



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

# June 2003

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## GCSE

### Design and Technology Product Design

3544

Higher

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**Design and Technology: Product Design**

## Higher Tier

Question 1

(a), (b) or (c) Any three sensible research methods:

Questionnaire/Survey	(1 mark)
Word process/ photocopy	(1 mark)
To identify the target market for the products. To identify suitable products for sale in the shop	(1 mark)
Visit other charity shops.	(1 mark)
Search the yellow pages or the Internet	(1 mark)
To find out what existing shops sell or what existing charities do.	(1 mark)
Write to charities that are experts in the field.	(1 mark)
Word process or e-mail experts.	(1 mark)
To gather information about existing charities and their products.	(1 mark)

Internet or library search

Using computer

To gather information about health issues.

Disassembly

Product Analysis.

**Total 9 marks**

Question 2

Food product answers as follows:

<p>(a) Salad. Cheese, Lettuce, tomatoes, corn, dressing.</p> <p>(2 marks)</p>	<p>(a) Spicy hot and sour soup. Pork, chicken stock, mushrooms, sesame oil, soy sauce, salt, chilli oil, vinegar, coriander and pepper. Stock and named spices. Tofu. Accept chicken</p> <p>(2 marks)</p>
<p>(b) Vegetable fibre content. Variety and freshness of ingredients leads to high nutritional values including protein and fat in the cheese, vitamins and minerals in the salad.</p> <p>(3 marks)</p>	<p>(b) Variety and freshness of ingredients leads to high nutritional values including protein, vitamins and minerals.</p> <p>(3 marks)</p>
<p>(c) High fibre content and a variety of vegetables helps protect against cancer. Cheese is a high fat food bad for heart disease suffers, but calcium content good for bone strength.</p> <p>(2 marks)</p>	<p>(c) processed nature of vegetables may lead to loss of valuable nutrients. Varied ingredients provide varied nutritional content, high in salt. Low fat and sugar.</p> <p>(2 marks)</p>
<p>(d) Individual or craft scale of production</p> <p>Accept batch</p> <p>(1 mark)</p>	<p>(d) Individual or craft scale of production</p> <p>Accept batch</p> <p>(1 mark)</p>

Oil burner/plant pot answers as follows:

<p>(a)</p> <p>Accept earthenware. Stoneware Clay. Colour achieved by using dipping in natural glaze.</p> <p>(2 marks)</p>	<p>(a)</p> <p>Earthenware plant pot. Decorative glazed design on outside of pot only. Slip.</p> <p>(2 marks)</p>
<p>(b)</p> <p>Stoneware tends to be robust, and readily available and is not expensive.</p> <p>Breakable, durable, waterproof.</p> <p>(3 marks)</p>	<p>(b)</p> <p>Earthenware clay is inexpensive and easy to work with. Inside of pot unglazed to enable water to be absorbed and held by the clay.</p> <p>Breakable, durable. Toxic fumes</p> <p>(3 marks)</p>
<p>(c)</p> <p>Stoneware is cheap and readily available. It is fired at a higher temperature and is less likely to fail during firing, because of its strength.</p> <p>(2 marks)</p>	<p>(c)</p> <p>Earthware clay is inexpensive and easy to work with. Readily available. Fired at a lower temperature.</p> <p>(2 marks)</p>
<p>(d)</p> <p>This oil burner is hand thrown as can be seen by the rings going around it. This is a craft or individual method of production for items produced in small batches.</p> <p>(1 mark)</p>	<p>(d)</p> <p>A batch produced item that is decorated by hand.</p> <p>Accept mass.</p> <p>(1 mark)</p>

Question 2

Book ends and CD rack answers as follows:

<p>(a)</p> <p>Sandalwood is actual but accept any suitable hardwood. Finish achieved by painting, wax or varnish.</p> <p>(2 marks)</p>	<p>(a)</p> <p>Thermoplastics, such as polyethylene are used for injection moulding. Fixings may include steel screws.</p> <p>(2 marks)</p>
<p>(b)</p> <p>Real woods when well finished are warm and smooth to touch. They are expensive looking. The wood used for carving needs to be dense with no visible grain. Carving requires skill and attention to detail. Sandalwood grows and is processed in Burundi.</p> <p>(3 marks)</p>	<p>(b)</p> <p>Thermoplastic can be used clear or coloured so give a modern appearance. It can scratch or discolour to look cheap though it is easily cleaned. Fumes that are harmful may be produced during manufacture. Colourful, strong. Can be reformed or recycled.</p> <p>(3 marks)</p>
<p>(c)</p> <p>Deforestation.</p> <p>The forests are being destroyed at an alarming rate; this will lead to environmental problems if new trees are not planted to replace those used. Carving provides employment for many people.</p> <p>(2 marks)</p>	<p>(c)</p> <p>Plastic does not degrade when thrown away so causes problems as rubbish in landfills. Fumes that are harmful may be produced during manufacture and incineration. Can be reformed or recycled.</p> <p>(2 marks)</p>
<p>(d)</p> <p>The bookends are hand carved individually.</p> <p>Accept batch / job / or jobbing production.</p> <p>(1 mark)</p>	<p>(d)</p> <p>CD racks are a mass production item.</p> <p>Accept batch.</p> <p>(1 mark)</p>

