SCOTTISH QUALIFICATIONS AUTHORITY

2006 Product Design

Intermediate 2

Finalised Marking Instructions

Product Design – Intermediate 2

SECTION A

Question 1(a)

(i) *"Properties of HDPE"*

- Tough/strong
- Durable
- Resists chemicals
- Lightweight
- Can be thermo formed etc
- Can be mass-produced
- In built colour/no need to paint it/no finish required
- Weatherproof/waterproof/won't rot
- Easily cleaned/can have a smooth surface
- Rigid (fairly)
- etc

Any 2 answers @ 1 each **(2)**

(ii) *"Suitable manufacturing process"*

- Vacuum forming/vacuum moulding
- Compression moulding
- Injection moulding
- Rotational moulding
- Blow moulding

NOT Thermoforming or Moulding

1 @ 1 mark **(1)**

(iii) *"Reasons for suitability of steel tube"*

- Light/lightweight
- Strong
- Rigid/doesn't bend
- Any sensible comparison with sold material
- Easy to drill, cut, join etc
- Cables can be run through it
- Readily available/standard component/cost effective/cheap
- Easy to finish/paint/powder coat etc

Any 2 answers @ 1 each **(2)**

(iv) *"fixing method"*

- Bolts
- All types of rivets
- Screws/studding
- Uprights located in sockets/pockets within the mould

NOT Nails/glue/knock-down fittings/clips/connectors/nuts

Any 1 answer @ 1 **(1)**

(v) *"surface finishes"*

- Plastic coating/Dip coating/Powder coating
- Galvanising/Sheradising
- Electro-plating
- Paint (+ gloss, cellulose, polyurethane, Hammerite, lacquer, spray etc)

NOT Paint on its own, Emulsion paint, Acrylic paint etc

Any 2 answers @ 1 each **(2)**

Question 1(b)

(i) *"anthropometrics"*

- Hand sizes
- Standing height sizes
- Arm reach
- 5^{th}-95^{th} percentile target user group
- The size of a wheelbarrow part with which the human interfaces
- etc

Any 1 piece of anthropometric information linked to appropriate wheelbarrow part @ 2 marks **(2)**

(ii) *"physiology"*

- Lifting - handles
- Seeing - high visibility colours
- Pushing - loaded barrow
- Gripping - handles
- Levering - brake
- Squeezing - trigger
- etc

Any 1 verb linked to appropriate wheelbarrow part @ 2 marks **(2)**

(iii) *"psychology"*

Issues are:

- Comfortable grip on handle
- Easily understood controls
- Understanding of brake mechanism
- Confidence in braking system
- Confidence in big yellow tyre for pushing
- 'Hygienic' materials
- etc

As psychology is easily linked with emotion, some sensible reference to happy, sad, desire, secure, safe, modern lifestyle, expensive image, user friendliness etc is also acceptable.

To gain 2 marks, responses would need to include an emotion/feeling linked to the wheelbarrow.

Any 1 described answer @ 2 marks **(2)**

Question 1(c)

(i) *"Ease of maintenance"*

- Cleaning
- Painting
- Replacing
- Servicing
- Lubricating

Any of the above activities linked to an appropriate part/requirement of the barrow.

Any 1 described answer @ 2 marks (max 2) **(2)**

(ii) *"safety"*

- Rounded edges
- Brakes
- British/European/World standards
- Well balanced
- Centre of gravity
- Ease of tipping
- Strength
- Instruction booklet/user guide

Any of the above safety issues linked to an appropriate part/requirement of the barrow

Any 1 described answer @ 2 marks (max 2) **(2)**

(iii) *"durability"*

- Waterproof
- Weatherproof
- Scratchproof
- Strong
- Easily maintained
- Solid construction
- Tough materials
- References to lifespan

Any of the above issues linked to an appropriate part/requirement of the barrow.

Any 1 described answer @ 2 marks (max 2) **(2)**

Total for section A: 20 marks

SECTION B

Question 2

"Compare Aesthetic qualities" of over door hangers:

- Plain versus fancy
- Modern versus traditional
- Silver versus black
- 2D versus 3D
- Shiny versus matt
- Straight lines versus curves
- Both look as if they are made of metal
- Both look smooth
- Both look as if they are factory made

Candidates may give contrasts, comparisons, opposites or similarities.

4 @ 1 mark per relevant visual comparison **(4)**

Question 3

*Issues to be researched **before** producing a specification:*

Candidates may simply list five general "research paths" from the following:

- Function
- Environment
- Ergonomics
- Durability
- Safety
- Cost
- Aesthetics
- Materials
- Manufacturing processes
- Existing products

If they list five they score 1 mark.
If they list four they score zero.

They have to **state** the issue and **explain** its relevance to gain a full mark for each.

