



General Certificate of Secondary Education

Design and Technology: Product Design (3544)

Higher Tier

Mark Scheme

2005 examination – June series

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**ASSESSMENT AND QUALIFICATIONS ALLIANCE
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

Summer Examination 2005

DESIGN AND TECHNOLOGY: PRODUCT DESIGN

HIGHER TIER

Question 1

- | | | |
|--|----------|-----------|
| (a) Timber, paper/card, natural and regenerated textiles – cotton, wool, silk, linen, acetate, viscose, all food materials | (1 mark) | |
| (b) Metals, plastics, ceramics, synthetic fibres | (1 mark) | |
| (c) Copper – non-ferrous metal | (1 mark) | |
| High Impact Polystyrene – thermoplastic | (1 mark) | |
| slip – liquid clay | (1 mark) | |
| silk – natural fibre | (1 mark) | |
| plywood – man-made board | (1 mark) | |
| rice – cereal | (1 mark) | |
| foil lined Duplexboard, composite | (1 mark) | |
| nylon, synthetic fibre | (1 mark) | (4 marks) |

Any four correct answers from table to maximum of 4 marks

- | | | |
|--|-----------|-----------|
| (d) Tiny <i>chips of wood</i> are cooked in water and chemicals to produce a <i>mushy wood pulp</i> . Pulp is poured over a <i>fine mesh and drained of water</i> . It is then passed <i>through rollers and dried</i> . | | |
| Full explanation which includes area in italics | (3 marks) | |
| Some areas missed but essentially correct | (2 marks) | |
| One aspect correct | (1 mark) | (3 marks) |
| (e) Reduce costs by maximising economies of scale in production | | |
| Manufacturers concentrate on their own specialism – contract out | | |
| Quality assurance already established | | |
| Ease of production/replacement/repair | | (2 marks) |
| A detailed answer including any of the above | (2 marks) | |
| Limited answer | (1 mark) | |

Total 11 marks

Question 2

(a) Requirements

Any sensible requirement such as:

Easily foldable, must insulate pizza, printed image, easy to carry etc.

Accept generic packaging criteria – preserve, protect, contain, inform, transport, which can all relate to take-away pizza but do not accept display for this context. (3 x 1 mark)

Reasons

Sensible answers related to requirements such as:

Easily foldable - saving time, staff ability

Must insulate – keep hot, prevent bacterial growth

Printed image – advertise/promote product or company

Easy to carry – might need to carry several, must fit into delivery box

Benefits to the environment.

(3 x 1 mark)

(6 marks)

Any combination of correct answers up to a maximum of 6 marks

(b) Any of the following:

low cost, good insulator, strength to weight ratio, rigid, easy to print onto, recyclable.

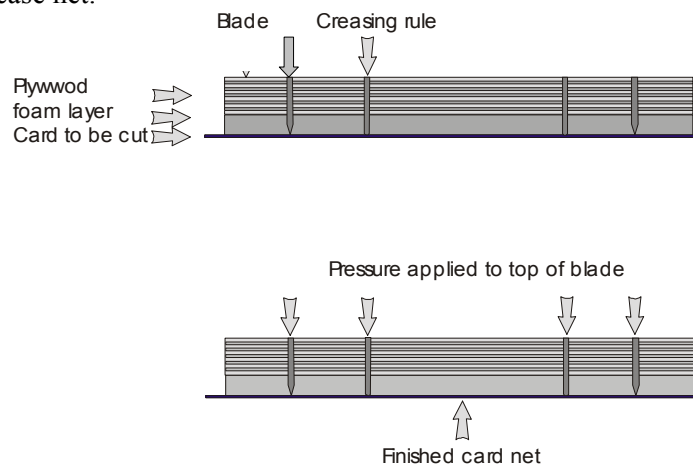
(2 x 1 mark)

(2 marks)

(c) Die-cutting or die stamping (accept press-knife cutting)

(1 mark)

Good clear indication of process showing cutting rule, creasing rule, foam to release net.



