



General Certificate of Secondary Education

Design and Technology (Resistant Materials Technology) Foundation Tier 3545/F

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.

Question 1

Any **four** correctly identified requirements.

Possible responses:

Do not accept repeat of “brightly coloured”

Must be entertaining / interesting

Must be soundly constructed

Must be capable of being manufactured in quantity

Must be safe to use

Must be made from non toxic materials

Must have no small / detachable parts

Must be educational

Weight related responses

Ergonomic/anthropometric related responses

4 x 1 mark

NB. Avoid obvious repeats.

Four correct explanations

4 x 1 mark

8 marks

Question 2

One answer provides enough evidence to award full marks for sketches and notes.

Quality of sketches

Quality 3D rendered sketches	<i>4 – 5 marks</i>	
Line sketches or an attempt at 3D sketches	<i>2 - 3 marks</i>	
Simple line sketching	<i>1 mark</i>	5 marks

Quality of notes

Detailed explanation	<i>5 – 6 marks</i>	
Simple explanation - descriptive	<i>3 – 4 marks</i>	
Labelling	<i>1 - 2 marks</i>	6 marks

Variety of ideas

Mark each idea separately against the following scheme

An excellent idea which, differs in approach or principal, fulfils the design brief, specification and shows originality	<i>6 marks</i>
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A very good idea which differs in approach or principal, fulfils the design brief and the specification	<i>5 marks</i>
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A good idea which differs in approach or principle, fulfils most of the design brief and specification	<i>4 marks</i>
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An idea which differs in approach or principle, fulfils some of the design brief and the specification	<i>3 marks</i>
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Own idea which is very similar to the other ideas with some development	<i>2 marks</i>
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Own idea which is very similar to the other ideas	<i>1 mark</i>
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(2 and 3 of three similar shape sorters would not achieve full marks but different shape sorters may.)
 (Close copies of abacus from the insert sheet with development max 1 *mark*)
 (Close copies of abacus from the insert sheet max 0 *marks*)

<i>3 x 6 marks</i>	18 marks
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29 marks

Question 3

- (a) Any **two** correct reasons required which relate to the performance of the design
No need to qualify

2 x 1 marks

“Better” on its own

0 marks

2 marks

- (b) Any **two** correctly circled modelling/prototyping materials.

Possible responses:

Criteria: must be cheap and or compliant

Balsa

Steel

Card

Aluminium

Mahogany

M D F

If more than 2 circled

2 x 1 marks

0 marks

2 marks

- (c) Award **one** mark each for a correct reason

Possible responses:

They are easy to cut into shape

They are quick to cut into shape

They are cheaper than the real materials

They don't require special equipment to work them

They allow judgements to be made

They look realistic

Performance testing answer

2 x 1 mark

(no double penalty if choose wrong material)

Award **one** mark for a suitable explanation

2 x 1 mark

4 marks

8 marks

Question 4

- (a) Designs could be made from wood, metal or plastic.

Plastic

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

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

Material - Possible responses:

ABS

GRP

HIPS

Polycarbonate PC

Polypropylene PP

HDPE

PVC

Acrylic

2 marks

Reasons - Possible responses:

Immaculate surface finish

Self coloured

Ideal for quantity production

Durable

Weatherproof

1 mark

Metal

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

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

Material - Possible responses:

Steel

Aluminium

Brass

2 marks

Reasons - Possible responses:

Good strength to weight ratio

Durable

Cost - if related to correct material (inexpensive)

Suitable for quantity production

1 mark

Wood

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

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

Material - Possible responses:

Beech

Ash

Oak

Teak

Mahogany

Pine

Plywood

MDF

2 marks

Reasons - Possible responses:

Attractive

Strong

Durable

1 mark

9 marks

(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

Screen

1 mark

With image

1 mark

Mouse

1 mark

Suitable graphics package e.g. ProDesktop

2D Design Corel Draw

1 mark

Drilling traditional

Sufficient detail for most of the frame to be drilled by a third party, most tools and equipment given.

