Version : 9/22/2006

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Design and Technology: Product Design 3544

Foundation Tier

Mark Scheme

2006 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

ASSESSMENT AND QUALIFICATONS ALLIANCE
GENERAL CERTIFICATE OF SECONDARY EDUCATION

June Examination 2006

DESIGN AND TECHNOLOGY: PRODUCT DESIGN

FOUNDATION TIER

Question 1

(a)

Product	Material	Recyclable/non-recyclable
Shirt	Cotton	Recyclable
Skateboard deck	Plywood	Recyclable
Cheese	Milk	Non-recyclable
Playing cards	Laminated card	Non-recyclable
Scooter	Aluminium alloy	Recyclable
Teacup	Porcelain	Non-recyclable

1 mark for each response correct
Up to a maximum of two products
2 × 2 marks for 2 products (4 marks)

(b) (i) copper / zinc
copper / aluminium
cotton / elastane
wood fibres / urea formaldehyde
polyester resin / glass
cardboard / aluminium (1 mark)

(ii) Named product (1 mark)

Explanation which indicates both where and why the material is used. (2 marks)

Explanation which indicates either where **or** why (1 mark)

(2 marks)

Marks can be awarded for part (ii) independent of answer in part (i)

Total 8 marks

Question 2

(a) (i) and (ii)

Market Research
Records opinions about new and existing products, undertake questionnaires, surveys and will analyse the results.
A detailed explanation which highlights more than one of the issues listed. (2 marks)
A basic explanation single point. (1 mark)

Product Analysis
Analysing different aspects of products such as function, materials, manufacturing processes, style, etc to find out its good and bad points. A detailed explanation which highlights more than one of the issues listed. (2 marks)

A basic explanation single point. (1 mark)

Questionnaire
A list of questions directed at a specific group of people the target audience, such as age, gender, likes, dislikes, etc.
A detailed explanation which highlights more than one of the issues listed. (2 marks)

A basic explanation single point. (1 mark)

Design Specification
A list of requirements for a product that is decided at the research stage may be linked to evaluation stages, such as target market, function, size, weight, durability, aesthetics, materials, safety, cost, green issues, manufacture, packaging, etc. A detailed explanation which highlights more than one of the issues listed. (2 marks)

A basic explanation single point. (1 mark)

(b) This question covers a wide range of ICT applications and equipment processes suggested in the marking scheme does not cover every eventuality. However pupils must explain how this process and equipment helped with the development of their projects and show working knowledge to gain the full marks. In this situation software is acceptable within the answer.

Process explained within the development of the project (2 – 3 marks)
Basic equipment or process (1 mark)

or 1 mark for each of the following if put into a list up to a maximum of 3 marks.

Desk top publishing to improve appearance
Word processing text
computer graphics such as 2D Design Tools / ProDesktop
analysing data - graphs / charts
spreadsheets for costings
databases to find out information – including CD ROMs
use Internet for research
email for research and communicating with others
producing CAD files
flowcharting
mind mapping software
scanning images
digital photography / video / sound
producing an e portfolio
etc. (3 marks)

Total 7 Marks

Question 3

(a) (i) Cup is wider at top than base and therefore less stable
Straw can act as lever and increase chance of tipping
Lightweight materials
Detailed qualified response noting one or more of above points (2 marks)
Superficial response noting one of above points (1 mark) (2 marks)

(ii) The cup needs to be insulated, easy to lift, easy to drink from, easy to carry, lid to prevent spills, stable, rigid, fairly firm
Single point given (1 mark) (1 mark)

(iii) To protect the user and keep the drink warm.
Detailed response which relates to (ii) (2 marks)
Superficial response or another requirement not used in (ii) (1 mark) (2 marks)

(iv) Expanded polystyrene/waxed card
Single point (1 mark) (1 mark)

(b) (i) The product – drinks carrier
The carrier must hold up to four drinks securely

4 suitably positioned holes cut out of top
(give 1 mark for each suitable hole)
Award maximum of 2 marks if positioning is not appropriate
(4 marks)

Any dimensions given (1 mark)
Diameter of holes sensible, e.g. between 70-80mm (2 marks)

