OCR
RECOGNISING ACHIEVEMENT

GCSE

Design & Technology (Resistant Materials)

General Certificate of Secondary Education **GCSE 1956**

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

Mark Schemes for the Components

June 2006

1956/1056/MS/R/06

Oxford Cambridge and RSA Examinations

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General Certificate of Secondary Education

Design & Technology: Resistant Materials Technology (1956)

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

MARK SCHEME FOR COMPONENTS

Mark Scheme 1956/01, 1056/01
June 2006

1 (a) Round wood is ‘dowel’. **[1]**

(b) Stage 1 Any reference to saw, chisel, laser cutter, router **[1]**

Stage 2 Drill, bit. **[1]**

Stage 3 File, glass/sandpaper, sanding disc, plane, spokeshave **[1]**

(c) Template drawn to shape of hull. [1]
Correct position of hole shown. [1] **[2]**

(d) Yacht suitable for children includes: **[1]**
safe to use, could be brightly coloured, creative play, easy to use

Reference to ‘no small parts’ or ‘non toxic’ must be justified **[1]**

(e) Some type of screw, nut & bolt, pin or nail. [1]
Type of washer/spacer or accept loose fit if stated. [1] **[2]**

2 (a) Two items of information include a wide variety of dimensions related to cycles, e.g. frame, wheels, seat height etc., types of cycle, most common maintenance, shape of cycle, construction of cycle, location of stand, available materials, **[1]**
construction techniques, weight of bicycle, references to market research **[1]**

(b) (i) emery cloth used to clean or smooth the metal. **[1]**

(ii) flux used to keep the joint clean, allow spelter to flow. **[1]**

(iii) brazing rod is the 'metal' used to join the two parts together, can fill the joint. **[1]**

(c) Safety precautions related to care when using the brazing torch, brazing hearth, holding work during the process. Wear goggles/welding goggles, tie back long hair, wear gloves **[1]**

(d) Suitable finish: paint or specific "Hammerite", plastic coating. **[1]**

(e) Three or more different heights of stem. **H** [1]

Use of screw, bolt or pin. **F** [1]

Screw, bolt or pin locked in place. **L** [1] **[3]**

3 (a) Stage 1 template, chinagraph pencil, permanent marker, scriber, felt tip (pencil/pen if reference to backing paper) **[1]**

Stage 2 saws include: coping, scroll, vibro, bandsaw, fretsaw, hegner, abrafile jigsaw **[1]**

Stage 3 use of file or wet or dry paper. **[1]**

Accept CAD-CAM response, e.g. laser cutter, if stage is relevant to description.

(b) Accurate location of base. **L** (for max 2 must be secure on 3 edges) [0-2]

Accurate location of hole. **H** [1] **[3]**

(c) Method of support includes any practical fixing between the back and the test tube or between the base and the test tube; e.g. use of folded acrylic with a hole for the test tube, or use of pegs/pins from the back for the test tube to fit between. Appropriate dia. hole, attached to back, height from base = half height of test tube.

Support for test tube	**T**	[1]	
Fixing of support to back or base	**F**	[1]	
Technical Detail eg materials, fixings	**D**	[0-2]	**[4]**

4 (a) Mechanism to include:
Compression springs below arms.
or
Tension springs between arms/ears (allow elastic bands) **M** [1]
or Counter weight
Springs must allow for arm to move independently. **I** [1]
Added details. **D** [1] **[3]**

(b) Reference must be made to some form of on-screen modelling.
Reference to CAD. Animation, Virtual design [1]
Explanation of how the mechanism can be animated. [1] **[2]**

(c) Injection moulding is expensive due to cost of initial tooling. **[1]**

(d) Two quality control checks to be carried out **during** manufacturing include:
quality of materials, quality of finish, critical dimensions, **[1]**
operation. **[1]**

(e) Market is aimed at children is worth 1 mark only.
For maximum 2 marks there should be a reference made to adults purchasing them for children and/or use in primary school **[2]**

5 (a) Finish applied before assembly because it is quicker, better and less awkward. **[1]**

(b) 2 advantages: less expensive than solid wood, stable, **[1]**
more readily available. **[1]**

(c) Argue that either can be more expensive to manufacture in quantity
Design **A**: more parts involving more processes, more time and more costs.
Design **B**: the brackets would need to be joined to a wall plate.
Award 0-2 marks dependent upon quality of explanation. **[2]**

(d) (i) Advantage to the consumer: lower cost, personal satisfaction of assembling them. Easier to transport. Cheaper - must be qualified **[1]**

(ii) Advantage to the manufacturer: lower production costs because products do not require assembling, less space required to store products. Quicker - must be qualified **[1]**

(e) Improvement to Design **A**: use of larger section solid wood, lengthen top rail of bracket, lipping applied to edges of shelf.
or
Improvement to Design **B**: widen wall plate joined to bracket, lipping applied to edges of shelf.