3 - 4 marks

Sufficient detail for some of the design to be drilled by a third party, some tools and equipment given

1 - 2 marks

or

Drilling CAM

Transfer of data to	<i>1 mark</i>	
Laser cutter or CNC router sketch or described	<i>1 mark</i>	
Process described	<i>1 mark</i>	
Laid or held on bed - vacuum or cramp	<i>1 mark</i>	
Safety points	<i>1 mark</i>	<i>max 4 marks</i>

Shaping traditional

Sufficient detail for most of the design to be shaped by a third party, most tools and equipment given.	<i>3 - 4 marks</i>
Sufficient detail for some of the design to be shaped by a third party, some tools and equipment given	<i>1 - 2 marks</i>

or

Shaping CAM

Transfer of data to	<i>1 mark</i>	
Laser cutter or CNC router sketch or described	<i>1 mark</i>	
Process described	<i>1 mark</i>	
Laid or held on bed - vacuum or cramp	<i>1 mark</i>	
Safety points	<i>1 mark</i>	<i>max 4 marks</i>

Finishing

Sufficient detail for most of the design to be finished by a third party, most tools and equipment given.	<i>3 - 4 marks</i>
Sufficient detail for some of the design to be finished by a third party, some tools and equipment given	<i>1 - 2 marks</i>
A work piece coming from laser cutter or router is good enough to satisfy	<i>2 marks</i>
A work piece coming from laser cutter or router is Not good enough to satisfy and needs further finishing which is described	<i>4 marks</i>

Assembly of the abacus is not part of the question and cannot be considered as a “finishing” process.

23 marks

Question 5

(a) Award **one** mark each for a correct response.

Possible responses:

- Brazing
- Welding (MIG, TIG, Arc, Oxy / Acetylene)
- Soldering (Soft, hard)
- Enamelling
- Casting (Aluminium, pewter)
- Smelting
- Annealing
- Hardening / tempering
- Vacuum forming
- Line bending
- Plastic / powder coating
- Steam bending
- Blow moulding
- Injection moulding
- Hot glue guns
- Iron on edging
- Extrusion
- Yoke/press forming

4 x 1 mark **4 marks**

(b) Award **one** mark for each correct answer.

Hazard	Risk to user	Precaution
Picking up hot metal	You could burn your hands	Wear heat protective gloves / gauntlets Use tongs
Hot metal / flux could 'spit' onto your clothing	You could burn your clothing Or your skin through clothing	Wear an apron (leather)
Hot metal / flux gives off fumes	You could damage your respiratory system Could be poisoned	Ensure the area is well ventilated by opening a window, switching on an air extraction system. Wear mask of any type

6 marks

10 marks

Question 6

- (a) **High chair A** - Award **one** mark for the generic term wood/plywood
- Award **two** marks for a suitable solid/laminated wood.

Material - Possible responses:

Pine
Beech
Oak
Ash
Mahogany *2 marks*
MDF *0 marks*

Reasons - Possible responses:

Attractive
Strong
Durable
Capable of being bent
Qualified cost *1 mark*

Cheap *0 marks*

- High chair B** - Award **one** mark for the generic term plastic thermo-set thermo-plastic
- Award **two** marks for any suitable specific plastic.

Material - Possible responses:

ABS
HIPS
Polycarbonate PC
Polypropylene PP
HDPE
PVC
GRP (fibreglass) *2 marks*

Acrylic *1 mark*

Reasons - Possible responses:

Immaculate surface finish
Self coloured
Ideal for quantity production / easily moulded
Hygiene related response / wipe clean
Durable
Strong *1 mark*

High chair C - Award **one** mark for the generic term metal (or iron).
- Award **two** marks for any suitable specific metal.

Material - Possible responses:

(Mild) steel
Aluminium *2 marks*

Reasons - Possible responses:

Good strength to weight ratio
Strong
Durable
Cost (inexpensive, mild steel) *1 mark* **9 marks**

If material is incorrect a mark can still be awarded for a correct reason

(b) **High chair A**

Award **one** mark for a low level response e.g.

Varnish
Paint
Polish

Award **two** marks for any suitable specific finish e.g.

Wax
Polyurethane / acrylic varnish
Stain
Natural
Spray paint *2 marks*

High chair C

Award **one** mark for a low level response e.g.

Paint
Plastic
Polished

Award **two** marks for any suitable specific finish e.g.

Gloss paint
'Hammerite'
'Smoothrite'
Powder / plastic coating
Anodised (aluminium only)
Cellulose spray
Chrome plating *2 marks* **4 marks**

13 marks

Question 7

(a) Award **one** mark each for a correct answer.

