OCR
RECOGNISING ACHIEVEMENT

GCSE

Design & Technology (Resistant Materials)

General Certificate of Secondary Education **GCSE 1956**

General Certificate of Secondary Education (Short Course) **GCSE 1056**

Combined Mark Schemes And Report on the Units

June 2005

1956/1056/MS/R/05

Oxford Cambridge and RSA Examinations

OCR (Oxford, Cambridge and RSA Examinations) is a unitary awarding body, established by the University of Cambridge Local Examinations Syndicate and the RSA Examinations Board in January 1998. OCR provides a full range of GCSE, A level, GNVQ, Key Skills and other qualifications for schools and colleges in the United Kingdom, including those previously provided by MEG and OCEAC. It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annersley
NOTTINGHAM
NG15 0DL

Telephone: 0870 870 6622
Facsimile: 0870 870 6621
E-mail: publications@ocr.org.uk

CONTENTS

General Certificate of Secondary Education

Design & Technology: Resistant Materials Technology (1956)

Design & Technology: Resistant Materials Technology (Short Course) (1056)

MARK SCHEME FOR COMPONENTS

Components	Content	Page
1956/01,1056/01	Paper 1 (Foundation)	1
1956/02, 1056/02	Paper 2 (Higher)	7
1956/03	Paper 3 (Foundation)	13
1956/04	Paper 4 (Higher)	19

REPORT ON THE COMPONENTS

Components	Content	Page
*	Chief Examiner's Report	26
1956/01,1056/01	Paper 1 (Foundation)	27
1956/02, 1056/02	Paper 2 (Higher)	30
1956/03	Paper 3 (Foundation)	34
1956/04	Paper 4 (Higher)	38
1956/05	Coursework	41
*	Grade Thresholds	43

Mark Scheme 1956/01, 1056/01
June 2005

1 **(a)** Saws – to **cut out** the shapes of the puppet 1

Files – to **smooth off** the sawn edges 1

Glasspaper – to **clean** the surfaces/edges of the puppet 1

Drill – to make the **holes** in the puppet for the strings 1

PVA – to **stick** the parts of the puppet together 1 **[5]**

(b) Accept: templates make marking out quicker, easier, or more accurate **[1]**

(c) **(i)** Methods include: pin and glue, screw and glue, dowel, halving joint, nut & bolt, glue, butt joint, screw, nail, housing joint **[1]**

(ii) Round off the ends/edges **[1]**
Padding, fabric, foam, rubber etc – NO mark

(iii) Attachments include: drilled hole for strings, cuts to accommodate strings tied around, use of hooks/eyes etc. Accept any practical method.
Hole only – 1 mark
String tied around wood (no cuts) – NO mark
[2]

2	**(a)**	Some form of screw, bolt, pin or dowel	1	
		Hands retained at back and front	1	
		Spacers/washers to allow for movement	1	**[3]**
	(b)	Two advantages of CAD-CAM include: Design can be saved Easy to change design More accurate Numbers look identical Professional/improved appearance/clearer to read	1+	
		1 (easier or quicker NO marks)		**[2]**
	(c)	Some form of stand/support	0-2	
		Appropriately named materials	1	
		Fittings and/or constructions used	0-2	**[5]**

3 (a) Aluminium suitability: accept any 2 reasons including:

easily bent to shape, does not corrode/tarnish, **[1]**
accepts range of finishes or can be self-finished **[1]**
(lightweight or strong NO marks)

(b) Fixing – either screw or glue 1

Hole in aluminium – must be countersunk for screw from back OR
Threaded for screw from front 1

[2]

(c) 2 reasons for model include:

test to see if hanger fits over door, check size and appearance, **[1]**
saves on materials if design does not work **[1]**

(d) Reduction in material used 1
Modification 1
Practical design (must be a modification of original) 0-2

[4]

4 (a) Accept **one** detailed explanation including:

Injection moulding only suitable due to high cost of initial tooling 1
Large quantities need to be manufactured to recover costs 1 **[2]**

(b) 2 quality control checks include:

random testing of material quality during manufacture **[1]**
testing of product dimension tolerances **[1]**
visual appearance to check quality of production process

(c) (i) Must include ONE CAD and ONE CAM reason -

CAD used to draw out the shape of the net accurately or a 3D image 1
CAM used to cut out the outline shape and engrave the bend lines, CAM will ensure repetitive control 1 **[2]**

(ii) Appropriately named software: '2D Design', 'Pro-Desk Top', etc **[1]**

Appropriately named machine 'CAMM 2', milling machine or equivalent **[1]**

(d) Injection moulding more environmentally friendly:

excess waste remaining after the net shape has been cut away 1
injection moulding uses only the plastic granules required for the notelet holder and there is minimal waste 1 **[2]**

5 **(a)** Anthropometric data: width of knees, depth of knees etc.
Must relate to the dimensions applied to human form. **[1]**

(b) Use of a hinge or pivot made from dowel or metal pin 0-2
Details 1 **[3]**

(c) 2 functional improvements include:

Lipping to edge of tray, some form of hand-holds, holes, recesses etc for cup holders/cutlery/pens/pencils etc
Use of plastic surface, legs redesigned for comfort, tray folds up
0-2 for each improvement (NO marks for 'bean bag' base) **[4]**

(d) 2 advantages of using plastics include:
easily wiped clean, easier to maintain since no finishing is required, **[1]**
more durable surface, self coloured **[1]**

Mark Scheme 1956/02, 1056/02
June2005

1 (a) Accept **one** detailed explanation including:

Injection moulding only suitable due to high cost of initial tooling 1
Large quantities need to be manufactured to recover costs 1 **[2]**

(b) 2 quality control checks include:

random testing of material quality during manufacture **[1]**
testing of product dimension tolerances **[1]**
visual appearance to check quality of production process