Quality of improvement:	**I**	[1]	
Notes to include technical detail	**N**	[1]	
Quality of sketch:	**S**	[1]	**[3]**

Mark Scheme 1956/02, 1056/02
June 2006

Paper 2

1	(a)	Mechanism to include: Compression springs below arms. or Tension springs between arms/ears (allow elastic bands)	**M**	[1]	
		or Counter weight Springs must allow for arm to move independently.	**I**	[1]	
		Added details.	**D**	[1]	**[3]**
	(b)	Reference must be made to some form of on-screen modelling. Reference to CAD. Animation, Virtual design		[1]	
		Explanation of how the mechanism can be animated.		[1]	**[2]**
	(c)	Injection moulding is expensive due to cost of initial tooling.			**[1]**
	(d)	Two quality control checks to be carried out **during** manufacturing include: quality of materials, quality of finish, critical dimensions,			**[1]**
		operation.			**[1]**
	(e)	Market is aimed at children is worth 1 mark only. For maximum 2 marks there should be a reference made to adults purchasing them for children and/or use in primary school			**[2]**

2 (a) Finish applied before assembly because it is quicker, better and less awkward. **[1]**

(b) 2 advantages: less expensive than solid wood, stable, **[1]**
more readily available. **[1]**

(c) Argue that either can be more expensive to manufacture in quantity
Design **A**: more parts involving more processes, more time and more costs.
Design **B**: the brackets would need to be joined to a wall plate.
Award 0-2 marks dependent upon quality of explanation. **[2]**

(d) (i) Advantage to the consumer: lower cost, personal satisfaction of assembling them. Easier to transport. Cheaper - must be qualified **[1]**

(iii) Advantage to the manufacturer: lower production costs because products do not require assembling, less space required to store products. Quicker - must be qualified **[1]**

(e) Improvement to Design **A**: use of larger section solid wood, lengthen top rail of bracket, lipping applied to edges of shelf.
or
Improvement to Design **B**: widen wall plate joined to bracket, lipping applied to edges of shelf.

Quality of improvement:	**I**	[1]	
Notes to include technical detail	**N**	[1]	
Quality of sketch:**S**		[1]	**[3]**

3 (a) (i) Up and down movement: reciprocating. **[1]**

(ii) Turns around movement: rotary/rotational. **[1]**

(b) Reciprocating movement produced by one cam fixed onto shaft.

Rotary movement produced by means of a disc connected to the bottom of the bird 'follower'.

Appropriate shaped cam-pear, eccentric, crank	**C**	[1]	
Disc attached to bottom of follower	**D**	[1]	
Disc shown off-centre, over cam or gear system	**OC**	[1]	
Quality of communication/technical accuracy.	**Q**	[0-2]	**[5]**

(c) Toy unlikely to be sold commercially:
it has limited appeal, it uses a lot of material, it is bulky,
it is too basic, poor design. [1]

(d) Two questions to <u>ask a child</u> include:
"Which part of the toy do you enjoy the most?".
"Do you find it easy to operate/turn the handle?" **[1]**
"Are there any parts of the design that you would change?" **[1]**

4 (a) Simple, easy to adjust method, details of fittings
e.g. metal pins, pegs. (housing max 2) [0-3] **[3]**

(b) (i) Mirror doors slide between grooves cut into top and bottom sides, or between applied runners.
(if runners are fitted to the front max 1 mark) [0-2]
Removal by means of grooves or runners in top side being twice the depth of those in the bottom side. [0-2] **[4]**

(ii) Sliding doors take up less space.
Hinged doors protrude therefore more vulnerable to damage
Safer if justified **[1]**

(c) Check must be made when joints have been cut out, prior to gluing up at 'dry-cramping' stage. **[1]**

(d) Suitable finish: polyurethane varnish., yacht varnish, marine varnish teak oil, Danish oil, gloss paint, waterproof lacquer
Must be a waterproof finish **[1]**

5 (a) Suitable plastic: polystyrene (HIPS), ABS, PVC, acrylic, perspex **[1]**

(b) Two features include: 'draw' or taper on sides of former, **[1]**
rounded edges/corners, vent/air holes. **[1]**