Possible responses:

Investigate existing products

Send e mails

Any communication between designer, manufacturer & customer

Order materials

Market research

Advertise the product

3 x 1 mark **3 marks**

Avoid obvious repetition

(b) Award **one** mark each for a correct advantage.

More professional quality

More accurate

Quicker to edit (cut, copy, resize)

Easier to apply a rendering

Can be stored electronically

Can be sent electronically

Quicker easy to use (must be qualified)

3 x 1 mark

0 marks

3 marks

Avoid obvious repetition

6 marks

Question 8

Award **one** mark for each correct tool letter.

Award **one** mark for each correctly named tool.

Saw cut	Tool letter	Tool name
1	C	Coping saw
2	B	Panel saw Hand saw Rip/cross cut
3	A	Tenon saw Dovetail saw Back saw
4	D	Hacksaw

8 marks

Question 9

(a) Award **one** mark each for **two** correctly identified reasons.

Possible responses:

- The child would fall off
- There is no back / head support
- The seat is too big
- There is nothing for the child to hold onto
- The child is unlikely to be able to hold on themselves *2 x 1 mark*

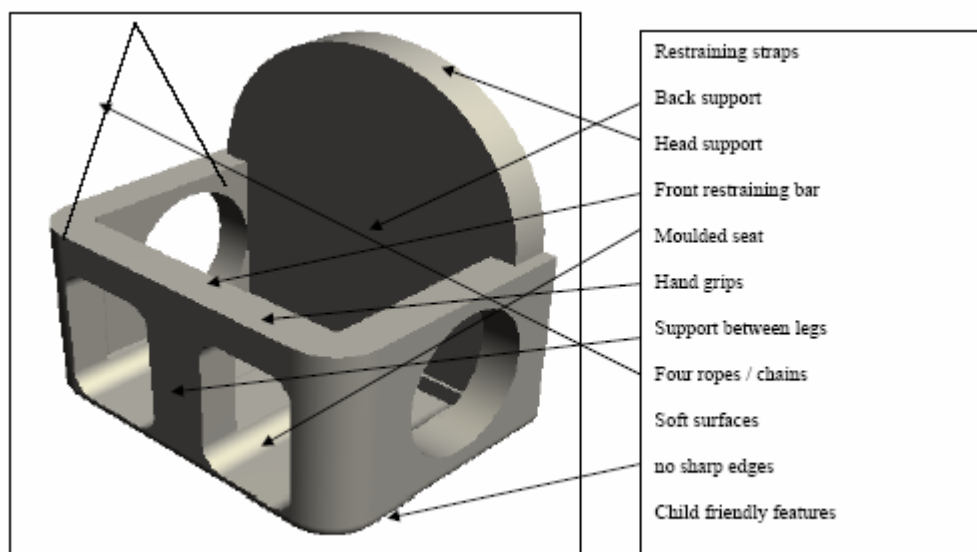
Award **one** mark each for **two** suitable explanations. *2 x 1 mark* **4 marks**

(b) Quality sketch with notes *2 marks*
Simple sketch *1 mark*

Award **one** mark each for any of the following features:

- Restraining straps
- Back support
- Head support
- Front restraining bar
- Moulded seat
- Hand grips
- Support between legs to stop slipping
- Four ropes / chains for stability
- Soft surfaces no sharp edges
- Child friendly features – graphics colours *6 x 1 mark* **8 marks**

12 marks



Question 10

- (a) Award **one** mark for each correctly entered blank.

Plastic is a **n o n - r e n e w a b l e** resource. To save the environment we must **r e d u c e** the amount of plastic we use. We must also **r e u s e** the plastic we have and **r e c y c l e** waste plastic.

4 x 1 mark **4 marks**

- (b) Award **one** mark each for **two** correct reasons.

Possible responses:

Converts CO₂ into O
Less energy used in production
Bio-degradable
Is a renewable resource – plant 2 for 1
Provides a habitat for flora and fauna
Does not pollute the atmosphere
Recyclable
Aesthetic considerations

2 x 1 mark

Award **one** mark each for **two** suitable explanations

2 x 1 mark **4 marks**

8 marks