(d) (i) Must include ONE CAD and ONE CAM reason –

CAD used to draw out the shape of the net accurately or a 3D image 1
CAM used to cut out the outline shape and engrave the bend lines, CAM will ensure repetitive control 1 **[2]**

(ii) Appropriately named software: '2D Design', 'Pro-Desk Top', etc **[1]**

Appropriately named machine 'CAMM 2', milling machine or equivalent **[1]**

(d) Injection moulding more environmentally friendly:

excess waste remaining after the net shape has been cut away 1
injection moulding uses only the plastic granules required for the notelet holder and there is minimal waste 1 **[2]**

2 **(a)** Anthropometric data: width of knees, depth of knees etc.
Must relate to the dimensions applied to human form. **[1]**

(b) Use of a hinge or pivot made from dowel or metal pin 0-2
Details 1 **[3]**

(c) 2 functional improvements include:

Lipping to edge of tray, some form of hand-holds, holes, recesses etc for cup holders/cutlery/pens/pencils etc
Use of plastic surface, legs redesigned for comfort, tray folds up
0-2 for each improvement (NO marks for 'bean bag' base) **[4]**

(d) 2 advantages of using plastics include:
easily wiped clean, easier to maintain since no finishing is required, **[1]**
more durable surface, self coloured **[1]**

3 (a) (i) Annealing softens the metal, makes it malleable, easier to bend **[1]**

(ii) Mild steel rod would be heated to bright red and allowed to cool **[1]**

(b) Use of blocks and pegs to position the mild steel rod against the former 0-2
Retention of end of rod 1 **[3]**

(c) Improvement to ends: lipping, iron-on veneer. NO mark for paint **[1]**

(d) **Additions** to the mild steel ends includes the use of brackets, modifications to the length and/or width of the shelves 0-2

Fixing to the shelf 1

Fixing to the frame 1 **[4]**

4 **(a)** Reasons include: to stop material spinning, material can 'snag' and distort the hole or (with plastic material) cause cracking **[1]**

(b) The longer the lever the more force that can be applied **[1]**

(c) Use of locking system that can be tightened against pillar 0-2
(use of a screw that tightens directly against the pillar – max 1mark)

Device must allow for quick release; e.g. wing nut design
or some form of thumb-tightening device/lever/cam 0-2
[4]

(d) Adjustable 'foot' must fit onto end of arm 1
Method of fitting to arm must allow 'foot' to pivot 0-2
Appropriate materials named 1 **[4]**

5 **(a)** Handle 1
Fitting to tap 1
Ease of use 1
Additional detail 1

[4]

(b) Ergonomic considerations important: must relate to the human hand, grip and the finger, wrist or arm operation of the tap **[2]**

(c) Prototype trials involve giving individuals the opportunity to try out the device,
and obtaining feedback either by means of questionnaire or interview **[2]**

(d) Appropriate named material includes a variety of metals and plastics **[1]**

Appropriate process must be for the named material **[1]**

e.g. aluminium would be die-cast or polypropylene would be injection moulded

Mark Scheme 1956/03
June 2005

1 (a) (i) Pine/redwood/parana pine/Scots pine/red deal/spruce (any softwood) **[1]**

(ii) Any appropriate reason:
easy to work with/readily available/cost effective over hardwood
can be painted, stained etc (must relate to a softwood) **[1]**

(b) *1* Try square/ruler/template/pencil/marking knife/marking gauge/sliding bevel
2 Any named saw including just 'saw' on its own **[2]**

(c) Goggles/mask/tie back hair/use extraction system/one operator/use correct side of disc/contact of work piece with table **[1]**

(d) Screwed to body/dowel (axle) and external fix e.g. star washer, split pin etc.

Method (1)
Details (1)
Quality of solution/notes (1) **[3]**

(e) Rounded comers, affix sticker, decorate, front aerofoil, bumpers, doors, etc.

Improvement (1)
Detail (1) **[2]**

2 **(a)** Brass, copper, guilding metal, nickel silver, aluminium, duraluminium (not a precious metal) **[1]**

(b) Would method work? (1)
Details of: control device/former/jig/folding bars/holding method (1)
Forming – method of achieving shape (1) **[3]**

(c) Draw file, wet and dry, buffing wheel, Water of Ayr stone, pumice powder, emery cloth, liquid metal polish, whiting (accept Brasso or Silvo) **[1]**

(d) Protection/aesthetic improvement/improved appearance **[1]**

(e) Aesthetic improvement, stability, stop trophy from falling over, space for winners details **[1]**

(f) Any natural hardwood do **not** accept a manufactured board **[1]**

(g) Suitable method: screwed, glued if appropriate adhesive suggested, riveted, double sided tape, slot in base if sufficient detail given (**not** nailed), nut & bolt

method (1)
appropriate/details (1) **[2]**

3 **(a)** Compact grain, ease of construction related to artefact, very hard wearing, does not split easily, stains-polishes easily

1 mark for each different point **[1]**

[1]

(b) Staining, pre-coloured varnish, pre-coloured wax, dye, felt pen **[1]**

(c) Use of depth stop, adapter, block or tape attachment to drill piece **[1]**

(d) Any **two** stages: mark out square (stage 2 only), feed saw blade through hole to saw (not just saw out square)/correct saw suggested/chiselling/ mortising machine/filing/sanding **[2]**

(e) Location at: one point (**E**ndstop or **e**nd mark) **E** (1)
two points (**B**ack stop) **B** (1)
method of achieving **L**ength **L** (1)
Holding method **H** (1) **[4]**

4 **(a)** Internet research, CAD, virtual modelling, presentation of ideas to client, e-mailing ideas, testing, allows more than one person to work on the design

1 mark for each ***different*** use **[0-2]**

(b) **(i)** Less expensive to purchase, easier to transport home, can be disassembled for house move, storage/feeling of personal accomplishment, easier to wrap for present giving, more likely to be a stock item and so available, extended market