Textile product answers as follows:

<p>(a)</p> <p>Sarong made from silk which is a natural but expensive fabric decoration by Batik Dye and thread</p> <p>Accept cotton</p> <p>(2 marks)</p>	<p>(a)</p> <p>Shorts made from 100% manufactured fibre including lycra and nylon.</p> <p>Dye and thread. Sewn/iron on logos. Elastic.</p> <p>(2 marks)</p>
<p>(b)</p> <p>Pure silk can shrink if not washed by hand and dries slowly. Gets heavy when wet. It needs to be handled with care. Must be hand washed. Dye colours may fade or wash out in hot water. Cool and light weight. Non irritant.</p> <p>(3 marks)</p>	<p>(b)</p> <p>Nylon is a hard-wearing material that dries easily when washed; it is light and when mixed with lycra (elastane) makes a very flexible fabric. Can be machine-washed. Holds shape/support.</p> <p>(3 marks)</p>
<p>(c)</p> <p>Pure silk is a natural and renewable resource. Biodegradeable.</p> <p>(2 marks)</p>	<p>(c)</p> <p>New fabrics are being developed continually. Most are made from the by-products of the refining of oil.</p> <p>(2 marks)</p>
<p>(d)</p> <p>Batik is a handcraft. These items are made individually to form small batches.</p> <p>(1 mark)</p>	<p>(d)</p> <p>Sports shorts are in demand and are mass-produced.</p> <p>(1 mark)</p>

One mark per box for a partially correct answer.

Full marks per box for full answer showing understanding.

**Total 16 marks**

Question 3

- (a) To protect a new design idea, a 'Patent' has to be applied for through the 'Patent office'.  
Designs may also be registered or a copyright applied. Trade marking. (1 mark)
- (b) (i) Care labels should be attached to clothing to comply with BSI and EU regulations, to protect the customer from damaging the product. (2 marks)
- Inform how to care for clothes and not damage them. (1 mark)
- (ii) The label gives details of washing instructions with
- A maximum temperature of 40c
  - **reduced** mechanical action,
  - The item should not be bleached,
  - Not Tumble dried,
  - Not ironed.
- 2 marks for a correct answer including most points correct.
- 1 mark for stating the correct washing instructions as above. (2 marks)
- (c) (i) BSI stands for British Standards Institution. (2 marks)
- (ii) Companies use this as a quality mark that suggests that their product has passed British Standards **tests**. This is used to attract customers who may buy the product they expect it to be reliable. In turn the production of quality items gives a company a good reputation which will increase sales. Must mention 'tests' to get full 3 marks. (3 marks)
- (iii) Manufacturers can buy copies of the relevant standards which include details of test that products have to pass to qualify for the standard mark. The manufacturer has to meet the specified criteria. (2 marks)

**Total 12 marks**

Question 4

(a) A prototype is the initial model of a product made to test the viability of an idea. (1 mark)

(b) Correct naming of stages of production may include:  
Preparation of materials, Organisation of equipment,  
Processes used,

Finishing techniques and processes.

Quality control checks. (3 marks)

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(c) Materials correctly prepared. M (2 marks)

Names of tools and equipment,

1 mark for each suitable tool. Maximum 4 marks E (4 marks)

Clear understanding of manufacturing processes and sequence correct.

1 mark for each stage Maximum 6 marks P (6 marks)

Up to 2 marks for clarity of response C (2 marks)