The carrier must be made rigid

Additions to make the tray more rigid such as addition of connecting flaps, locking tabs, etc (1 – 2 marks)

A workable solution showing clear feasibility
(Note – make reference to part (ii) for evidence) (1 – 2 marks)

The carrier should have room for a company logo

Suitably positioned logo for maximum impact (2 marks)
Position indicated (1 mark) (12 marks)

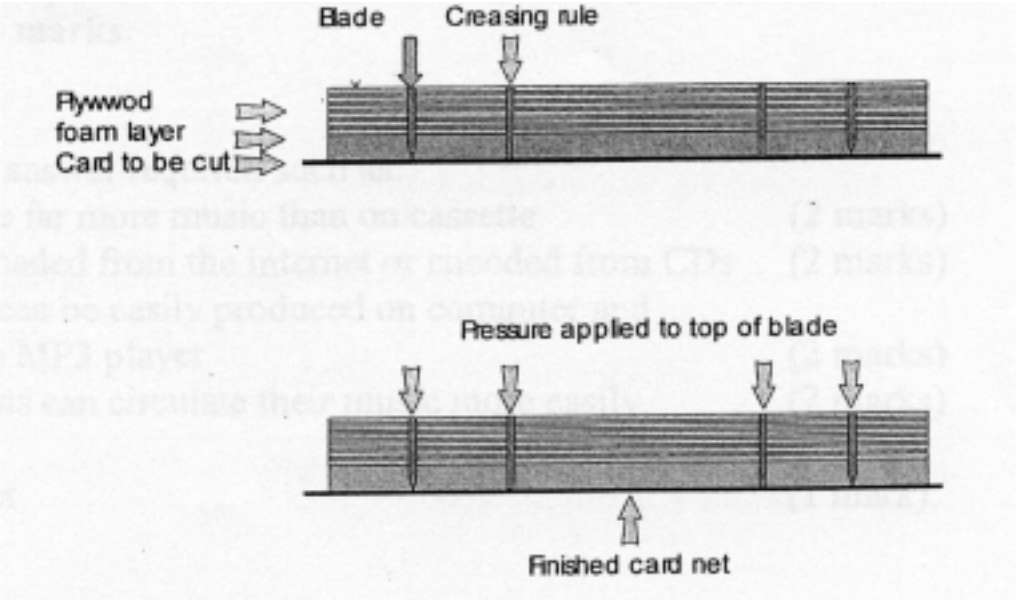
(ii) The Logo – Easy Drink
Logo uses name "Easy Drink" which is easy to read. (1 mark)
Logo includes graphic image – symbols, initials, etc as well as text
(1 mark)
Logo makes sensible use of colour – single, two/three colours only
(1 mark)
Logo has visual impact and is suitable for a take away drinks company.
(1 mark)
Design will work in position indicated. (1 mark) (5 marks)

(c) (i) Only accept one of the following for 2 marks:

Lithography, Screen Printing, Flexography (2 marks)

Any other named printing process –gravare, sublimation, block, letterpress, etc (1 mark) (2 marks)

(ii) Die-cutting or stamping (accept press-knife cutting)



A detailed explanation which might show cross section of die cutting tool or some other "pastry cutter" type tooling. Should reference sharp block for cutting, rounded block for creasing.
Possible processes include:
Die cutting or stamping
Press knife cutting or stamping
Forme (3 – 4 marks)

A partially correct explanation which might omit creasing rule or indicate printed image applied after cutting. (2 marks)

(**or** a school based method and/or development/net up to a maximum of 2 marks)

Superficial reference to stamping (1 mark) (4 marks)

Total 29 marks

Question 4

(a) **A - 35 mm film camera**
Advantages – Very good picture quality with proven technology very reliable. Interchangeable lenses with manual setting. Removable flash system. Speeds and shutter speeds can be adjusted for different effects. Use of filters. Film readily available in B&W or colour. Can be used with tripod.

Disadvantages – Heavy to carry replacement films are sensitive to light, Films have a shelf life. Take time to process the pictures. Complex to use, limited number of pictures, requirement to change films, etc.