Any two correct answers **[0-2]**

(ii) Less labour required for assembly/less storage space required, easier/less expensive transportation costs,
less costly manufacture, higher turnover because of above points

Any two correct answers **[0-2]**

(c) Screwdriver, allen key, spanner, drill, hammer **[1]**

(d) Quality assurance, safety standard, meet the standard **[1]**

(e) Less storage space, less financial out lay, cash flow improvement, changes can be made quickly/more flexibility (Look for understanding of JIT production system.), 'clean' stock

[0-2]

5 **(a)** Stability, aesthetically pleasing, not damage the surface of the bedside table, easy access the switch, no sharp projecting parts, easy to clean-dust, not slip on bedside table **[0-2]**

(b) Unable to locate switch easily, knocking it over – over/pulling cable, electric shock if faulty, unable to find light in dark, brightness of light, heat hazard **[0-2]**

(c) Soldering/hard soldering, specialist brazing (NOT brazing),
suitable named adhesive, friction fit **[1]**

(d) More parts to assemble, more labour required, would take longer to make, more equipment required, electrical safety **[1]**

(e) Bulb holder mount/adapter suggested, screwed to top of lamp, screwed into top of lamp **[0-2]**

(f) A suitable method shown (1)
that does not affect the stability of the bedside light (1)
[2]

Total [50]

Mark Scheme 1956/04
June 2005

1 **(a)** Internet research, CAD, virtual modelling, presentation of ideas to client, e-mailing ideas, testing, allows more than one person to work on the design

1 mark for each ***different*** use **[0-2]**

(b) **(i)** Less expensive to purchase, easier to transport home, can be disassembled for house move, storage/feeling of personal accomplishment, easier to wrap for present giving, more likely to be a stock item and so available, extended market

Any two correct answers **[0-2]**

(iii) Less labour required for assembly/less storage space required, easier/less expensive transportation costs,
less costly manufacture, higher turnover because of above points

Any two correct answers **[0-2]**

(c) Screwdriver, allen key, spanner, drill, hammer **[1]**

(d) Quality assurance, safety standard, meet the standard **[1]**

(e) Less storage space, less financial out lay, cash flow improvement, changes can be made quickly/more flexibility (Look for understanding of JIT production system.), 'clean' stock

[0-2]

2 **(a)** Stability, aesthetically pleasing, not damage the surface of the bedside table, easy access the switch, no sharp projecting parts, easy to clean-dust, not slip on bedside table **[0-2]**

(b) Unable to locate switch easily, knocking it over – over/pulling cable, electric shock if faulty, unable to find light in dark, brightness of light, heat **[0-2]**

(d) Soldering/hard soldering, specialist brazing (NOT brazing), suitable named adhesive **[1]**

(d) More parts to assemble, more labour required, would take longer to make, more equipment required, electrical safety **[1]**

(e) Bulb holder mount/adapter suggested, screwed to top of lamp, screwed into top of lamp **[0-2]**

(f) A suitable method shown (1)
that does not affect the stability of the bedside light (1)
[2]

3 **(a)** Screws, must include details – pilot, clearance, countersunk - any two x (1)
Tenon (1), mortice (1)
'fox' wedge
wedge (must include shoulder for 2 marks)
Dowels (1), holes (1)
K-D fittings if appropriate – fitting (1), attachment (1)

[2]

(b) **M**ethod = screwed, machine screw and nut, screw and post (1)
Detail/quality e.g. washer between pieces (1)
Stopping movement (1)
Correct position achieved (1) **[4]**

(c) **E**lectrical current (1)
Shrinkage/shortening of wire (1)
Pulling motion raises arm (1)
Switch of current returns to original length/arm position (1) **[4]**

4	(a)	**M**ethod of stopping rotation	(1)	
		Detail/quality of method i.e. slot and peg/grove - slot etc.	(1)	
		Return method	(1)	
		Details e.g. spring, elastic, second string fixing method counterweight	(1)	**[4]**
	(b)	**P**artial protection achieved (1) OR **F**ull protection achieved (2)	(2)	
		Holding method achieved	(1)	
		Quality method of holding toy achieved	(1)	
		Constructional details/fittings/materials suggested	(0-2)	**[6]**

5 **(a)** Parts held together by friction alone without any additional help, mechanical fixing or adhesive etc.

"Jammed together" worthy on 1 mark only
If "friction fit" described allow if sufficient detail
dependant on understanding and explanation **[0-2]**

(b) Lightweight, anti-slip capability, corrosion resistant,
strength if qualified i.e. strength to weight ratio/comparison **[0-2]**

(c) **A**djustment considered/attempted (1) OR **A**djustment achieved (2)
Safety considered/attempted (1) OR **S**afety achieved (2)
Locking method considered/attempted (1) OR **L**ocking securely achieved (2) **[6]**

Total [50]

Report on the Components
June 2005

Chief Examiner's Report

All four exam papers were accessible to the vast majority of candidates. On the Foundation papers many candidates achieved their highest marks for the first two questions. On the Higher paper there were some examples of excellent answers to the design-type questions some of which carried substantial mark allocations.

There are areas of the specification content where examiners felt that candidates could improve. Some of these areas are basic to this specification and include:

- properties and uses of common resistant materials and "Smart" materials;
- the correct use of technical vocabulary; and,
- industrial practices and commercial production methods.

In addition, candidates practical knowledge and applications for CAD/CAM remains an issue for those centres with limited resources .

Finally, parts of the Themed question were poorly answered suggesting that candidates have failed to research those focused points included in the pre-release information to centres thoroughly.

One of the disappointing features of this year's coursework appears to be the heavily structured approach by some centres that denies candidates the opportunities to 'stamp' their individualism and flair on a project. Centres are reminded that candidates need to take full responsibility for their own planning, designing and practical work. It was pleasing that CAD was much more evident in folders work this year.