(c) Two ergonomic features include: comfortable grip on pole,
rounded edges of case are safe, appropriate size/shape of switch,
light that flashes/ buzzer that sounds when in contact **[1]**
with metal wire. **[1]**

(d) Design of case may be modified to accommodate
a sliding base, a hinged base or an inset base.
Use of velcro or magnetic catches accepted.
Practical design to include ease of access [0-3]
Accuracy of technical detail. [0-2] **[5]**

Mark Scheme 1956/03
June 2006

1 (a) (i) Housing joint, dowel joint, knock down fitting, corner support, 0-2
0-2 depending on detail and clarity If screws only = **1** mark

(ii) Correctly named joint. If nothing drawn above but have named a correct joint mark can be awarded 1

(b) Protection, easier cleaning, aesthetics, smooth finish **1** mark for each correct point 1
1

(c) Box 1 Glass paper, (accept sandpaper), cork block, sanding disc, belt sander, linisher orbital sander. 1
Box 3 White spirit, cellulose thinners, methylated spirit, Turps, brush cleaner, water 1
1 mark for each correct point

(d) **S = solution** Base, shelf shown = **1** mark
D = details Materials, construction methods = **0-2** marks 0-3

[10]

2 (a) Box 1 Try square, (accept tri square), marking knife, craft knife, pencil, sliding bevel, combination square (not ruler or set square) 1
Box 2 Sawing board, bench hook, G cramp, (accept vice) 1
Box3 Back / tenon / dovetail saw. Any named saw except Hand or Chain 1

(b) Any between 5.5 to 7 mm 1

(c) Star washer. Plastic or rubber cap applied, split pin, burring over the ends, threaded and nut applied, "soldered" addition, 1
1 mark for each correct answer 1

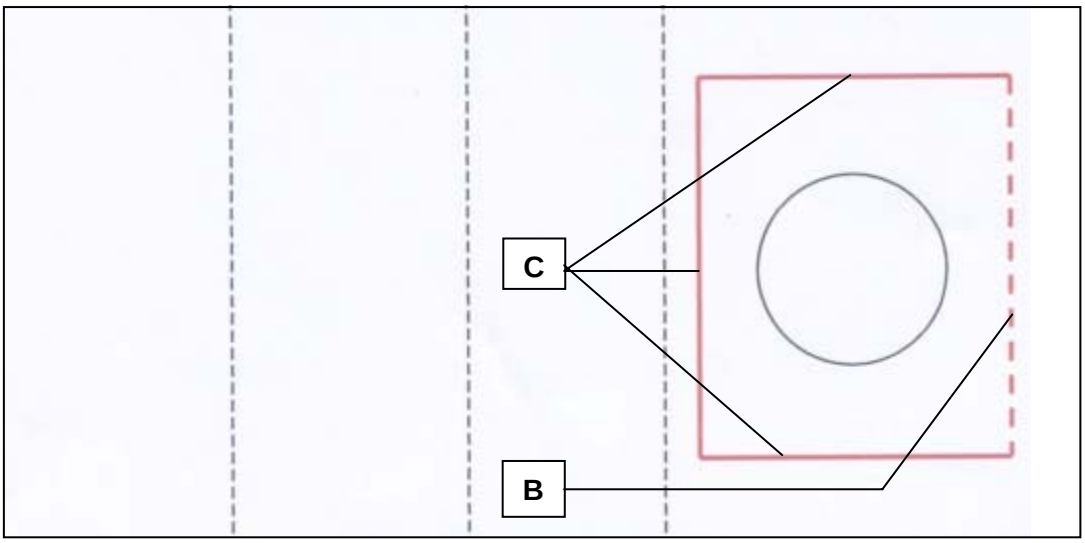
(d) Solution proposed
Would the hammer stay in place? 0-1 mark
Is it easy to remove? 0-1 mark

Technical details: How are components attached, hole sizes, P.V.A. / pre-manufactured components. 0-2 0-4

[10]

3 (a) Ability to be bent, water resistant, weather resistant, easy to clean / wipe clean / wash, lightweight, available in different colours, easy to work with, 1
readily available, no applied finish required Any two 1
points **1** mark each

(b) **C = Cut** lines = 1 mark for correct position of all 3 lines (all 3 lines required)
B = Bend lines = 1 mark correct position of line 0-2



(c) Box 1 Drill a small hole, feed blade of saw through hole, saw the cut lines, use coping saw /piercing saw "Saw out" or "saw it" **not** rewarded unless appropriate details are given. 1

Box 2 Heat the material using line bender (strip heater), bend the shelf using line bender (strip heater), use former to get correct position. 1