(1 mark each up to maximum of 3 marks)

(3 marks)

Some understanding of the process (may not include above headings but should make reference to stamping

(1 mark)

Total 12 marks

Question 3

- (a) Three distinctly different answers required such as:
- | | | |
|--------------------------|----------|--|
| Plays music | (1 mark) | |
| pocket sized | (1 mark) | |
| has headphones/earpieces | (1 mark) | |
| volume control | (1 mark) | |
| easy to carry | (1 mark) | |
- Any combination up to a maximum of 3 marks** (3 marks)
- (b) Main changes due to new technologies such as:
- | | | |
|---------------------------------|----------|--|
| Analogue to digital technology | (1 mark) | |
| MPEG compression files | (1 mark) | |
| increases in battery technology | (1 mark) | |
| developments in microchips | (1 mark) | |
- Additional changes partially due to areas such as:
- | | | |
|--|----------|--|
| New markets | (1 mark) | |
| Volume production/markets allowing advanced technology at lower prices | (1 mark) | |
- Accept:
- | | | |
|-----------------|----------|--|
| Technology push | (1 mark) | |
| Market pull | (1 mark) | |
- Reward fuller explanation of a single change or any combination of above for maximum of 4 marks.** (4 marks)
- (c) One complete answer required such as:
- | | | |
|--|-----------|--|
| Ability to store far more music than on cassette | (2 marks) | |
| Can be downloaded from the internet or encoded from CDs | (2 marks) | |
| Compilations can be easily produced on computer and downloaded to MP3 player | (2 marks) | |
| Unknown artists can circulate their music more easily. | (2 marks) | |
- Limited answer (1 mark) (2 marks)

- (d) Full explanation required which could include:
Technological push,
Market pull,
Product specification and includes input from finance, production, maintenance staff, consumers, environmental groups, legislators, marketing etc.
All stakeholders are involved.
Part of Total Quality Management and involves looking at all procedures and processes.
- | | | |
|--|-------------|-----------|
| Clear response where candidate shows a full understanding of the main points | (4 marks) | (4 marks) |
| Candidate shows good understanding but there are some omissions | (2-3 marks) | |
| Generic answer related to keeping a market share/responding to customers | (1 mark) | |
- (e) A detailed answer is required for full marks which might include:
Feedback or pressure on individual manufacturers.
Changes in regulation or legislation resulting in type approval against set standards.
- | | | |
|--|-----------|-----------|
| Clear response where candidate shows a full understanding | (3 marks) | (3 marks) |
| Candidate shows some understanding but response is superficial | (2 marks) | |
| Generic answer related to improvements/policing etc. | (1 mark) | |
- (f) (i) Any named designer – accept single name e.g. Starck. Dyson (1 mark)
- (ii) Reasons will be varied but might include:
Popularity/fashion trends, simplicity, use of new materials or technologies, innovation/novelty
- | | | |
|--|-----------|-----------|
| Clear response where candidate shows a full understanding of the designer’s work and can justify why it is successful. | (3 marks) | (3 marks) |
| Candidate shows some understanding but the response is rather superficial | (2 marks) | |
| Single word answer which might come from the list above. | (1 mark) | |

Total 20 marks

Question 4

- (a) (i) Any suitable material which can be moulded, stamped, milled etc,
Plywood, MDF, aluminium, Polystyrene, felt, fabric (specific), clay, card, biscuit mix, pastry, acrylic, etc. (1 mark)
- (ii) Any sensible reason related to chosen material such as:
Ease of production, cost, availability (1 mark)
- (b) An accurate description of the process such as casting, injection moulding, laser-cutting, die-cutting, milling etc. is required. The process chosen must be feasible for this quantity and related to school production.
- (i) Clear and accurate description where candidate shows a full understanding of the process and has taken account of repeatability through moulds, jigs, formers CAD/CAM etc. (4 marks) (4 marks)
Candidate shows some understanding but response is lacking in some areas (2-3 marks)
Simple division of labour with no reference to manufacturing aids (1 mark)
- (ii) Correctly named tools & equipment (up to 3 examples) - appropriate to the process described. (1-3 marks) (3 marks)
- (iii) Clarity of communication:
Drawings and notes are easy to follow. Candidate has laid out process sequentially (3 marks) (3 marks)
- Drawings and notes are detailed but they are not easy to follow or may be superficial in detail. (2 marks)
- Clear sketches without notes or clear notes without sketches (1 mark)
- (c) Appropriate decoration techniques might include:
printing, painting, texturing, engraving, glazing, icing, embossing, embroidery etc. depending on the material used.
- Decoration is appropriate to the leaf shape and adds visual impact. The process, which will be suitable for a batch of 200 is clearly explained and takes account of repeatability and accuracy. (3-4 marks) (4 marks)