There were a number of features in the Assessment Objectives that were evident in the best projects achieving the highest marks, including:

- In Objective 2 candidates reflecting on their research and evaluating its relevance and usefulness before developing a design specification.
- In Objective 3 a thorough evaluation of each design proposal rather than a tick-list against a design specification.
- In Objective 4 clear reasoning and investigation resulting in the choice of materials, constructions etc.
- In Objective 5 thorough planning and a range of techniques as well as the utilisation of CAM.
- In Objective 6 an evaluation that is carried out in the situation in which the product will be used.

Principal Examiner's Report

1956/1056 Paper 1 – Foundation tier

General Comments

The majority of candidates attempted all the questions and gained marks throughout the paper. There were many excellent answers to Question 1 where the majority of candidates achieved their highest marks. There are areas of the specification where candidates could show improvement, including:

- properties of materials, specifically metals and plastics;
- industrial practices, specifically injection moulding;
- practical knowledge and understanding of CAD-CAM in the design and manufacture of products;
- an understanding of anthropometrics;
- overall quality of communication in terms of clarity of sketches and the accuracy of technical detail in written notes.

Comments on Individual Questions

1 (a) Most candidates were able to describe where or for what purpose the tools could be used when making the puppet.

(b) It was pleasing to read many correct reasons for the use of templates. The most popular reasons included that it was quicker and that the puppets would be marked out identically.

(c) (i)
There was a good range of joining methods given including screws, nails, adhesive and joints such as halvings and housings.

(ii)
The majority of answers referred to rounding off the sharp edges of the wooden handle or to make it to the shape of a hand. No credit was given to answers that involved the use of fabric or padding.

(iii)
The most popular method of attaching the string to the handle was to drill a hole, thread the string through and knot it. Credit was given for alternative practical methods.

2 (a) For maximum marks candidates needed to show some form of pin or bolt through the clock face and hands, a means of retaining this at the front and back and use of a washer or spacer to enable the hands to move freely. Most candidates showed the pin or bolt with fewer showing the method of retention and only a minority giving details of washers.

(b) The most common advantages of using CAD/CAM rather than painting the numbers on the clock face included a neater, more professional appearance, more accurate and identical quality. Many candidates simply stated quicker or faster and received no marks.

(c) When using sketches and notes to show a design for a clock stand, the question asked candidates to include details of materials, fittings and methods of construction. There were specific marks allocated to these 3 features. Many candidates drew some sort of stand and gained some credit, but often details about its size, how it could be connected to the back of the clock or what it was made from were lacking.

3 (a) Most of the reasons given for using aluminium for the coat hanger included strong and cheap, neither of which is correct. While accepting that aluminium is relatively lightweight, this is not a relevant material property for this application. The best answers included: aluminium is easy to bend to shape, that it does not corrode or tarnish and that it can be self-finished or accepts a range of finishes.

(b) The vast majority of candidates used a screw to fix the wooden coat peg to the coat hanger but very few realised that the screw would need to be countersunk to avoid it rubbing against the door face.

(c) The majority of candidates gave sensible reasons for making a card model before making it in aluminium: to check its size, to see if it would work, to avoid wasting aluminium.

(d) The majority of candidates were able to achieve marks for this question but sometimes it was not possible to see if there was a reduction in waste because there were no sizes given. Many candidates did show a modified design that would work.

4 (a) Many candidates simply re-wrote the question indicating that they knew it must be an expensive process but were unable to explain why. Injection moulding is one of the most common industrial manufacturing processes. It was disappointing that only a minority of candidates were able to explain the high initial tooling costs making it essential to recover these costs by means of volume production.

(b) Many candidates gained one mark for describing a quality control check that could be
carried out during manufacture. The most common check being to the size of the holder.

(c) (i)
The answers describing how CAD/CAM could be used to help in the design and manufacture of the notelet holder were generally poor with many vague responses. Only a minority of candidates described how CAD could be used to draw an accurate net or how CAM could be used to engrave the bend lines or cut out the outline shape of the holder.

(ii)
Only a minority of candidates gave appropriately named software or computer-controlled machine. The most common correct answers included reference to Pro Desktop or Techsoft 2Design and named a CNC router, miller or Roland CAMM 2 machine to manufacture the holder. Those candidates who showed awareness of the use of laser cutters gained reward for this answer.

(d) Many candidates seemed to understand that making the holder from sheet plastic was more wasteful than injection moulding but were unclear of the reasons. Many candidates incorrectly referred to the machines giving off toxic fumes during the manufacture. There were some excellent answers that referred to injection moulding using only the amount of material that was required with no waste, whereas cutting the holder from sheet plastic would mean that material would be wasted.

5 (a) Very few candidates understood how anthropometric data could be used in the design of the tray. The best correct answers referred to the distance across the person's knees or reach in bed.

(b) The vast majority of candidates showed the legs of the tray folded up using a hinge. Most candidates gained marks for this but failed to gain full marks either because of lack of clarity in their sketches or lack of technical detail in their notes.

(c) Many candidates provided good practical functional improvements to the tray. The most popular included a lipping to prevent items from falling off and indentations to take a cup or plate.

(d) There were many correct advantages for using plastic rather than wood for the tray top. The best answers included durability, easily wiped clean and easier to maintain. Many candidates failed to appreciate the material properties of plastic and gave lightweight and cheap as their answers.

1956/1056 Paper 2 – Higher Tier

General Comments

There were opportunities for candidates to demonstrate their ability to provide solutions to design problems in Questions 2-5. Many candidates failed to achieve maximum marks due to a combination of poor communication skills and a lack of accurate annotated technical detail. There are areas of the specification where candidate performance could be improved, including:

- properties of materials, specifically metals and plastics;
- industrial practices, specifically injection moulding and other manufacturing processes used in volume production;
- practical knowledge and understanding of CAD-CAM in the design and manufacture of products;
- metalworking techniques associated with heat treatment and bending of metal;
- an understanding of anthropometrics and ergonomics;
- overall quality of communication in terms of clarity of sketches and the accuracy of technical detail in written notes.