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SEE NEXT PAGE FOR TABLE



	<b>Shorts</b>	<b>Sarong</b>	<b>Salad</b>	<b>Soup</b>
<b>Preparation of materials</b>	Iron material, check pattern, cut and pin to fabric.	Wash material, measure and cut to size, mix dye, prepare wax. Paint, block, screen.	Wash all salad ingredients, weigh out cheese.	Wash meat, wash vegetables, weigh ingredients, slice meat, chop vegetables.
<b>Naming tools and equipment</b>	Scissors, needle, pins, sewing machine, over locker.	Scissors, needle, pins, sewing machine, dye bath, Batik wax pot. Paints, block, screen.	Scales, knives, chopping board, bowl.	Scales, knives, chopping boards, wooden spoon, metal pot with lid.
<b>Description of processes</b>	Cut out fabric, pin and tack, remove pins, machine together.	Dye material orange, apply black design, fix machine hems.	Slice cheese, chop salad ingredients, mix in a bowl.	Fry meat, mushrooms, onions, herbs, add stock and simmer.
<b>Finishing techniques and processes</b>	Cut loose threads, iron.	Cut loose threads, iron.	Mix dressing and toss salad. Serve on plates.	Garnish with herbs/fried bread.
<b>Safety precautions</b>	Care in using sewing machine, scissors etc. Heat of iron.	Care in using the sewing machine, needles, scissors, heat of iron and wax pot.	Clean all equipment, care in chopping ingredients.	Care in chopping ingredients, all equipment must be clean, care with heat and hot liquid.
<b>Quality control checks</b>	Check all seams. No loose threads.	Check dye is fast. All wax is removed. No loose threads, seams are straight.	Cheese sliced equally. Check sell by dates. Equal servings. Check moisture content of cheese.	Check sell by dates. Ingredients well chopped (equal size). Ingredients well cooked. Taste test.

	Book ends	CD rack	Accept Slip Casting or Throwing	
			Oil burner	Plant pot
<b>Preparation of materials</b>	Cut sections to size. Mark out design to cut.	Heat plastic granules. Turn on machines. Prepare mould.	*Clean and check mould fasten mould together, mix slip. *Wedge clay, roll into ball, throw into centre of wheel.	
<b>Naming tools and equipment</b>	Mallet, chisels, marking knife, band saw/scroll saw, ruler, pencil, try square.	Mould, hack saw, files, *injection moulder, *oven (plastics oven), *vacuum former.	*Mould, leather strap or rope, sponge, fettling tool, wooden tool. *Potters wheel, cutting wire, metal turning knife, glaze bucket, kiln.	
<b>Description of processes</b>	Cut outline, of design, shape detail with chisel, glue sections together.	*Heat plastic, force into mould, let cool, remove file off sprue, *cut frame supports.	Wheel turns, move clay and down shape, push hand into centre to shape, cut shape from wheel.	Pour slip into mould, check thickness with pin. Remove excess slip, leave to dry. Remove from mould.
<b>Finishing techniques and processes</b>	Sand rough edges, paint on design, wax or varnish.	File all rough edges, assemble frame and insert shelves.	Turn using metal tool.	Smooth with wooden tool.
			Biscuit fire to 1000°C, decorate or glaze, glaze fire 1060°C – 1160°C	
<b>Safety precautions</b>	Wear goggles when using machinery, keep hair and loose clothing tied safely.	Use protective gloves and face mask whilst heating plastic.	Wear protective clothing when using the kiln, glaze powder may contain toxic chemicals so wear a face mask, wear goggles when necessary. Gloves for mixing slip	
<b>Quality control checks</b>	All sections securely fixed together. No rough edges.	CD Shelves and frame must have no rough edges. All sections must fit together.	Visual check of shape, may use callipers to check size or diameter. Visual check of glaze or decoration. Kiln temperature, check clay has no air bubbles.	

\* May accept either process

- (d) Understanding of Health and Safety issues with equipment named, with safe use clearly explained

1 mark for each safety issue raised.

Maximum 4 marks

Simply naming unrelated equipment with irrelevant explanation (Goggles, apron, gloves)

Maximum 2 marks

**Total 22 marks**

### Question 5

- (a) Packaging is to protect, advertise, contain and inform. Transport. (3 marks)

- (b) (i) Rubbish caused by careless dropping of empty containers causes local problems.  
People need to be more environmentally aware.  
Danger to trapped animals.  
Landfill sites are filled quickly. More packaging needs to be recycled.  
Broken glass can cause injury.  
Reference to reuse or reducing amount of packaging

1 mark for each correct answer

Maximum 6  
marks

3 marks for full and workable explanation.

(6 marks)

- (ii) Composite material is when two or more materials are combined by bonding.

(1 mark)

They are produced to have improved properties for specific purposes.

(1 mark)

When packaging food products composites are used to give food safe package that is light, air tight, and suitable for printing onto.

(1 mark)

C cannot be recycled as it is made of composite material which includes a mixture of different materials which would have to be separated for recycling.