Decoration is generally appropriate to the leaf shape and adds visual impact.
The process is reasonably explained but may not take account of
repeatability and accuracy or may not be suitable for the scale of production (2 marks)

Decoration provides some visual impact. (1 mark)

- (d) Response needs to deal with quality systems and should take note of manufacturing aids.

A full response which might include:

QA is clearly accounted for through the choice of process, such as CAM, which ensures consistency. Materials are checked, samples are taken at various stages. Final check against agreed sample. (3 marks) (3 marks)

A more superficial response may refer to checks being made at various stages of production. (2 marks)

Final inspection against agreed sample only (1 mark)

- (e) Manufacturing issues such as reducing dust, danger from power tools etc.
Consumer issues such as hygiene, no sharp edges etc. depending on materials used.

(i) General understanding about assessing and reducing risks through agreed procedures, maintenance schedules, processes, handling etc. Legal responsibility to both workforce and customers. At least two areas covered (2 marks) (2 marks)

One area covered only (1 mark)

(ii) A clear account which relates to the chosen material/processes and describes the RA procedures in some detail. (2 marks) (2 marks)

Superficial response related to chosen materials/processes (1 mark)

Total 23 marks

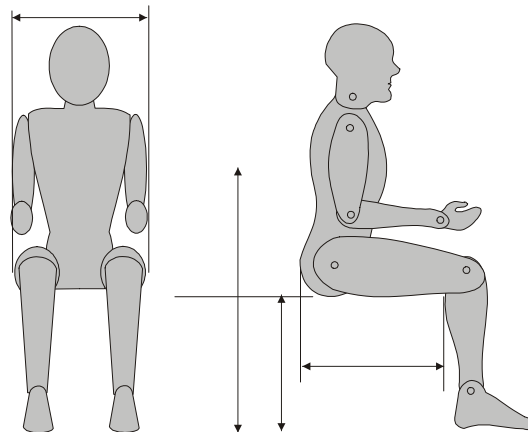
Question 5

- (a) Anthropometrics (2 marks) (2 marks)
 Ergonomics (1 mark)

(b) People vary so much in size. Ignore the 5% at each extreme of the range. (5th to 95th percentile). Aim to meet the needs of the remaining 90%.eg. door height for tallest, seat height for smallest. The larger the sample the likelihood of more reliable data.

- Full account including range of data, optimum size (3 marks) (3 marks)
 Some knowledge of application data (2 marks)
 Superficial account (1 mark)

- (c) Diagram and notes which show:
 Seat height -floor to under knee when seated. (1 mark) (6 marks)
 Seat depth – calves to rear of buttocks when seated. (1 mark)
 Seat width – width of hips. (1 mark)
 Backrest/Headrest height. (1 mark)
 Clarity of communication. (2 marks)
 (To achieve 2 marks for C of C must show at least 2 measurements)



- (d) Product might include:
 Cycles, clothing, rucksacks, car seats, office chairs etc (0 mark)

Clear diagrams and notes which show how the product adjusts to different sizes. Do not expect mechanisms but reward if present. Diagrams should show the extent of the movement (for example, the car seat moves forward and back as well as backrest tipping – some lift up as well) (3-4 marks) (4 marks)

Poor diagram of product where it is clear that adjustment can be made (2 marks)

Diagram which is recognisable as the named product but shows no clear adjustment, such as office chair with arrow. (1 mark)

