



General Certificate of Secondary Education

Design & Technology (Resistant Materials Technology) Higher Tier 3555/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 **four** 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

Weight related responses

Ergonomics related responses

Must have be educational

4 x 1 mark

Four correct explanations

4 x 1 mark

NB. Avoid obvious repeats

8 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

Mark Situation 1 against the following scheme.

An excellent idea which fulfils the design brief, specification and the given situation, shows originality	<i>5 - 6 marks.</i>
An good idea which fulfils most of the design brief , specification and the given situation, 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>
Copy from insert sheet	<i>0 marks (developed 1 mark)</i>

Mark Situation 2 against the following scheme

An excellent idea using a sophisticated, or a number of simple, workable, mechanism. e.g. chain of gears, multiply use of cams and followers, shows originality	<i>5 – 6 marks</i>
A good idea with a simple, workable, mechanism e.g. 2 meshing gears, single cam and follower, shows some originality	<i>3 - 4 marks</i>
A simple idea with an identifiable mechanism, little chance of working	<i>1 – 2 marks</i>
	<i>2 x 6 marks</i>

Quality of evaluation

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

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

24 marks

Question 3

Quality of Sketching

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 good 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 mechanism	<i>4 – 5 marks</i>
Input motion / output motion direction/type gear ratio, name of mechanism, labelled, good description.	
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

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-Desgner, 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*

Shaping and/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 the 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*

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*

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

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

1 mark

Award **one** mark for a suitable explanation

1 mark

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

Possible responses:

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

1 mark

Award **one** mark for a suitable explanation

1 mark

4 marks

Question 6

Award **one** mark for each correct answer

Hazard	Risk to user	Precaution
Picking up hot plastic	You could burn your hands	Wear heat protective gloves / gauntlets/use tongs
Hot plastic gives off fumes	You could damage your respiratory system / Poison you	Ensure the area is well ventilated by opening a window, switching on an air extraction system. Wear a safety mask
Plastic adhesive touches clothing	You could damage your clothing	Wear an apron (leather)

6 marks

Question 7

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

Material - Possible responses:

Pine
Beech
Oak
Ash
Mahogany
Or any other light coloured wood
(not plywood)

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 (hygiene related response, e.g. wipe clean)
Self coloured
Strong
Ideal for quantity production (easily moulded/shaped)
Durable

2 x 1 mark

6 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

1 mark

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

Must be a non toxic finish

The finish must not contain lead

1 mark

1 mark

8 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

Plastic 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

8 marks

Question 9

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

Possible responses:

To research their design

To e mail their idea to others

To sell their product

To source materials for their product

Any market related process

Communication between designer/manufacture/customer

Avoid obvious duplication

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