Comments on Individual Questions

1 (a) Many candidates simply re-wrote the question indicating that they knew it must be an expensive process but were unable to explain why. Injection moulding is one of the most common industrial manufacturing processes. However, there were many correct answers explaining how the high initial tooling costs make it essential to recover these costs by means of volume production.

(b) Many candidates gained at least one mark for describing a quality control check that could be carried out during manufacture. The most common check being to the size of the holder. Some answers referred to tests that would be carried out as part of a final evaluation of the product rather than a quality control check during manufacture.

(c) (i)
The answers describing how CAD/CAM could be used to help in the design and manufacture of the notelet holder were generally poor with many vague responses. Only a minority of candidates described how CAD could be used to draw an accurate net or how CAM could be used to engrave the bend lines or cut out the outline shape of the holder.

(ii) Only a minority of candidates gave appropriately named software or computer-controlled machine. The most common correct answers included reference to Pro Desktop or Techsoft 2D Design and named a CNC router, miller or Roland CAMM 2 machine to manufacture the holder. Those candidates who showed awareness of the use of laser cutters gained reward for this answer.

(d) Many candidates seemed to understand that making the holder from sheet plastic was more wasteful than injection moulding but were unclear of the reasons. Many candidates incorrectly referred to the machines giving off toxic fumes during the manufacture. There were some excellent answers that referred to injection moulding using only the amount of material that was required with no waste, whereas cutting the holder from sheet plastic would mean that material would be wasted.

2 (a) Very few candidates understood how anthropometric data could be used in the design of the tray. The best correct answers referred to the distance across the person's knees or reach in bed.

(b) The vast majority of candidates showed the legs of the tray folded up using a hinge. Most candidates gained marks for this but failed to gain full marks either because of lack of clarity in their sketches or lack of technical detail in their notes.

(c) Many candidates provided good practical functional improvements to the tray. The most popular included a lipping to prevent items from falling off and indentations to take a cup or plate.

(c) There were many correct advantages for using plastic rather than wood for the tray top. The best answers included durability, easily wiped clean and easier to maintain. Many candidates failed to appreciate the material properties of plastic and gave lightweight and cheap as their answers.

3 (a) (i)
Very few candidates understood that annealing softens mild steel rod to enable it to be bent to shape.

(ii)
Many candidates described that the steel would be heated up but often incorrectly quenched. It is disappointing that candidates have such a poor grasp of basic metalworking techniques.

(b) For maximum marks candidates needed to show the steel rod held in position against the wooden former by means of pegs or blocks and some means of retaining the end of the rod during bending. Many candidates achieved marks for the first part but not the second.

(c) Many candidates gave practical methods of improving the edge of chipboard, the most popular being the application of veneer or a wooden or plastic lipping.

(d) Many candidates achieved some marks for simply screwing through the frame into the ends of the chipboard. frames. Many candidates failed to appreciate that the end frames were only 8mm diameter and that it would be difficult to successfully drill and screw through into the shelves. The question gave candidates a clue by stating that additional materials, fittings or fixings may be added. There were many superb solutions given using steel brackets, welded or brazed to the end frame that allowed the shelves to be secured by means of screws.

4 (a) Candidates generally were aware that if the metal was not clamped down it could spin and snag resulting in damage to the material and/or a distorted hole.

(b) Many candidates understood the principles of levers but there were many who incorrectly referred to the length of the handle getting in the way of the drill operation.

(c) The best clamping devices involved the use of a collar that could be tightened against the pillar by pulling the ends of the collar together. The best methods of achieving quick release included the use of the wing nut principle or some form of long lever. Many candidates showed the clamping device tightened directly against the pillar of the drill without some form of flat or groove that would result in damage.

(d) There were some excellent designs for a pivoting foot to be fitted to the arm of the claming device. These designs showed a foot secured to the arm yet allowed to pivot freely. If the candidate named an appropriate material from which the foot could be made then maximum marks were awarded. Unfortunately many candidates were unable to show practical designs and often the chosen materials for the foot were wood and rubber.

5 (a) There were many innovative prototypes designed by candidates. The best designs incorporated a long lever for the handle, a cut out shape that would fit directly onto the existing tap that could be fitted and removed quickly and easily. The majority of candidates achieved marks for incorporating some, if not all, of the practical aspects of their designs.

(b) Ergonomics is such an important part of designing, especially when designing for a client or a market. It was disappointing therefore that only a minority of candidates demonstrated any understanding of ergonomics. The best answers referred to the need for the prototype design to fit the shape of the user's hand to enable the tap to be turned on or off effectively.

(c) The majority of candidates realised that the best way to trial the prototype would be to give the prototype to groups of users to try out and then obtain feedback by means of interview or questionnaire. Some candidates confused this type of trialling with a final evaluation and described how you would test it out on an individual basis.

(d) This part of the question was very poorly answered. Many candidates were unable to name an appropriate material from which their design could be mass produced and subsequently were unable to provide the appropriate means of manufacture.

1956/03 - Foundation Tier

General Comments

The vast majority of candidates attempted all of the questions and were able to gain marks throughout the paper. There was clear evidence of very good time management by most candidates.

There are areas of the specification where candidates could show improvement, including:

- correct technical terminology for tools and processes;
- basic properties of commonly used resistant materials
- more accurate and detailed responses to the pre-printed theme question;
- an understanding of the use and value of jigs and formers,and;
- knowledge and understanding of 'commercial production methods'.

Comments on Individual Questions

Question 1

(a) (i) Well answered with the most popular answer being pine.
MDF was the most popular incorrect answer.
(ii) Generally well answered with 'easy to shape and form' being the properties most
often identified.
Candidates were rewarded for the correct properties even if part (i) was incorrect.
However "cheap and/or cheaper" failed to gain a mark.