Box 3 file edges, polish edges, by appropriate method. 1

Accept Laser cutting 1 mark for Laser plus up to 2 for other details)

(d) **Quality of solution** provided. Thread cut and nut, hole drilled with pin, sawn along length and folded over, **0-2**

Technical details / sympathetic to materials **0-1** 3

[10]

4 (a) Second point correctly selected 1

(b) Safe in use, brightly coloured, economical to produce (not cheap), easy to maintain / clean, weather resistant / water resistant, no small choking hazards, no toxic paints / finishes / no sharp parts, have educational value, have play appeal, self finish, any appropriate points. 1 1

(c) Early 3D evaluation, testing, showing a client, see if it works correctly / looks correct, saves money on materials, avoids waste, avoids mistakes, to see if it could be manufactured 1 1
Any appropriate points

(d) Analysing / evaluating the manufacturing and the processes involved and assessing the risks to the health and well being of the workforce and plant. Assessing the likelihood of any potential injury or damage and putting into place remedial / prohibitive measures. Putting into place procedures to avoid / lessen / minimise the risks / dangers identified. 0-2
Pro-active approach to identify and minimise incidents of harm. Do they understand?

OR

Analysing / evaluating toys and their use / the user - assessing the risks to their health and well being.

(e) Any appropriate explanation reference repeated accuracy, ease of repeated action, of a process during manufacture or assembly of a product. 1 1

(f) Give toy to child to play with / observe, drop testing, asking adults / parents views, impact testing, swallow testing, probe testing, scratch paint testing. 1
Any appropriate test.
If an example given e.g. “pulling out/at the eyes of the teddy” reward if correct

[10]

5	(a)	Aluminium / aluminium alloys	1
	(b)	Lightweight (not light), weather resistant, does not rust	1
	(c)	Fruit pickers, caretakers, street wardens, councils workers, contractors, volunteer groups, older / disabled people, dustmen, recyclers, street cleaners, cleaners. Any suitable suggestion	1 1
	(d)	Easy to store, can be put in bag / pocket / car boot more easily, easy to transport / carry, less space taken up in shop storage / display, less space taken up with transport from factory to stores, less storage space needed in factory	1 1
	(e)	Ease of manufacture, inexpensive / if compared, no physical protrusions, vibration resistant, unlikely to come undone, can be removed for maintenance with simple tooling, smooth surfaces which allow easy movement of the moving parts	1
	(f)	Is mechanical principle correct – do they understand 0-2 Will it work? Repositioning cord, shortening cord, moving roller	
		Technical detail provided of solution 0-1	0-3
			[10]
			Total 50 marks

Mark Scheme 1956/04
June 2006

1 (a) Second point correctly selected 1

(b) Safe in use, brightly coloured, economical to produce (not cheap), easy to maintain / clean, weather resistant / water resistant, no small choking hazards, no toxic paints / finishes / no sharp parts, have educational value, have play appeal, self finish, any appropriate points. 1 1

(c) Early 3D evaluation, testing, showing a client, see if it works correctly / looks correct, saves money on materials, avoids waste, avoids mistakes, to see if it could be manufactured 1 1
Any appropriate points

(d) Analysing / evaluating the manufacturing and the processes involved and assessing the risks to the health and well being of the workforce and plant. Assessing the likelihood of any potential injury or damage and putting into place remedial / prohibitive measures. Putting into place procedures to avoid / lessen / minimise the risks / dangers identified. 0-2
Pro-active approach to identify and minimise incidents of harm. Do they understand?

OR

Analysing / evaluating toys and their use / the user - assessing the risks to their health and well being.

(e) Any appropriate explanation reference repeated accuracy, ease of repeated action, of a process during manufacture or assembly of a product. 1 1

(f) Give toy to child to play with / observe, drop testing, asking adults / parents views, impact testing, swallow testing, probe testing, scratch paint testing. 1
Any appropriate test.
If an example given e.g. “pulling out/at the eyes of the teddy” reward if correct

[10]

2	(a)	Aluminium / aluminium alloys	1
	(b)	Lightweight (not light), weather resistant, does not rust	1
	(c)	Fruit pickers, caretakers, street wardens, councils workers, contractors,	1
		volunteer groups, older / disabled people, dustmen, recyclers, street cleaners, cleaners. Any suitable suggestion	1
	(d)	Easy to store, can be put in bag / pocket / car boot more easily, easy to transport / carry, less space taken up in shop storage / display, less space taken up with transport from factory to stores, less storage space needed in factory,	1 1
	(e)	Ease of manufacture, inexpensive / if compared, no physical protrusions, vibration resistant, unlikely to come undone, can be removed for maintenance with simple tooling, smooth surfaces which allow easy movement of the moving parts.	1
	(f)	Is mechanical principle correct – do they understand 0-2 Will it work? Repositioning cord, shortening cord, moving roller. Technical detail provided of solution 0-1	0-3
			[10]

3 (a) Sheradised, galvanised, dip coated, plastic coated, powder coating, chrome / nickel plated. 1

(b) Strength (stability) Reference to gain structure, laminations, glued layers, 1
WBP qualities. 1
Do not reward readily available, cost even if compared, available in large sheets.
1 mark for each correct response.

