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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Design and Technology Resistant Material Technology 3545/F

Foundation Tier

Mark Scheme

2008 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.

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1 Any **four** correctly identified requirements.

Possible responses:

1. Must be stylish
2. Must be capable of being manufactured in quantity
3. Must be safe to use
4. Must be ergonomically designed
5. Must be waterproof
6. Must be stable
7. May mention material first followed by reason — 4 × 1mark

Any **four** relevant explanations

1. You are more likely to sell a stylised design
2. This will ensure that the price is kept low and the quality kept high
3. No one should injure themselves when using the camping chair
4. The user should find it comfortable to sit on
5. It could be out in wet weather
6. If should not fall over when being sat on — 4 × 1mark

Total 8 marks

2 Quality of sketches

- Quality 3D rendered sketches — 5 – 6 marks
- Quality line sketches or an attempt at 3D sketches — 3 – 4 marks
- Simple line sketching — 1 – 2 marks

Quality of notes

- Detailed explanation — 3 marks
- Simple explanation — 2 marks
- Labelling — 1 mark

Variety of ideas

Mark each idea separately for evidence of:

- Seating — 1 mark
- Eating surface — 1 mark
- An excellent idea which, differs in approach or principal, fulfils the design brief, specification and shows originality. — 4 marks
- A very good idea which differs in approach or principal, fulfils the design brief and the specification. — 3 marks
- A good idea which differs in approach or principle, fulfils most of the design brief and specification. — 2 marks
- An idea which is a development of one of the other ideas. Or an idea which is very similar to the other ideas. — 1 mark

3 × 6 marks

Total **25 marks**

3 Award **one** mark for **each** correctly entered cell.

Answers must relate to:

Symbol	Meaning	Process
A	*Safety glasses must be worn*	*When drilling a piece of metal*
B	A dust **mask** must be worn	When sanding a piece of wood/spray painting
C	Ear defenders/protection/muffs/plugs must be worn	When machining a piece of wood
D	Gloves must be worn	When handling hot/sharp/toxic materials
E	Highly flammable	When using a solvent based adhesive/spray painting
F	Electrical hazard	When maintaining electrical equipment

Total 10 marks

4 (a) **Either design could be made from wood, metal or plastic**

Award **one** mark for the generic term plastic.

Award **two** marks for any suitable specific plastic.

Possible responses:

- ABS
- GRP
- HIPS
- Polycarbonate
- Polypropylene
- HDPE
- PVC
- Acrylic
- HDPE
- Foamex Foamed PVC etc.

2 × 1 mark

Reasons
Possible responses:

- Immaculate surface finish
- Self coloured
- Ideal for quantity production
- Durable
- Weatherproof

1 × 1 mark

Award **one** mark for the generic term metal
Award **two** marks for any suitable specific metal

Possible responses:

- Steel
- Aluminium
- Brass

2 × 1 mark

4 (a) Reasons

Possible responses:

- Good strength to weight ration
- Durable/strong
- Cost (inexpensive)
- Suitable for quantity production

Award **one** mark for the generic term wood

Award **two** marks for any suitable hardwood/ softwood/ manufactured board.

Possible responses:

- Beech
- Ash
- Oak
- Teak
- Mahogany
- Pine
- Plywood
- mdf

2 × 1 mark

Reasons

Possible responses:

- Attractive
- Strong / sturdy
- Durable

1 × 1 mark

4 (b) Use the descriptors below to award marks
Quality of notes and sketches

Detailed notes and quality sketches	3 – 4 marks
Simple notes and sketches	1 – 2 marks

Marking out (traditional)

Sufficient detail for most of the design to be marked out by a third party, most tools and equipment given.	3 – 4 marks
Sufficient detail for some of the design to be marked out by a third party, some tools and equipment given.	1 – 2 marks

Or

Marking out CAD

Monitor/mouse/keyboard		1 mark
Graphics package e.g.	Techsoft 2D Designer Pro desktop Corel draw	1 mark
Description of how to produce the image		1 – 2 marks

Cutting and shaping (traditional)

Sufficient detail for most of the design to be cut and shaped by a third party, most tools and equipment given.	3 – 4 marks
Sufficient detail for some of the design to be cut and shaped by a third party, some tools and equipment given.	1 – 2 marks

Or

Cutting and shaping CAM

Transfer of data to CAM	1 mark
Laser cutter/CNC router	1 mark
Description of how the cut and shape the cup holder	1 – 2 marks

Bending / joining (traditional)

Sufficient detail for most of the design to be bent and joined by a third party, most tools and equipment given.	3 – 4 marks
Sufficient detail for some of the design to be bent and joined by a third party, some tools and equipment given.	1 – 2 marks

Or

Joining CAM

Transfer of data to CAM	1 mark
Laser cutter/CNC router	1 mark
Description of how to cut the joints	1 – 2 marks

4 (b) **Finishing (traditional)**

Sufficient detail for most of the design to be finished by a third party, most tools and equipment given.	3 – 4 marks
Sufficient detail for some of the design to be finished by a third party, some tools and equipment given.	1 – 2 marks

Or

Finishing. (Laser cut)

