any combination of product and appropriate finish. e.g. garden bench – wood stain / varnish; ski jacket – waterproofing; vase – glaze; saucepan handle – polythene plastic dip-coating; card – laminating.

No mark for product, 1 mark for finish.
Finish must match product selected. 1 mark

(ii) To visually enhance the material e.g. gloss/ silk/ matt/ metallic/ hammered finish;
To protect from deterioration, corrosion;
To make more durable/ waterproof.

Sound response which makes reference to two of the ideas above in brief or one idea in detail. 2 marks

Brief/ single word answer with reference to one idea only. 1 mark

Does not need to relate to product or finish given in part (i) 2 x 2 marks

(c) (i) Any combination of material and appropriate stock form. Stock form must match material selected.

e.g. Paper: A3, thickness, weight and colour;
Food: Fresh, frozen, dehydrated, liquid and canned;
Metal: Sheet, rod, bar and tube;
Ceramics: Slip, body, pigment and oxides;
Textiles: Roll width, linear metre, weight and ply;
Wood: Rough sawn, PSE, sheet size and mouldings;
Plastics: Granules, sheet, rod, powder and foam.

No mark for material, 1 mark for stock form. 1 mark

(ii) Materials processed into standard sizes to enable costing, transportation, manageable, ready for manufacture, stock forms driven by consumer demand etc.

A concise and detailed response showing a good understanding of factors relating to a primary processing and specifying materials. 3 marks

Sound response which makes reference to ideas above in brief or one idea in detail. 2 marks

Brief / single word answer with reference to one idea only. 1 mark

TOTAL FOR QUESTION 2: 15 Marks

Question 3

(a) (i)

Reuse	Use the packaging again e.g. plastic carrier bag, wash out glass bottle and refill, get the maximum use out of a product before disposing of it.
Recycle	Process the materials from used products to be used to make new products. Put recyclable used products in recycling bins, materials will need to be separated; some are too difficult to separate and therefore cannot be recycled. Council collection processes.
Reduce	Reduce the amount of raw materials used by reducing our consumption of products, recycling and reusing existing products and materials.
Rethink	Rethink the design of products to minimise use of non renewable resources, use of energy in manufacture and use and therefore their carbon footprint.
Repair	Repair and maintain products rather than replace to minimise use of non renewable resources, energy in manufacture and therefore reduce a products carbon footprint.
Refuse	Refuse plastic carrier bags / unnecessary packaging when offered or have the choice to reduce use of non renewable materials.

Sound response which makes reference to two of the ideas above in brief or one idea in detail. 2 marks

Brief / single word answer with reference to one idea only. 1 mark

3 x 2 marks

(b) (i)

Games console	Cotton dress	Hair straighteners
Plastics from oil, energy used for extraction and primary processing into material stock form, secondary processing into product. Transportation – product miles. Packaging for transport to retail outlet. Printing – instruction manual. Energy used during use, might be left on for internet updates. Disposal after use. Become obsolute when new models are launched.	Production of chemical fertilisers used in cotton growing. Energy used for primary processing of cotton into fabric and dyeing process, transport of fabrics / garments across world as made in eastern countries. Printing – swing tickets / labels. Energy used in laundry – washing and ironing.	Plastics from oil, energy used for extraction and primary processing into material stock form, secondary processing into product. Transportation – product miles. Packaging for transport to retail outlet. Printing – instruction manual. Energy used during use – heat uses lots of energy. Disposal after use. Non renewable / recyclable ceramics.

Dishwasher	Dinner plates	Soft drink
Plastics from oil, metal, energy used for extraction and primary processing into material stock form, secondary processing into product. Transportation – product miles. Packaging for transport to retail outlet. Printing – instruction manual. Energy used during use. Disposal after use.	Energy used for extraction of raw material and primary processing into material stock form, secondary processing into product. Transportation – product miles. Packaging for transport to retail outlet. Energy used during use – washing in dishwasher / by hand (hot water). Disposal after use / recycling / washing for reuse.	Metal - energy used for extraction and primary processing into material stock form, secondary processing into can. Printing – label. Transportation – product miles. Packaging for transport to retail outlet. Disposal / recycling of can after use.