NOTE: question asks for research **before** producing a specification

The full list is extensive and would include any of the following PLUS a relevant piece of additional information:

- Non slip +
- Treads +
- Comparison with similar products +
- Identifying target users/target purchasers +
- Storage +
- Easy grip +
- Lightweight +
- Materials
- etc

eg The feet must not slip about

Although this reads as a line out of a Design Specification, it is a typical Intermediate 2 candidate's way of saying that the material for the feet must be researched as it must be non-slip.

It gains a **full mark** as it makes the **link between 2 out of 3** of the following.

The part	FEET
The issue to be researched	NON SLIP MATERIALS
The reason	IF THE LADDER SLIPS IT COULD BE DANGEROUS

Any 5 @ 1 mark each **(5)**

Question 4

(a) *"Manufactured boards"*

- Blockboard/laminboard
- Plywood/stout-heart plywood
- MDF
- Hardboard
- Chipboard
- Contiboard
- Pinboard/Sundeala board/Notice-board
- etc

Any 2 "wood based" boards @ 1 mark each **(2)**

(b) *"reasons for using manufactured boards"*

- Available in large sheets/quick area coverage
- Stable in varying temperatures
- Thin veneers of expensive timbers sandwich cheaper cores
- Easier to work with
- Tend to be less expensive (cheaper) than solid timber
- Choice of grain
- Smooth surface/textured surface
- Strong in both/all directions
- Hard wearing/durable/strong
- Heat resistant
- Easy to clean/hygienic
- More environmentally friendly
- etc

Any 3 reasons @ 1 mark each **(3)**

Question 5

(a) In response to parts (i), (ii) and (iii) of this question candidates may choose design issues ie

- Function
- Environment
- Ergonomics
- Durability
- Safety
- Cost
- Aesthetics
- Materials
- Manufacturing processes
- etc

or as the question asks "aspects of the vacuum cleaner" ie

- On/off buttons
- Suction
- Manoeuvrability
- Emptying
- Colours of the various parts
- Length of hose
- Weight of product
- etc

Either approach is acceptable.

Generic/non specific descriptions of the following 3 evaluation techniques, without any link to either "design issues" or to "the product", gain 1 mark each.

(i) *"user trial"*

Aspect of product design/issue + description must suit evaluation by a user trial.

Marks awarded for a description based on a 2-1-0 range. **(2)**

(ii) *"test rig"*

Aspect of product design/issue + description must suit evaluation by a test rig.

Marks awarded for a description based on a 2-1-0 range. **(2)**

(iii) "survey"

Aspect of product design/issue + description must suit evaluation by a survey.

Marks awarded for a description based on a 2-1-0 range **(2)**

Question 5

(b) *"symbol information"*

- identifies it as a plastic
- is recyclable/can be recycled/has been recycled
- names the plastic
- groups the plastic
- polypropylene

Any 2 @ 1 mark each **(2)**

Question 6

(a)(i) *"injection points"*

Visual or functional descriptions are acceptable

eg "small mark which shows where the plastic was injected into the mould"
eg "small mark/nipple which is cut off later"
eg "small mark which is visible from the back as a sink-mark due to contraction"

Marks awarded for a description based on a 1-0 range

(ii) *"webs"*

Visual or functional descriptions are acceptable

eg "inbuilt into the mould, a wall which gives stiffness to the product/component"
eg "a wee, stiffening, strengthening rib"
eg "visible from the back as a groove or valley"
eg "an upright piece of plastic between two points"

Marks awarded for a description based on a 1-0 range

(iii) *"ejector marks"*

Visual or functional descriptions are acceptable

eg "round marks which show where the component was pushed out of the mould"
eg "small circular dents"

Marks awarded for a description based on a 1-0 range

In all of the above, the candidate may refer to evidence which they can see on the graphic. **(3)**

(b) *"initial set up costs"*

- purchase of expensive machinery/equipment
- purchase of computers to make it all work
- purchase of expensive moulds
- mould design/rapid prototyping
- staff training due to cost of computers
- mould manufacture

NOT Cost of plastic/raw materials

Any 2 @ 1 mark each **(2)**

Question 6

(c) *"cheap production method"*

- moulds are reusable
- it is mass-production/24-7 production/flow production
- large numbers can be produced
- identical components
- little wastage
- CAD/CAM/CADAM/CNC etc
- few errors/few mistakes
- it's a cheap way of making detailed/complex items
- raw materials for process can be reclaimed/recycled
- automated process
- minimal workforce (low wage bill)
- batch production
- etc

Any 2 @ 1 mark each **(2)**

(d) *"thermoplastic"*

- Polythene
- Polycarbonate
- ABS
- Polypropylene
- Polystyrene
- Nylon
- PVC
- Acrylic
- etc

Any suitable thermoplastic 1 @ 1 mark **(1)**

Total for section B: 30 marks

[END OF MARKING INSTRUCTIONS]