(b) *1 & 2* A very good range of appropriate tools were given. Many identified a "jig" and were positively rewarded. A minority of candidates suggested a 'hack saw' and in this instance were rewarded.

(c) Very well answered with 'wearing goggles' being the most popular correct answer.

(d) 3 marks were available for this question with one mark available for a suitable method, one for details of the method given and one for the quality and potential success of the suggested method. Almost all candidates gained a mark for the method with a high proportion gaining a 2nd mark for giving sufficient appropriate details. A significant number of candidates gained the third mark for the quality of their chosen method the question then proving to be a very good discriminator.

(e) A wide range of improvements was suggested with the majority of candidates gaining one mark but with a significant number gaining both marks.

Question 2

(a) Well answered with the most popular answer being aluminium.
Steel and stainless steel being the most popular incorrect answers.

(b) A significant number of candidates understood the principles of holding and bending of sheet metal using some 'former' with a lesser number correctly suggesting the use of a bench press. However a large number of candidates simply suggested holding the sheet metal in a vice with little other evidence of knowledge and understanding of the bending process being demonstrated. These candidates were rewarded but did not receive the full three marks. Many candidates failed to suggest the method of 'forcing' the distortion of the sheet material.
A small number of candidates misread the question and suggested a line bender to 'bend the plastic'.

(c) A range of responses was seen with 'wet and dry' and 'emery cloth' being the two most common correct answers. A small number of candidates suggested 'filing' having failed to read the question correctly.

(d) Very well answered with the majority of candidates gaining a mark for correctly identifying some 'protection' or 'improved/enhanced aesthetics'.

(e) Well answered with the majority of candidates gaining a mark for suggesting improved stability but with significantly fewer suggesting improved aesthetics.

(f) A significant number of candidates failed to gain a mark to this part of the question with MDF, timber and plywood being the most common incorrect answers. Oak and Mahogany were the two most popular correct answers.

(g) Drilling holes and screwing the trophy to the wooden base was by far the most popular method suggested by candidates and sufficient details were suggested for most candidates to gain both available marks.
'Gluing it on' with no other details suggested then became the most popular incorrect answer failing to gain a mark.

Question 3

(a) Most candidates gained one of the two available marks for this question. A significant number of candidates correctly identified the working properties of beech with a lesser number identifying the tight grain structure and resistance to splitting of the material. Candidates who suggested that it was 'cheap' or 'readily available' failed to gain a mark.

(b) 'Staining' or 'dying' the material were the two most popular correct answers with a
smaller number of candidates correctly suggesting coloured varnish.
Spray painting was the most popular incorrect answer with candidates failing to read the question correctly.

(c) A variety of appropriate methods were suggested, with a large majority of candidates gaining a mark for this question. Those who were referring to the 'depth stop' on a machine or pillar drill often failed to use the correct terminology but in this instance were still rewarded if they demonstrated sufficient understanding.

(d) Sawing out the waste material followed by filing and sanding it smooth were the most popular answers to this part of the question.
Many candidates interpreted the question well and suggested the marking out of the square as their first stage and were appropriately rewarded.

(e) A wide range of responses was seen to this part of the question. There was some evidence of knowledge of jigs by many candidates whilst a significant number failed to grasp the concept. The full range of marks was awarded with a significant number of candidates gaining two marks and somewhat fewer gaining three or the full four marks.

Question 4
This question is about Industrial Practices, CAD/CAM and the effects of D&T in Society.

(a) *1 & 2* A significant number of candidates gained a mark for correctly suggesting CAD could be used in the designing of the chair. Other correct suggestions were researching, drawing up the specification and testing and modelling.
The most common incorrect answer was CAM with significant numbers of candidates
failing to realise that this part of the question was about 'designing'.

(b)(i) The vast majority of candidates gained one mark for this part of the question with a significant number gaining both marks showing good understanding. That it was likely to be 'cheaper than an assembled product' and also that transportation and storage were both advantages were the three most popular responses.

(b)(ii) Slightly less well answered than part (b) of the question but still well answered with only a small number of candidates demonstrating confusion between the consumer and the manufacturer. Saving the manufacturer time and costs for assembly staff were the two most popular answers with less storage and transport issues a close third.

A very small number of candidates suggested **disadvantages** to the consumer and manufacturer respectively and so failed to gain reward.

(c) The vast majority of candidates gained a mark for this part of the question with Allen Key and Screwdriver being the most popular correct answers.

(d) Many candidates gained the mark for correctly suggesting the meeting of a standard of safety and/or quality. The most popular incorrect response was that the product was British made.

(e) This part of the question was very poorly answered with knowledge of JIT systems
being limited to candidates from only a few centres. Where candidates had the knowledge the two marks were easily gained.

Question 5
This is the Themed question with pre-release materials being sent to centres prior to the examination.

(a) Generally well answered with most responses reflecting the candidates own experiences. A very good range of sensible suggestions was made with almost all candidates gaining one mark but a significant number gaining two marks.

(b) Again generally well answered with candidates own experience and common sense gaining them at least one mark. An equally good range of responses was seen to this part of the question.

(c) Generally poor responses to this part of the question despite the fact that the pre-release material should have guided candidates towards a knowledge and understanding of appropriate manufacturing processes of domestic Bedside Lighting. Only a minority of candidates correctly identified the soldering process.
A significant number suggested screwing the parts together which is an appropriate method but is not 'permanent' which is what the question asked.

(d) Knowledge of manufacturing processes and the fact that there would be more parts to assemble and so would take longer and so cost more to produce was almost non-existent.

(e) Surprisingly few candidates showed any understanding of how to fix a bulb holder to the wooden lamp. There were very few marks awarded for this part of the question despite the content of the pre-release material to centres.

