Cambridge Assessment International Education

Cambridge International A Level

DESIGN AND TECHNOLOGY **9705/32**

Paper 3 **October/November 2020**

MARK SCHEME

Maximum Mark: 120

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks	Guidance
Section A Part A – **Product Design**			
1(a)	suitable material: • abs, polypropylene, • appropriate hardwood, plywood • aluminium alloy. • mild steel (with finish) [1] reasons: • rigid, stiff, will keep shape • easy to join, fabricate • accept finish appropriate for application 2 valid reasons 2 × [1]	**3**	*Award marks for any other acceptable answer*
1(b)	quality of description: • fully detailed, all/most stages [4–7] • some detail [0–3] quality of sketches up to [2]	**9**	*Dependant on material chosen – could be Fabricated using butt joints. PVA on hardwood or plywood – maybe biscuit joints* *ABS and polypropylene joined using appropriate solvent/cement* *Aluminium and mild steel could be folded and riveted – mild steel sweated*

Question	Answer	Marks	Guidance
1(c)	explanation could include: • change in process • change in materials • use of moulds • simplification of design quality of explanation: • logical, structured [4–6] • limited detail [0–3] quality of sketches up to [2]	**8**	*Marks awarded for correct use of templates and jigs* *Cutting parts to length / shape* *Folding / bending / holding whilst being joined* *Injection moulding not appropriate for batch of 100 – award [3] marks for full description of producing box using injection moulding*

Question	Answer	Marks	Guidance
2	Discussion could include: • impact of social media • rapid development / improvement in products • expense of keeping up to date for manufacturers • research development • regular updates on target market trends examples / evidence could be • specific markets • specific reference to company successes / difficulties • specific products – mobile phone, fitness trackers • marketing methods – specific social media examination of issues • wide range of relevant issues [4–8] • limited range [0–3] quality of explanation • logical, structured [4–8] • limited detail [0–3] supporting examples / evidence [4]	**20**	

Question	Answer	Marks	Guidance
3(a)	description of process • fully detailed, all / most stages [3–5] • some detail [0–2] quality of sketches up to 2 2 × [7]	**14**	***Laminating*** *Strips of wood cut* *Smooth former prepared* *Strips glued and placed on former* *Clamped* *Removed and shaped/finished* ***Brazing*** *Clean surfaces to be joined* *Apply flux* *Carefully position,* *apply flame* *when right heat apply brazing spelter* *cool and clean* ***Calendering*** *polymer melted* *extruded onto series of heated rollers* *thickness and surface treatment dependent upon roller settings / type* *run off onto flat area to cool*
3(b)	Laminating – solid, strong structure • some give / flexibility • low waste / environmentally friendlier brazing – very strong joint • basic process, easy to produce good joint • gives cleaner finish than welding calendering – even thickness, easily set • large lengths of sheet produced / cut to width / length • effective use of material, no wastage 2 × [3]	**6**	

Question	Answer	Marks	Guidance
Part B – **Practical Technology**			
4(a)	Hardness – ability to resist abrasion or indentation [1] Stiffness – resistance to deflection or deformation by an applied force [1]	**2**	
4(b)	Hard material could be • high carbon steel • titanium • diamond [1] Stiff material could be • cast iron • high carbon steel • stainless steel [1]	**2**	Must be two different materials Accept any other correct response
4(c)	Fully detailed description of test [6–8] Some detail of most stages [3–5] Limited detail [0–2] Quality of sketches [2]	**10**	*For full marks, test must show* • *sample held firmly and being subjected to a bending force* • *Standard size samples* • *Accurate positioning of applied load* • *Method of measurement*
4(d)	explanation could include: • specific performance requirements of materials • functional success • safety/legal implications • simplification of design quality of explanation: • detailed, logical, structured [4–6] • limited detail [0–3]	**6**	

Question	Answer	Marks	Guidance
5(a)(i)	S2 switches circuit on [1] When S1 triggered [1] output of 3 goes high [1] time determined by C1 [1] and R2 [1]	**5**	
5(a)(ii)	$T = C \times R$ [1] $= 100\,000 \times \frac{100}{1000\,000}$ [1] = 10 seconds [1]	**3**	
5(b)	Discussion could include: • rapid development of technology • demand for improvement in products • very competitive market • need to explore new directions examples / evidence could be • specific reference to innovative designers / companies • specific products – tablet computers, voice controlled devices • rapid communication through social media examination of issues • wide range of relevant issues [3–5] • limited range [0–2] quality of explanation • logical, structured [3–5] • limited detail [0–2] supporting examples / evidence [2]	**12**	

Question	Answer	Marks	Guidance
6(a)	Applications could be: **Cam –** Car engine, locking device, childs toy **Crank –** Engine start up, bicycle, wind up radio **Ratchet –** spanner, screwdriver, winch 3 × [1] Quality of description and communication up to 3 3 × [3]	**12**	
6(b)	Example could be: **Pneumatic** braking systems, tyres **Hydraulic** tipping systems, braking systems 2 × [1] explanation could include: • suitability of each system • reference to example • Safety / efficiency quality of explanation: • detailed, logical, structured [4–6] • limited detail [0–3]	**8**	*Accept brakes as an example for each as long as clear understanding of differences evident* *Hydraulic brakes are usually used in passenger cars of all kinds, while pneumatic brakes in heavy trucks and trailers*.

Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7	scale [2] ellipse construction [3] ellipse in isometric [4] handle [5] positioning of parts [3] line quality / accuracy [3]	**20**	

Question	Answer	Marks	Guidance
8	**Electrical** methods could be Photocopying Offset Lithography Digital printing **Mechanical** methods could be: Screen printing Letterpress example $2 \times [1]$ Quality of description • fully detailed [4–7] • some detail, [0–3] Quality of sketches up to 2 $2 \times [9]$	**20**	

Question	Answer	Marks	Guidance
9(a)	Suitable material – **box** Corrugated card Corriflute Solid white board [1] Suitable material – **loose fill chips** Expanded polystyrene Polyurethane Starch $2 \times [1]$	**2**	
9(b)	Quality of description • fully detailed, all stages covered [10–14] • some detail, most stages covered [5–9] • limited detail [0–4] Quality of sketches and communication [4]	**18**	*Description should include* *Net design* *Tabs and locking method* *Die cut shape* *Folding*

Question	Answer	Marks	Guidance
Section B			
	Analysis Analysis of the given situation / problem. [0–5] Detailed written specification of the design requirements. At least five specification points other than those given in the question. [0–5] **Exploration** Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection. • range of ideas [0–5] • annotation related to specification [0–5] • marketability, innovation [0–5] • evaluation of ideas, selection leading to development [0–5] • communication [0–5] **Development** Bold sketches and notes showing the development, reasoning and composition of ideas into a single design proposal. Details of materials, constructional and other relevant technical details. • developments [0–5] • reasoning [0–5] • materials [0–3] • constructional detail [0–7] • communication [0–5] **Proposed solution** Produce drawing/s of an appropriate kind to show the complete solution. proposed solution [0–10] details/dimensions [0–5] **Evaluation** Written evaluation of the final design solution. [0–5]	**80**	