



General Certificate of Secondary Education

Design & Technology (Resistant Materials Technology) Higher Tier 3545/H

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 **five** correctly identified requirements.

Possible responses:

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

Ergonomic related responses

Weight related responses

Environmental related issues

5 x 1 mark **5 marks**

Five correct explanations

5 x 1 mark **5 marks**

NB. Avoid obvious repeats

10 marks

Question 2

Quality of sketches

Quality 3D sketches with colour or rendering	<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>

Quality of notes

Detailed explanations	<i>3 marks</i>
Simple notes	<i>2 marks</i>
Labelling	<i>1 mark</i>

Variety of ideas

Situation 1 and 2 - mark each idea separately against the following scheme.

An excellent idea which fulfils the design brief, specification, given situation and shows originality.	<i>5 - 6 marks.</i>
A good idea which fulfils most of the design brief, specification, given situation and shows some originality	<i>3 - 4 marks</i>
A simple idea which fulfils some of the design brief, specification and the given situation	<i>1 - 2 marks</i>

NB. Idea copied from insert sheet *0 marks*

Situation 3

An excellent idea using a sophisticated or a number of simple, workable, mechanisms
e.g. chain of gears, multiply use of cams and followers and shows originality *5 - 6 marks*

A good idea with a simple, workable, mechanism
e.g. 2 meshing gears, single cam and follower and shows some originality *3 - 4 marks*

A simple idea with an identifiable mechanism,
little chance of working *1 - 2 marks*

3 x 6 marks

Quality of evaluation

Award up to **two** marks for **each** evaluation using the following scale:

Evidence of analytical thinking	
Two or more points considered	<i>2 marks</i>
One point considered	<i>1 mark</i>
(each point must be qualified)	

32 marks

Question 3

Quality of sketches

Good line sketching	<i>2 marks</i>
Simple line sketching	<i>1 mark</i>

Quality of notes

Full explanation of the function of the mechanism with good use of technical terminology	<i>3 marks</i>
Good explanation of the function of the mechanism with some use of technical terminology.	<i>2 marks</i>
Explanation of the function of the mechanism	<i>1 marks</i>

Details of mechanism

Award marks using the following scale:

Clear details of the function of the workable mechanism	<i>4 - 5 marks</i>
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e.g. Input/output/type of motion

Some details of the function of the mechanism	<i>2 - 3 marks</i>
Limited details of the function of the mechanism	<i>1 mark</i>

10 marks

Question 4

Use the descriptors below to award marks.

NB. If the candidate’s answer describes a ‘one off’ production method they can only access a maximum of 2 marks for each section

Stage 1 Marking out (traditional)

Sufficient detail for the design to be marked out
by a third party, **using a template** 3 - 4 marks
Sufficient detail for most of the design to be marked out
by a third party, tools and equipment given 1 - 2 marks

or

Marking out (CAD)

Sufficient detail for the design to be drawn
by a third party, **using CAD** 3 - 4 marks

- *Screen with image*
- *Software package – 2D-Designer, Corel draw, Pro-Desktop*
- *Multiple images*
- *Dimensioning*
- *Tessellation and reducing waste*

Sufficient detail for most of the design to be drawn
by a third party, **using CAD** 1 - 2 marks

Stage 2 Shaping an/or drilling (traditional)

Sufficient detail for the design to be shaped and/or
drilled by a third party, **using a jig/template** and
a mechanical method of cutting/drilling 3 - 4 marks

Sufficient detail for most of the design to be shaped
and/or drilled by a third party, **using a jig/template** and
a mechanical method of cutting/drilling 1 - 2 marks

or

Shaping and drilling (CAM)

Sufficient detail for the design to be shaped and drilled by a third party **using CAM** *3 - 4 marks*

- *Transferring data*
- *Laser or CNC router*
- *Process*
- *Power settings*
- *Safety*
- *Clamping*

Sufficient detail for most of the design to be shaped and drilled by a third party **using CAM** *1 - 2 marks*

Stage 3 Joining the frame to the base

Sufficient detail for the frame to be joined to the base by a third party **using a jig.** *3 - 4 marks*

Sufficient detail for most of the frame to be joined to the base by a third party, some tools and equipment given *1 - 2 marks*

Stage 4 Finishing.

Sufficient detail for most of the design to be finished by a third party, most tools and equipment given. *1 - 2 marks*

14 marks

Question 5

- (a) Award **one** mark for a suitable advantage.