(f) The majority of candidates correctly suggested the drilling of holes for the cable and with a significant number understanding the fact that stability of the bedside light should not be affected by the exit of the cable from the bedside light.

1956/04 - Higher Tier

General Comments
The vast majority of candidates attempted all of the questions and were able to gain marks throughout the paper. There was clear evidence of excellent time management by most candidates.

There are areas of the specification where candidates could show improvement, including:

- more accurate and detailed responses to the pre-printed theme question;
- 'commercial production methods'.
- 'Smart' and Modern Materials, and;
- knowledge and understanding of Pre-manufactured Standard Components.

Question 1
This question is about Industrial Practices, CAD/CAM and the effects of D&T in Society.

(b) *1 & 2* A significant number of candidates gained a mark for correctly suggesting CAD could be used in the designing of the chair. Other correct suggestions were researching, drawing up the specification and testing and modelling. The most common incorrect answer was CAM with significant numbers of candidate failing to realise that this part of the question was about 'designing'.

(b)(i) The vast majority of candidates gained one mark for this part of the question with a significant number gaining both marks showing good understanding. That it was likely to be 'cheaper than an assembled product' and also that transportation and storage were both advantages were the three most popular responses.

(b)(ii) Slightly less well answered than part (b) of the question but still well answered with only a small number of candidates demonstrating confusion between the consumer and the manufacturer. Saving the manufacturer time and costs for assembly staff were the two most popular answers with less storage and transport issues a close third.

A very small number of candidates suggested **disadvantages** to the consumer and manufacturer respectively and so failed to gain reward.

(c) The vast majority of candidates gained a mark for this part of the question with Allen Key and Screwdriver being the most popular correct answers.

(d) Many candidates gained the mark for correctly suggesting the meeting of a standard of safety and/or quality. The most popular incorrect response was that the product was British made.

(e) This part of the question was very poorly answered with knowledge of JIT systems being limited to candidates from only a few centres. Where candidates had the knowledge the two marks were easily gained.

Question 2
This is the Themed question with pre-release materials being sent to centres prior to the examination.

(g) Generally well answered with most responses reflecting the candidates own experiences. A very good range of sensible suggestions were made with almost all candidates gaining one mark but a significant number gaining two marks.

(h) Again generally well answered with candidates own experience and common sense gaining them at least one mark. An equally good range of responses was seen to this part of the question.

(i) Generally poor responses to this part of the question despite the fact that the pre-release material should have guided candidates towards a knowledge and understanding of appropriate manufacturing processes of domestic Bedside Lighting. Only a minority of candidates correctly identified the soldering process.
A significant number suggested screwing the parts together which is an appropriate method but is not 'permanent' which is what the question asked.

(j) Knowledge of manufacturing processes and the fact that there would be more parts to assemble and so would take longer and so cost more to produce was almost non-existent.

(k) Surprisingly few candidates showed any understanding of how to fix a bulb holder to the wooden lamp. There were very few marks awarded for this part of the question despite the content of the pre-release material to centres.

(l) The majority of candidates correctly suggested the drilling of holes for the cable and with a significant number understanding the fact that stability of the bedside light should not be affected by the exit of the cable from the bedside light.

Question 3
(a) A well answered question with the vast majority of candidates correctly suggesting a 'mortise and tenon' joint. Other successful solutions included a doweling joint. Screwing the parts together was rewarded where sufficient detail was shown.

(b) (b) The majority of candidates gained one mark for details of how the pivoting could be achieved but many responses lacked sufficient detail to gain more marks. A significant number of candidates failed to respond to the second bullet point which required a method of 'stopping' the barrier arm in the correct horizontal position. Those candidates who did respond generally gained two marks for this aspect of the design.

(c) This question was very poorly answered with only a small minority of students showing
any knowledge or understanding of shape memory alloy (SMA). Where candidates did have the knowledge four marks were awarded in almost every case.

Question 4

(a) A very good variety of solutions to both aspects of the designing were seen. A variety of stops and pins were seen with the more adventurous candidates cutting parts of the disc away and also producing semi-circular slots to facilitate the restriction of rotation of the disc.
Springs, elastic, weights and additional 'string pulls' were all solutions which gained reward for the second part of the question.
A small number of candidates failed to respond to this second aspect of the question.
In a significant number of cases there was a lack of sufficient detail provided by candidates to gain the full four marks.

(b) Very well answered with many candidates showing excellent design skills. Where candidates had used the bullet pointed requirements of the question as a point of reference they scored well. The full range of marks was awarded to many candidates but with the vast majority gaining 3 to 4 marks. Where candidates had suggested the handle there were some excellent solutions.

Question 5

(a) Knowledge of 'friction fit' was generally limited but there were a number of very good, correct responses. Many candidates gained a mark through their own analytical skills of the situation.

(b) *1 & 2* The majority of candidates gained one mark for this part of the question with a lesser number gaining both marks thus showing good understanding. The strength of the material in relation to the function i.e. safely taking the weight of the user and the ability to retain a non-slip surface were the two most popular answers. A small number of candidates reflected on the need for material 'not rusting' failing to make the link with the question stating 'the need to withstand wet conditions' and subsequently were not rewarded.

(c) There were many excellent solutions suggested and the majority of candidates gained at least one or two marks even at this level. As with last year this is commendable. The most popular solutions involved some form of additional sliding tubes with locking nuts, split pins and spring-loaded catches. The best answers included accurate technical information and detail and so achieved maximum marks.
very small number of candidates produced designs which did not attach to the ladder at all and in these cases the solutions were generally of poor quality often such things as using a car jack to support the ladder on the different ground slopes.