B - 35 mm film disposable camera
Advantages – cheap to buy, simple to use, lightweight, compact size.

Disadvantages – This is not the best system for the environment very wasteful, as the camera is used once and thrown away. Limited functions often with poor lens quality. Has to be sent away for processing film.

C - phone camera
Advantages – easily carried small in size easily used to take quick photos. Can send pictures via blue-tooth technology (wireless). Part of another product which is always carried around.

Disadvantages- new technology untested, limited picture control and quality. Expensive.

D - digital camera with memory card
Advantage – the picture can be processed very quickly. Interchangeable memory cards to which can be reused. Small light and compact in design very good picture quality. Can delete unwanted pictures. Store images on computer. Can email images. No printouts needed.

Disadvantages – involved process to print pictures requires high volume batteries, battery life.

One advantage/disadvantage with qualification (2 marks)

Very simple statement (1 mark)
(4 × 2 marks)
(Accept answers for more than two cameras if rubric is not followed) (8 marks)

(b) Reference to continuous change new and developing technologies fashion / public taste, legislation safety standards, technology push/market pull, continuous improvement, etc.

Reason and qualification (2 × 2 marks)

Reason (2 × 1 mark) (4 marks)
Total 12 marks

Question 5

(a) **Quality of communication reward up to 2 additional marks (flair, use of colour, clarity, etc)**

(max 2 marks)

Accept both physical modelling and virtual modelling on computer.
Fully detailed sketches and/or annotation. All information must relate a modelling process to gain full marks.

(4 marks)

Detailed sketches and/or notes but minor omissions are evident (3 marks)

Several sketches with some annotation. (2 marks)

Simple sketches with a few labels (1 mark) (6 marks)

(b) Any suitable test during production of a prototype or product.
Test appears sensible and has clear measurable outcomes such as taste, strength, fire resistance, etc. It is fully clear what is being tested

(3 marks)

Test is detailed but it may not be clear what is being tested or for what purpose

(2 marks)

Single word or superficial response such as "fire test", "taste test", "strength test", etc (1 mark) (3 marks)

Total 9 marks

Question 6

(a) (i) Any suitable material which can be moulded, stamped, milled etc,
Plywood, MDF, aluminium, Polystyrene, felt, clay, card, biscuit mix, pastry, acrylic, etc (1 mark) (1 mark)

(ii) Any sensible reason related to chosen material such as:
Ease of production, cost, availability (1 mark) (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 candidates shows 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)

(Production that relies solely upon hand processed such as sawing, scissors, one-off production methods allow maximum of 2 marks)

Simple division of labour with no reference to manufacturing aids (1 mark)

(ii) A full list of tools and materials correctly named. (3 marks) (3 marks)

Some items not mentioned on the list (2 marks)

A limited list with some omissions (1 mark)

Reward responses in found in places other than the tools and equipment box

(iii) Quality of communication:
Drawing 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

Door and windows shown appropriately positioned (1 mark)

The process, which will be suitable for a batch of 50 is clearly explained and takes account of repeatability and accuracy. (3 marks)

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)

Superficial notes (1 mark) (4 marks)

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

A full response which might include: QA is 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.
(1 mark)

A more superficial response may refer to checks being made at various stages of production. (1 mark) (2 marks)

(e) Any 2 sensible safety rules which is related to named processes such as:
Tie back loose hair, wear goggles, clamp work prior to drilling, ensure guards are in place etc. (2 × 1 mark)

Any 2 sensible reasons related to rule which shows understanding such as:
Loose hair can get tangled in moving machinery
Particles from drilling might damage unprotected eyes
Work might spin round and cause danger etc. (2 × 1 mark) (4 marks)

Total 22 marks

Question 7

(a) The product is made from different materials, manufactured in different locations, manufacturing all components at the same time, non-compatible processes such as heat treatments etc. Different parts have different functions.

With an explanation (2 marks) (2 marks)

Without an explanation (1 mark)

(b) An appropriate example from students experience with clear notes and sketches used. A detailed explanation of the processes undertaken.

(3 – 4 marks) (4 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) Any of the following:

Flat pack, Cheaper for the producer, less storage required and smaller work force required. Easier to transport, etc.