A concise and detailed response showing a good understanding of factors relating to a product's carbon footprint.

A sound response showing a basic understanding of factors relating to a product's carbon footprint. 3 marks

A simplistic statement which mentions one point only.

2 marks

1 mark

(ii) E.g. Turn television off rather than leaving on standby. Buy products that are manufactured in the UK to reduce global transport. Wash clothes at cooler temperatures, don't leave straighteners switched on. Reuse plastic carrier bags, recycle products after use to minimise use of non-renewable materials and reduce landfill sites.

Sound response which makes reference to two of the ideas above in brief or one idea in detail. 2 marks

Brief / single word answer with reference to one idea only. 1 mark

2 x 2 marks

TOTAL FOR QUESTION 3: 13 Marks

Question 4

(a) (i) A precise drawing showing high level skills. Solution is fully feasible and suitable for manufacture in this quantity. 3-4 marks

Some parts of the drawing not easy to understand. Solution might not be completely feasible. 1-2 marks

(b) (i) A suitable material that is specifically named.
E.g. plywood, MDF, aluminium, polystyrene, acrylic, felt, clay, card, biscuit mix, pastry etc. 1 mark

(ii) Reason shows good understanding of the working properties of the material. 2 marks

Reason is vague and lacking in understanding of the properties of the materials. 1 mark

(c) Response does not need to be in flowchart form. Accept a sequential process.

Correct main stages of manufacture listed. Quality control checks correctly identified for major stages of manufacture. Suitable for producing 200. 7-8 marks

Generally correct main stages of manufacture listed. Quality control checks correctly identified for most stages of manufacture although some might be inappropriate or superficially explained. Suitable for producing 200. 5-6 marks

Some of main stages of manufacture correctly identified but some might be missing or incorrect. Some quality control checks are correctly identified or several may be identified but might not be the most appropriate for the process or sufficiently explained. Process may not be suitable for producing 200. 3-4 marks

Few stages of manufacture correctly identified, quality control checks may be missing or incorrect for process, process may not be suitable for producing 200. 1-2 marks

(d) **Note – a layout will not always be drawn. Should accept clear instructions from candidates as to how processes are divided into tasks/labour. Be aware that credit cannot be given for simple repetition of part (c).**

A well planned layout and feasible order of processes and sequence is clear with no major omissions. Correctly named tools and equipment for major stages of manufacture. Quality of communication is good. Clear drawings and notes sequentially laid out. 8-10 marks

A generally correct layout and sequence of manufacturing detailed but maybe some omissions. Quality of communication is reasonable. Drawings and or annotation lack significant details or may be difficult to understand in places. 5-7 marks

Only part of the layout or process superficially detailed, incorrect or unsuitable for producing 200. Some tools and equipment are correctly named. Superficial information only may be given. 2-4 marks

Very limited information given about the process or process is largely incorrect, unsuitable for producing 200. Quality of communication may be poor, drawings without notes or notes without drawings, not easily understood and inappropriate or no tools or equipment identified. 0-1 mark

Maximum 5 marks for response which doesn't show a team production layout.

TOTAL FOR QUESTION 4: 25 Marks

Question 5

(a)

 Charcoal heated iron Comfortable, insulated wooden handle, easy filled with charcoal, long lasting heat source, aesthetically pleasing decorative handle and animal detail.	 Modern steam iron Lightweight, translucent water reservoir, smooth glide base plate, spot spray and steam functions, thermostat control, long electric cord, smooth cushion gripped ergonomically designed handle, modern colours.

Two marks per feature (only reward a maximum of two features)

Sound response which identifies feature and provides rationale for change. — 2 marks

Identifies feature but no rationale provided. — 1 mark

2 x 2 marks

Although:
A concise and detailed response which makes reference to one feature with multiple rationale may be awarded 3 – 4 marks. — Max of 4 marks

(b) International code assists export as three dot code recognised by all cultures/languages, opening up wider markets. Manufacturers do not need to put names of all fabrics on thermostat. Users can easily recognise what heat setting to use and minimise accidental damage to garments.