(1 mark)

**Total 13 marks**

**Question 6****(a) Quality of idea**

One vague idea	(1 mark)
Quality idea	(2 marks)
Quality idea original in approach or principal	(Maximum 3 marks)

**Quality of notes**

Evidence of labelling	(1 mark)
An explanation of the idea	(2 marks)
Clear and detailed explanation	(3 marks)
As above with evidence of analytical thinking	(Maximum 4 marks)

**Quality of sketches**

Simple line drawing	(1 mark)
Quality line drawing or an attempt at 3D representation	(2 marks)
Quality 3D drawing	(Maximum 3 marks)

**(b) Quality of drawing**

Little evidence of a workable solution	(1 mark)	
Some evidence of a workable solution	(2 marks)	
Workable solution	(3 marks)	
Good workable solution/tabs included or reference made to vacuum forming.	(4 marks)	Orientation correct
Very good workable solution	(5 marks)	
Very good workable and imaginative solution	(6 marks)	
Excellent accurately drawn imaginative and workable solution	(Maximum 7 marks)	

**Correct information**

- Only one or two pieces of vital information included. (1 mark)
- Some vital information included with more than one significant omission. (2 marks)
- Most vital information included but with a significant omission. (3 marks)
- Bar code, recycling symbol, indication of age limits or weight, a relevant BSI symbol; all included with annotation regarding manufacturing material. (Maximum 4 marks)

**Total 21 marks**

Question 7

- (a) Using CAD means that designs can be tested before they are made. (1 mark)
- Different elements of a design can be brought together, (pictures, photographs, bar codes and printed information). Measurements calculated accurately. (1 mark)
- Designs are produced on computer and then sent directly to a machine to be made. (1 mark) Maximum  
3 marks
- (b) The computer informs the machine what shapes to cut out and print avoiding possible mistakes due to human error. Machines calculate best fit of repeated shapes. (2 marks)
- Machines can cut and fold card packages avoiding people getting involved in high risk operations. (2 marks)
- and put tops and labels on plastic ones after the packages has been filled. (1 mark)
- The packages are moved around the machines by conveyor belt with workers only used to keep the machines running and to check the work is being done correctly. (2 marks)
- 2 marks only when reasoned explanation given, for each example

- (c) Wind energy – Wind farms seen as an eye sore but resource freely available, especially in some areas of this country.

Solar power – weather can be a problem but solar power simply needs light. Solar cell systems are expensive to install in individual properties but any surplus energy produced can be sold back to electricity companies.

Water or hydroelectric power – Dependant on terrain of the country and power has to be transported to areas of civilisation as good hydroelectric sites are usually in mountains far from cities.

Geothermal – hot rocks

Maximum 2 marks for simply naming energy sources.

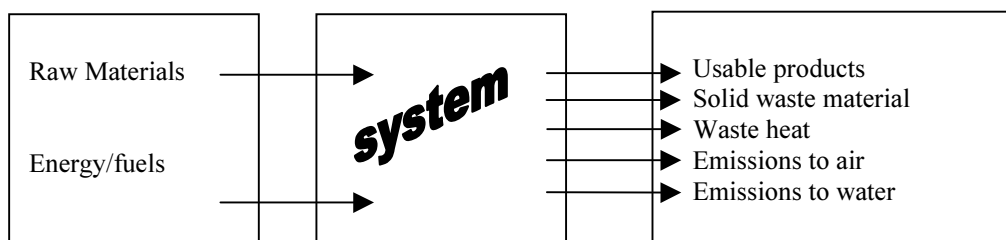
Each source must have at least one advantage and disadvantage for full marks.

(6 marks)

- (d) 1 mark for each correct answer.

**Inputs**

**Outputs**



Maximum 3 marks

**Total 16 marks**

**Question 8**

- (a) New display areas will need to be installed.

The Health and wellbeing shops signs.

Security in the shop as a corner building it has a big glass window area.

Lighting may be a problem.

Staffing levels may be a problem.

Regulations regarding access for the disabled facilities.

Maintenance and safety.

Room for queues at cash desks.

Cost of shopfitting.

Easy access fire exits

(4 marks)

- (b) Award marks for sensible layout that includes the following:

Ability to move around units/sensible use of space (1 mark)

Textile display unit appropriately placed (1 mark)

Security cameras appropriately placed (1 mark)

Till points either side of exit or at sensible points. (1 mark)

Appropriate number and placement of low level (1 mark)

Appropriate number of and placement of higher level (1 mark) (6 marks)

Award up to 2 marks for clear drawing and notes locating fixtures on the plan. (2 marks)

Maximum 8 marks



(c) Clear reasons that relate to the specification such as: (Mark C before B)

Large fitting placed by walls with low fittings providing visibility for security reasons.

Till points near exit for security.

Security cameras placed for a maximum visibility.

Store may be divided into area for products made of different materials or products focusing on different senses. (Smell, taste, vision, feel, hearing) or different activities (eating, sleeping, doing sport, relaxing). To encourage customers to move around the store.

Large spaces between displays to enable people n wheelchairs to move easily around the shop.

Maximum 4 marks

**Total 16 marks**

**TOTAL MARKS FOR PAPER: 125**