(1 × 2 marks) (2 marks)

(d) Correctly named non-permanent fixings, nuts, bolts/screws/knock down fittings/screw threads Velcro, Poppers, Cocktail sticks etc.
Drawings clear and show how fixing works (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)

Total 11 marks

Question 8

(a) Any two of the following function listed:
To protect
To inform
To display
To transport
To contain
To preserve

With an explanation (2 marks) (4 marks)
Without an explanation (1 mark)

(b) **Container A** - advantages - material is transparent level of milk visible. Easy to hold, large volume, easy to pour. Re-sealable etc.
Container A - disadvantages –non biodegradable, heavy, difficult to pour

Container B- advantages - biodegradable, cheap to produce, advertising on the surface
Container B - disadvantages – Difficult to open, cannot reseal container. Difficult to pour. Difficult to recycle.

Container C- advantages – Clean to use, can be sterilised and reused. Can contain advertising. Easy to pour, transparent.
Container C - disadvantages – Difficult to hold by some users, cannot reseal container expensive to produce, brittle will smash on impact.

Any detailed advantage from above (2 marks)
Any superficial advantage from above (1 mark)

Same for disadvantage
Candidate must choose same container in order to achieve maximum marks (4 marks)

(c) Better for environment, reduces land fill, reduces pollution, breaks down naturally, etc (1 mark) (1 mark)

(d) **Symbol A -** Steel (1 mark) (3 marks)

Symbol B - Glass. (1 mark)

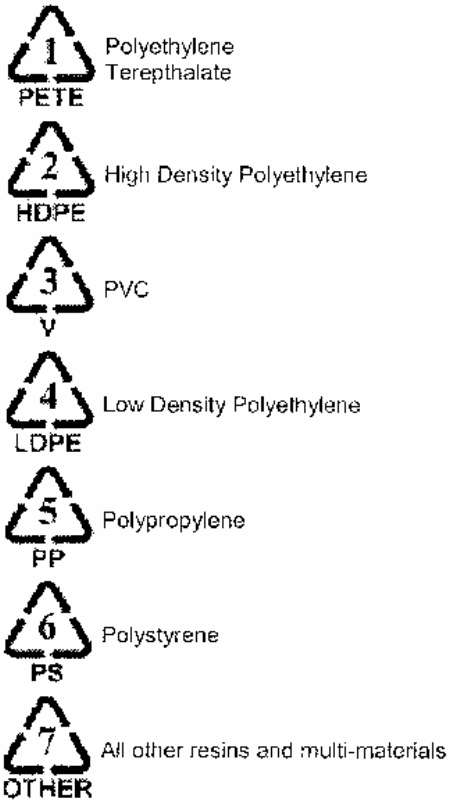
Symbol C - Aluminium (1 mark)

(e) Reasons such as preservation of natural resources, global warming, deforestation, environmental impact of landfill sites, sustainable supplies, increase in recycling bins, etc.

Full explanation (3 marks) (3 marks)
Partial explanation (2 marks)

Limited understanding of the issue (1 mark)

(f) Symbol with number in (2 marks)
Symbol without number or with letters only (1 mark)



Not accepting the following

Mobius Loop

Total 17 marks

Question 9

(a)	Computer Aided Design	(1 mark)	(1 mark)
(b)	**Advantages of using CAD** – changes can be made easily, electronic storage of designs, designs can be sent quickly via E mail, designs can be rotated/changed from 2D to 3D and rendered, accuracy.		
	An advantage relevant and well explained	(2 marks)	
	An advantage relevant but not explained	(1 mark)	
		(2 × 2 marks)	(4 marks)
(c)	Computer Aided Manufacturing	(1 mark)	(1 mark)
(d)	**Advantages of using CAM –** very accurate, particularly useful in producing large quantities of the same the object. Will run for extended periods of time. Reduction of labour costs etc.		
	An advantage relevant and well explained	(2 marks)	
	An advantage relevant but not explained	(1 mark)	
	(2 x 2 marks)		(4 marks) **Total 10 marks**

Total marks for paper = 125