A good response showing a good understanding of components and the advantages to the manufacturer. 2 - 3 points well made or 4 points briefly stated. — 4 marks

A sound understanding of components and their use by manufacturers. 2 points well made or 3 points briefly stated. — 3 marks

One point well made or 2 points briefly stated. — 2 marks

A simplistic statement which mentions one point only. — 1 mark

(c) Continuous Improvement: manufacturers try to continuously improve products through Quality Management, working to standards such as BS EN ISO 9000 2000, guidelines to demonstrate quality controls, looking at how they can do this better, improve the product to make it more economical to produce, incorporate new technology. Continually improving products as a result of improving production processes encourages consumer to want latest versions before existing products need replacing, using up more non renewable resources, increasing consumption, increasing landfill sites, using more packaging etc. Continuous Improvement could be used by manufacturers as an opportunity to look for more environmentally friendly production methods, ways of using less raw materials, less energy in manufacture, increasing lifespan of products. Legislation can force improvement.

A concise and detailed response showing a good understanding of continuous improvement and its impact on the environment including several points well made. Response well structured with good use of appropriate design and technology and showing a good grasp of grammar, punctuation and spelling. 7-8 marks

A sound response showing a basic understanding of continuous improvement, a good understanding of its impact on the environment, 2 to 3 points well made. Response fairly well structured with sound use of design and technology terminology with only small number of errors in grammar, punctuation and spelling. 5-6 marks

A reasonable response showing a basic understanding of continuous improvements its impact on the environment, some points well made or a combination of simplistic statements. Response reasonably well structured with some use of design and technology terminology with some errors in grammar, punctuation and spelling. 3-4 marks

A brief and simplistic statement which mentions one or two points only. Response poorly structured with little or no use of design and technology terminology and with numerous errors in grammar, punctuation and spelling. 1-2 marks

(d) E.g. clean base plate, self clean steam / water reservoir (calc clean?) to remove calcium deposits, uncoil cable, clean body, empty water when not in use, electrical PAT testing.

Any appropriate maintenance task. 1 mark
2 x 1 mark

Appropriate action to be taken by user. 1 mark
2 x 1 mark

TOTAL FOR QUESTION 5: 20 Marks

Question 6

(a) (i) Survey of human measurements to help designers create products suitable for human use. Promote safe use as designed for human body – fit for hand, non slip, support for spine to minimise neck and back strain etc.

A sound description of anthropometric data. 2 marks

A simplistic statement. 1 mark

(ii) Designers use measurements between 5^{th} and 95^{th} percentile to ensure fully ergonomic, comfort for user. Range of measurements that is inclusive of most people. Designers select the appropriate end of range e.g. 95^{th} percentile for door frame, 5^{th} percentile for chair height

A concise and detailed response showing a good understanding of 5^{th} to 95^{th} percentile. 3 marks

A sound description of 5^{th} to 95^{th} percentile. 2 marks

A simplistic statement. 1 mark

(b) (i) A detailed response showing a very good understanding of the implication and issues of each adjustment required, dealing with specific benefit as well as the broader benefits of comfort, safety, reach etc. 3 marks

A reasonable response which may be two basic descriptions of each adjustment or one adjustment described in detail. 2 marks

A basic description of one adjustment but with limited or no explanation. 1 mark

(ii) Minimum: 0352 1 mark

Maximum: 0476 1 mark

TOTAL FOR QUESTION 6: 10 Marks

Question 7

(a) (i) Any appropriate design movement as listed in the specification

E.g. Arts & Crafts Movement, Art Nouveau, Art Deco, Bauhaus, Modernism, De Stijl, Memphis, Post Modernism 1 mark

(ii) Any appropriate design features typical of that movement e.g.