Sufficient detail for most of the design to be finished by a third party, most tools and equipment given.	3 – 4 marks
Reference to the fact that a laser cut stand would not need finishing as the laser produces a good quality finish.	2 marks
'No finish required' without explanation.	1 mark

Total **23 marks**

5 Serving spoon A

- Award **one** mark for the generic term wood. Or an incorrect <u>solid</u> wood e.g. pine mahogany
- Award **two** marks for a suitable solid wood

Possible responses:

- beech
- birch
- sycamore
- maple
- ash
- rubber wood

2 marks

Reasons

Possible responses:

- Attractive
- Strong
- Durable
- Safe
- Hygienic

1 × 1 mark

Serving spoon B

- Award **one** mark for the generic term plastic or an incorrect plastic eg: acrylic, thermoset, ting plastics, thermoplastic.
- Award **two** marks for a suitable specific plastic.

Possible responses:

- ABS
- HIPS
- Polycarbonate PC
- Polypropylene PP *
- HDPE
- PVC
- melamine

2 marks

5 Possible responses:

- Immaculate surface finish (shiny) (smooth)
- Self coloured
- Ideal for quantity production suitable for moulding/forming
- Durable
- Hygienic
- Re-cyclable

1 × 1 mark

Serving spoon C

- Award **one** mark for the generic term metal or for an incorrect metal eg: aluminium, chrome, steel
- Award **two** marks for a suitable specific metal

Possible responses:

- Stainless Steel
- Silver
- Chrome plated brass etc.

2 marks

Reasons

Possible responses:

- Good strength to weight ratio
- Durable
- Cost (inexpensive, steel)
- Hygienic
- Springy (returns to shape)
- Shiny

1 × 1 mark

Total 9 marks

6 Award **one** mark for **each** correctly entered cell.

Mark to the grid

Joint	Fixing letter	Name of fixing	Tool name
1.	**D**	**KD. fitting cam-bolt cam-lock**	**screwdriver**
2.	**B**	**screw**	**screwdriver**
3.	**C**	**bolt nut and washer**	**Spanner/ socket/ wrench/Allen key**
4.	**A**	**rivet pop/blind**	**rivet gun pop/blind**

Total 12 marks

7 Award **one** mark for **each** correctly identified part.

(a) Chain/link/rivet — 1 mark
(b) Sprocket (chain ring/chain wheel) — 1 mark

Award up to **two** marks for a suitable explanation.

(c) Look for **two** from the following details:

- Your leg drives the sprocket (chain ring) via the pedal/crank assembly
- The front sprocket (chain ring) drives the chain
- The chain transfers power to the rear sprocket (cassette/cluster)
- The rear sprocket (cassette/cluster) turns the wheel

2 marks

(d) Award **one** mark each for **two** correctly identified maintenance operations.

Possible responses:

Cleaning the chain
Oiling the chain
Adjusting the chain check/tighten bolts
Check for stiff/broken links
Check for stretch
Check for tooth damage

2 × 1 mark

(e) Award up to **four** marks for a suitable explanation.

Look for the following details:
Award **two** marks for detailed explanations or **four** marks for a simple list.

- Extends the life of the machine
- The machine runs efficiently
- The machine runs smoothly/quietly
- The machine is safer to use

4 marks

Total 10 marks

8 (a) **Two** reasons required

Possible responses:

- The fork will be very difficult to use
- The fork will be dangerous to use

2 × 1 mark

Two relevant explanations required

2 × 1 mark

(b) Award **one** mark **each** for any of the following ergonomic features:

- Rounded edges
- Simple shaping
- Complex shaping (finger/thumb grooves)
- Textured surface/colour
- Evidence of a hilt
- RH / LH considerations
- Hanging hole
- Extended length for heat
- Different material for grip

5 × 1 mark

Quality 3D sketch with notes	3 marks
Simple sketch with notes/ Quality sketch no notes/ Quality notes no sketch	2 marks
Simple sketch or notes	1 mark

Total **12 marks**

9 (a) Award **two** marks for a suitable smart material

Possible responses:

- polymorph

2 × 1 mark

(b) Award **two** marks for **two** correctly identified advantages.
Does not have to relate to answer (a) above.

Possible responses:

- Quick to produce
- Can be easily moulded into shape
- Gives an accurate shape
- Has a high quality finish
- Can be re used
- Can be modified
- Less costly than the real thing
  Cheap (0)

2 × 1 mark

Award **two** marks for **two** correct explanations

2 × 1 mark

Total **6 marks**

10 Award **one** mark for **four** correctly entered word.

(a) A designer should make sure that their design is ***safe*** to use and that it does not ***offend*** any particular groups of people.

A manufacturer should make sure that the materials and finishes they use are ***non-toxic*** and that they do not ***pollute*** the environment.

4 × 1 mark

(b) Award **two** marks for **two** correctly identified reasons.

Possible responses:
Award **two** marks for detailed explanations or **four** marks for a simple list.

- Packaging uses up our natural resources
- Packaging looks unsightly
- Packaging fills up landfill sites
- Packaging can harm wildlife
- Difficult to re-cycle

2 × 1 mark

Total **8 marks**