Principals Moderators
Internal Assessment
1956/05 (1056/03)

Overview

Moderators reported that coursework this year in Resistant Materials had become very predictable and mundane.
Many centres have adopted a formulaic approach which prevents candidates from using their initiative, taking risks, showing flair or using real problem solving skills.
Moderators often found that all the objectives contained exactly the same sheets with slight adjustments depending on the nature of the product being made. Teachers need to remember that coursework is an examination component and candidates should have the opportunity to take responsibility for their own planning, investigations and outcome.
Hopefully, with the emphasis on KS3 D&T this year, we may see a return to more creative designing and problem solving in the near future.
It is encouraging to see that elaborate borders are disappearing and candidates are producing far more computer generated A3 and A4 sheets within their portfolios. It is a requirement of the specification to use CAD to generate ideas and / or modelling. Candidates are encouraged to use CAM if available within the centre, but need to be aware that assessment criteria for AO5 state that candidates use a range of skills and techniques. Cutting and gluing shapes is not enough to warrant high construction marks. Candidates need to consider construction joints and the fabrication of their machined components. They need to show evidence of their knowledge and understanding of the cutting paths, speed feeds and cut depths etc.

Objective1

Candidates are asked to write a design brief for a marketable product, consider the needs of a potential user group and provide some background information explaining the need or opportunity for designing / redesigning a new product. This can usually be done on one sheet and needs to remain focused.

Objective 2

Some candidates become disillusioned having to complete Objective 2 before they are ‘allowed’ to start designing their product! Many successful centres run AO2 and AO3 side by side. As the candidate starts to design, they realise that they need important information. This then results in more focused, relevant research. Many of the sheets in this section can be completed for homework. Candidates can investigate the needs of the user group via a questionnaire or by an in depth interview. It is important that the candidate reflects on the data acquired from this and the product evaluation exercise and explains how the information will influence their own designing. High achieving candidates need to use the data collected in AO2 to compile a detailed design specification which acknowledges the need for a control device to guarantee consistent quality if more products are made.

Objective 3

Candidates are expected to produce a range of quick sketches, showing initial thinking and problem solving as they address many of the criteria from the specification. It is disappointing when candidate present ‘finished’ ideas – one on each page with no evidence of how they arrived at the solution. The range of communication techniques can include the use of pencil crayons, marker pens, CAD

drawings, pro-desktop modelling, card, polymorph and other suitable modelling materials. For high achieving candidates the selection of a final idea needs to go beyond ticking boxes in a specification grid. There needs to be evidence of an informed decision.

Objective 4

Having established what the candidate wishes to make, this objective focuses on the decisions that need to be made about materials, construction methods, finishes etc. The candidate needs to investigate the possibilities, by testing or experimenting. The majority of centres pay too little attention to these development processes. The exact size and shape of each component needs to be established and if any items such as hinges, catches or handles need to be purchased. It is at this stage that the candidate needs to consider a simple control device like a jig, former or template that can be used in objective 5 when making the product and evaluated in objective 6. Again, this area is often overlooked by many centres. Any modifications that take place as a result of testing need to be documented by the candidate. The use of digital cameras to record testing has enhanced the quality of communication in this section.

Objective 5

Planning carries up to 12 marks. The candidate needs to show the order of construction – tools and equipment used – risk assessment and a time allocation / estimation. A retrospective log of how the product was made carries no marks and is not a requirement of the specification.

Candidates produced a wide range of products ranging from small delicate pieces of jewellery through to larger pieces of furniture. The quality of outcome varied considerably between centres.

Objective 6

Many candidates still fail to test their product in the situation it was designed to be used in. When done well, candidates asked a representative from the user group to comment on the success of their outcome. Many of the suggestions made were considered and evaluated by the candidate. To move beyond the middle box on the assessment grid candidates need to evaluate the success of the control device.

The marks awarded for presentation are used well by most centres, rewarding candidates for their ability to communicate their thoughts and actions in a logical and well presented manner.

General Certificate of Secondary Education
Design & Technology: Resistant Materials (Short Course) 1056
June 2005 Assessment Session

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
01 Paper 1	50			29	25	21	17	13
02 Paper 2	50	29	24	19	13			
03 Coursework	105	78	66	54	43	33	23	13

Syllabus Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175				93	77	62	47	32
Percentage in Grade					22.6	22.3	18.9	14.9	9.8
Cumulative Percentage in Grade					22.6	44.9	63.8	78.8	88.7

The total entry for the examination was 364

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	129	113	97	81	61	51		
Percentage in Grade		10.2	20.1	26.7	29	11.5	1		
Cumulative Percentage in Grade		10.2	30.3	57.1	86.1	97.6	98.6		

The total entry for the examination was 304

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	4.7	9.2	12.3	25.5	17.3	10.6	8.1	5.3
Cumulative Percentage in Grade	4.7	14	26.3	51.9	69.2	79.9	87.9	93.3

The total entry for the examination was 668

General Certificate of Secondary Education
Design & Technology: Resistant Materials (Full Course) 1956
June 2005 Assessment Session

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
01 Paper 1	50			29	25	21	17	13
02 Paper 2	50	29	24	19	13			
03 Paper 3	50			31	26	22	18	14
04 Paper 4	50	33	28	24	19			
05 Coursework	105	78	66	54	43	33	23	13

Syllabus Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175				93	78	63	48	33
Percentage in Grade					28	24.5	20.8	13.7	7.6
Cumulative Percentage in Grade					28	52.6	73.4	87.2	94.8

The total entry for the examination was 15013

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	135	118	101	84	65	55		
Percentage in Grade		10.6	23.6	30.9	22.5	8.9	1.7		
Cumulative Percentage in Grade		10.6	34.3	65.2	87.7	97.7	98.5		

The total entry for the examination was 13662

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	5.1	11.3	14.8	25.4	17.1	11.7	7.1	3.9
Cumulative Percentage in Grade	5.1	16.4	31.2	56.6	73.7	85.4	92.6	96.6

The total entry for the examination was 28675

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Information Bureau

(General Qualifications)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: helpdesk@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553