Arts & Crafts Movement	The Arts and Crafts movement was founded by William Morris at the end of the nineteenth century. His designs for wallpaper, furniture and textiles were inspired by organic shapes and patterns found in nature. Morris was a socialist, firmly against poor working conditions and the damage done to the environment by industrialisation. He was, however, keen to promote the production of quality products and his work used expensive materials and traditional techniques that only the wealthy could afford.
Art Nouveau	This design style took its name from a shop that opened in Paris in 1895. Based on the organic lines of climbing plants and Japanese art, it was popular with designers of glass, furniture, fabrics and wrought ironwork, one of the most famous designs being the lamps of Louis Tiffany.
Art Deco	Fashionable and glamorous period of design, influenced by other design movements as well as Egyptian art, such as that on the tomb of Tutankhamen. Much use of geometric shapes e.g. the sunburst in window design. Used in interior design between 1920 and 1939, its influence can also be seen in the architecture of the time. Clarice Cliff, a famous designer of ceramics, decorated her work using this bright, bold style until World War 2; it then became illegal to use time and resources on decorating products.
Bauhaus	Bauhaus designers used modern materials and mass production methods. Experimental work using colour and form was encouraged to produce designs that were artistic and skilled – whilst also following the underlying principle that form should follow function.
Modernism	Modernist designs were made ergonomically, using appropriate materials and very little decoration. Designers like Charles Rennie Macintosh used geometric shapes, which were easier to mass produce.
De Stijl	Using basic shapes and primary colours, this movement took geometric design to another level. Founded in Holland, it was the inspiration for a range of furniture and architecture that used only the essential form and colour in the design.
Memphis	MEMPHIS was a Milan-based collective of young furniture and product designers led by Ettore Sottsass. After its 1981 debut, Memphis dominated the early 1980s design scene with its post-modernist style: experiments with unconventional materials, historic forms, kitsch motifs and gaudy colours; furniture made from the flashily coloured plastic laminates emblazoned with kitsch geometric and

	leopard-skin patterns usually found in 1950s comic books or cheap cafés. Other pieces of furniture and lights were made from industrial materials – printed glass, celluloids, fireflake finishes, neon tubes and zinc-plated sheet-metals – jazzed up with flamboyant colours and patterns, spangles and glitter. By glorying in the cheesiness of consumer culture, Memphis was "quoting from suburbia", as Sottsass put it. "Memphis is not new, Memphis is everywhere." Matteo Thun described Memphis as "a mental gymnasium".
Post Modernism	Established in Italy in the late 1960's, radical design (or anti design) was epitomised by two main studios 'Archizoom Associati' and 'Supertudio'. The groups wrote manifestos and designed products that questioned good taste. The radical design movement is often seen as the direct precursor to post-modern design, as it ought to blur the traditional visual language of modernism. A lot of postmodern design involves breaking rules and the use of "vernacular" items. Vernacular items are basically things that you wouldn't normally consider to be "designed." An example of vernacular would be a parking ticket or a job application. Obviously, somebody designed them at some point, but you wouldn't normally think of them in a design sense. Breaking conventions and the use of vernacular items tends to make things look haphazard, unintentional, or like they weren't really designed, hence the "anti-design" nickname.

One mark per feature identified. 2 x 1 mark

(b) Design that was of its era but is still considered attractive today, stands the test of time. Ground breaking product which everybody wants, instantly recognisable, fashionable. Copied by other designers. Use of materials, textures, colours etc belong to it and when seen on other products in that combination are recognisable as from the original. Balance of form and function, aesthetically pleasing.

Concise and detailed answer which uses one example in detail to illustrate point or more examples briefly and shows a good understanding of iconic design. 4 marks

Sound and fairly detailed answer which shows a good grasp of what iconic design is and uses at least one example in brief. 3 marks

Reasonable response which may not fully understand the meaning of iconic design or may not include example of iconic design. 2 marks

Limited, superficial or largely incorrect response. No examples of products. 1 mark

TOTAL FOR QUESTION 7: 7 Marks