(c) Shaping for comfort / rounded edges / radiused corners / indentations, padding, fabric coating / plastic coating. 1

(d) Hand grips = long twisted links, forged from single billet, plastic coated with tube for hand positions, sleeve. 0-2

(e) **Secure:** Quality and details, thread cut with lock nut of some type, threaded strip, hole drilled / with a secure pinning of some sort **0-2**

Damage: Quality and details Strip / spread plate / washers of appropriate nature to spread load below plywood seat. **0-2** 0-4

[10]

4 (a) Injection moulding 1

(b) Ensuring quality of product, customer satisfaction, company image, minimise losses through waste, maintain consistency of artefact, minimise waste, safety, component fit. 1 1
Any two **different** valid reasons

(c) Dimensional accuracy, surface blemishes, strength testing. 1

(d) **Ease of removal** = grip, serrations, lip, indentations, hole for pin, (will it work?) **0-2**
Security = clip over top of shelf, pin in hole on shelf, pimple and dent, enlarged with twin prongs, not into ends of shelf (will it work?) 0-4
0-2

(e) Sleeve (metal or plastic), internal strip with holes. 0-1
Appropriate additional details 0-1 0-2

[10]

5 (a) **M = manufacturing process** – process correctly named and appropriate to the funnel **= 1**

P = preparation of chosen material – cutting / shaping / mounting / holding material **= 1**

D = description of the manufacturing process – process understood with clarity **= 2**

F = finish applied to funnel – suitable finish identified / explained / description of **= 1** 0-5

(b) Can it be connected **1 mark**
Will it stay together, **1 mark**
Can it be easily separated when required, **1 mark**
No pre-manufactured components **1 mark**
Technical details, **1 mark**

If Pre-manufactured components are used MAXIMUM 1 MARK 0-5

[10]

Total 50 Marks

General Certificate of Secondary Education
Design & Technology: Resistant Materials (Short Course) 1056
June 2006 Assessment Series

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
01 Paper 1	50			27	23	19	16	13
02 Paper 2	50	28	23	19	14			
03 Coursework	105	79	67	55	44	34	24	14

Syllabus Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175				86	72	59	46	33
Percentage in Grade					22.1	25.6	13.8	12.3	14.8
Cumulative Percentage in Grade					22.1	47.7	61.6	73.9	88.7

The total entry for the examination was 285

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	132	115	98	82	64	55		
Percentage in Grade		7.3	20.3	26.3	25.0	17.2	3.0		
Cumulative Percentage in Grade		7.3	27.6	53.9	78.9	96.1	99.1		

The total entry for the examination was 270

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	3.9	10.8	14.0	23.7	21.1	8.0	5.75	6.9
Cumulative Percentage in Grade	3.9	14.7	28.7	52.4	73.6	81.6	87.3	94.2

The total entry for the examination was 555

General Certificate of Secondary Education
Design & Technology: Resistant Materials (Full Course) 1956
June 2006 Assessment Series

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
01 Paper 1	50			27	23	19	16	13
02 Paper 2	50	28	23	19	14			
03 Paper 3	50			34	29	25	21	17
04 Paper 4	50	35	30	26	21			
05 Coursework	105	79	67	55	44	34	24	14

Syllabus Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175				95	80	65	50	35
Percentage in Grade					28.4	24.2	21.2	14.0	7.3
Cumulative Percentage in Grade					28.4	52.7	73.8	87.8	95.1

The total entry for the examination was 14457

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	137	120	103	87	69	60		
Percentage in Grade		10.5	23.5	31.7	21.6	9.3	1.6		
Cumulative Percentage in Grade		10.5	33.9	65.7	87.3	96.6	98.2		

The total entry for the examination was 13209

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	5.0	11.3	15.2	25.1	17.1	11.8	7.3	3.8
Cumulative Percentage in Grade	5.0	16.3	31.5	56.6	73.7	85.5	92.8	96.6

The total entry for the examination was 27666

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