Possible responses:

They are quick to construct
They do not need any special tools
They have a high quality finish
They can be disassembled and reused

Award **one** mark for a suitable explanation *1 mark*

Award **one** mark for a suitable disadvantage *1 mark*

Possible responses:

They are expensive to buy
You are constrained to the regular shapes
of the blocks
Not an accurate representation of the final product

1 mark

Award **one** mark for a suitable explanation *1 mark*

4 marks

- (b) Award **one** mark for **each** of the following details:

Possible response:

Any reference to testing the product
Any reference to finding faults in the product
Any reference to saving cost in the event of problems being identified
Any reference to being able to seek consumer opinion
Any reference to being able to modify the product
Any reference to an improved product

5 x 1 mark

5 marks

9 marks

Question 6

(a) **NB Mark processes not tools**

Award **one** mark each for a correct response

Possible responses:

Brazing

Welding (MIG, TIG, Arc, Oxy / Acetylene)

Soldering (Soft, hard)

Enamelling

Casting (Aluminium, pewter)

Vacuum forming

Line bending

Plastic / powder coating

Steam bending

Hot gluing

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	Wear an apron (leather)
Hot metal / flux gives off fumes	You could damage your respiratory system or poison you.	Ensure the area is well ventilated by opening a window, switching on an air extraction system or wear a safety mask.

6 marks

10 marks

Question 7

- (a) **High chair A** - Award **one** mark for a suitable specific solid/laminated wood

Material - Possible responses:

Pine
Beech
Oak
Ash
Or any other light coloured wood

1 mark

Award **one** mark each for **two** correct reasons

Reasons - Possible responses:

Attractive
Strong
Durable
Cost (qualified) not 'cheap'
Capable of being bent
Any environmental related issue

2 x 1 mark

- High chair B** - Award **one** mark for a suitable specific plastic

Material - Possible responses:

ABS
PET
HIPS
Polycarbonate PC
Polypropylene PP
HDPE
PVC
GRP

Not Acrylic

1 mark

Award **one** mark each for **two** correct reasons

Reasons - Possible responses:

Immaculate surface finish
Self coloured
Ideal for quantity production
Lightweight
Durable
Strong
Any hygiene related response

2 x 1 mark

High chair C - Award **one** marks for any suitable specific metal

Material - Possible responses:

Steel

Aluminium

1 mark

Award **one** mark each for **two** correct reasons

Reasons - Possible responses:

Good strength to weight ratio

Durable

Strong

Cost (qualified) not 'cheap'

2 x 1 marks **9 marks**

(b) **High chair A**

Award **one** mark for any suitable specific finish e.g.

Polyurethane / acrylic varnish / accept trade names

Cellulose sealer

No oils

1 mark

High chair C

Award **one** mark for any suitable specific finish e.g.

Gloss paint

'Hammerite'

'Smoothrite'

Powder / plastic coating

Anodised (aluminium only)

Cellulose spray/laquer

Chrome plating

1 mark **2 marks**

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

Must be a non toxic finish

Must carry the appropriate safety standard mark

1 mark

Award **one** mark for a correct explanation

1 mark **2 marks**

13 marks

Question 8

Award up to **two** marks each for suitably expanded explanations.

Look for the following details:

Most plastics are made from oil which is a non renewable resource
Moving crude oil around the world can lead to ecological disasters when tankers get into trouble.
Plastics produces toxic gases when the oil is refined
Leads to acid rain
Leads to global warming
Plastics are mainly non biodegradable
Some plastics are incapable of being re cycled

NB. Avoid repeating marks

9 marks

Question 9

(a) Award up to one mark **each** for suitable advantage

Possible *Internet* responses:

To research their design
To e mail their idea to others
To sell their product
To source materials for their product
Any market research related responses
Any communication between designer/
manufacturer/client

3 x 1 mark **3 marks**

(b) Award up to one mark **each** for suitable advantage

Possible responses:

Quicker and easier must be qualified
Avoid obvious repetition

More professional quality
More accurate
Quicker to edit (cut, copy, resize)
Easier to apply a rendering
Can be stored electronically
Can be sent electronically

3 x 1 mark **3 marks**

6 marks

Question 10

- (a) Award **one** mark each for **two** features

Possible responses:

It is a multi activity play centre

It is brightly coloured

It has been ergonomically designed for the young child

2 x 1 mark

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

2 x 1 mark

4 marks

- (b) Award up to **two** marks **each** for correctly identified and explained developments.

Look for the following details:

Material technology

Durability

Colour pigment

Weather resistance

Mouldability

Manufacturing technology

Sophisticated moulds

Automated machinery

8 x 1 mark

8 marks

12 marks