- (e) (i) Any exclusive product such as wheelchair, baby buggy, dietary needs of elderly/diabetic, Braille sign etc. (1 mark)
- (ii) Clear explanation such as “to transport child in first two years of life”. (2 marks) (2 marks)
Superficial answer such as “for babies”. (1 mark)
- (f) (i) Marks to be accumulated by meeting each of the following criteria: (8 marks)

Plan (P)

A clear plan which shows a sink, cooker, fridge similar to samples.
Cooker is not in front of window (1-3 marks)

and

Work surface (W)

Work surface has been fitted and the fridge and cooker are not adjacent. (1- 2 marks)

and

Drawing (D)

Drawing is clearly and accurately to scale. (3 marks)

or

Drawing is clear but poorly drawn and/or not to scale (1-2 marks)

- (ii) Working triangle is clearly shown and makes good use of the space (2 marks) (2 marks)

or

Working triangle is shown but makes poor use of space (1 mark)

Reward innovation, such as creating an island unit, as long as all criteria are met at a basic level - up to a maximum of 10 marks.







- (g) Explanation which is clear and logical showing full understanding of working triangles. References to less movement/reaching. (3 marks) (3 marks)
- Shows some understanding of the amount movement Between working areas. (2 mark)
- Has explained the thinking but there is a serious flaw in the Design concept. (1 mark)

Total 31 marks

Question 6

- (a) Fully correct answer (2 marks) (8 marks)
 Partially correct answer (1 mark)

Reward any four up to a maximum of 8 marks

 Hand wash only, usually 40 degrees	 Do not place close to magnets such as found in speakers.
 Product easily damaged by flame e.g. (upholstery)	 Product suitable for freezing
 Low battery, recharge/replace	 Match two dots found on fabrics to heat control setting on iron

- (b) (i) Any suitable product such as furniture, gates, cars, bikes etc. (0 mark)
- (ii) Scotchguard fabrics, paint/powder coat on metals, varnish/preservatives on timber, glaze on ceramics etc. (1 mark)

Full description such as:

Scotchguard is sprayed onto fabric (often after completion as in the case with upholstery)

Metal is heated and plastic powder is sprayed on – metal goes into oven to set the material

Varnish is sprayed on – hand finishing between coats

Glaze is in liquid form and biscuit-fired clay is dipped/sprayed prior to secondary firing in a kiln

(3 marks)

named process/material but with reduced detail

(1/2 marks)

- (c) Complete answer for full marks (2 marks each) (8 marks)
Component identified such as “tyres” but without maintenance task (1 mark)

Any from:

Bike

Chain - tension/oil,

brakes – cable adjustment/check blocks,

Tyres – pressure/tread wear,

steering head – undue play adjusted,

crank – undue play adjusted,

wheel nuts – tight,

bearings- tight, wheel

handlebar – tight,

seat – correct height/tight etc.

Cleaner

Empty and clean pan,

change filters,

unclog brushes,

check tubes for blockages,

check cable for damage

Computer

Defragmentation,

disk cleanup,

virus checks,

file management,

download software updates etc.

cleaning

charging the battery

Up to maximum of 8 marks

Total 20 marks

Question 7

At this stage of the higher paper it is expected that candidates can undertake an extended writing task. The question has been structured into three sections of 2 marks each.

Give full credit for:

Use of CAD and CAM
Structural/mechanical testing/modelling
Accounts and stock control
Logistics
Just in time
Flexible manufacturing
Automation
Remote manufacturing
Electronic Product Definition

(2 marks each)

Give reduced credit for:

Word processing
Spreadsheets
Databases
Email
Presentation and general communication

(1 mark each)

Up to a maximum of 6 marks

(6 marks)

There are a maximum of three scoring points (Application, How and Why) which can be achieved in each section. No more than a total of 6 marks can be awarded for the three sections combined.

There are an additional 2 marks available for use of technological vocabulary/abbreviation and clear evidence of the candidate's knowledge and understanding.

(2 marks)

Total 8 marks