Cambridge Assessment International Education

Cambridge International A Level

DESIGN & TECHNOLOGY **9705/33**

Paper 3 **October/November 2023**

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.

Cambridge International is publishing the mark schemes for the October/November 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

PUBLISHED

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:

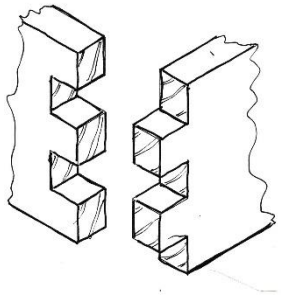
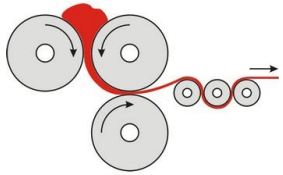
Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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.

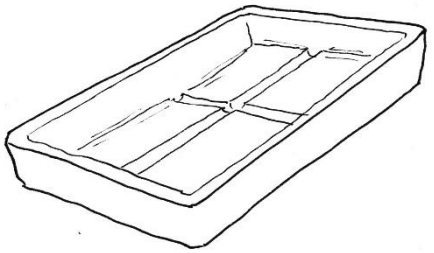
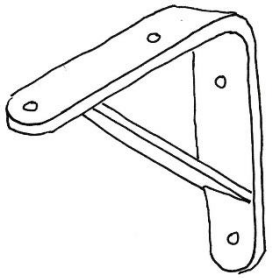
Question	Answer	Marks	Guidance
Section A Part A – **Product Design**			
1(a)	suitable material: – aluminium alloy, stainless steel – iroko, teak, cedar, pressure treated pine – HDPE, polypropylene, – Rattan (palm) synthetic rattan (polyethylene) **1** Reasons, dependant on material : – looks attractive – rigid, stable – long lasting, little maintenance 2 × **1**	**3**	*Accept any other suitable material or any other reason appropriate to material choice*
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. Does not have to be materials selected in part **(i)** can be a combination of materials* *Solid hardwood top, may need boards joined and glued for thickness or manufactured board and appropriate finish* *Legs turned* *Aluminium top with edging and support frame* *Legs turned* *Must show all key stages of manufacture for full marks*

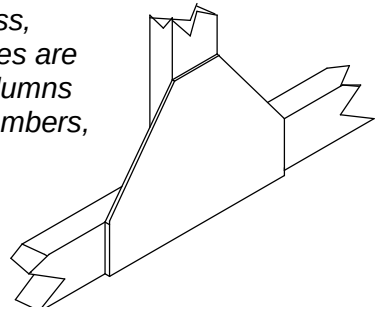
Question	Answer	Marks	Guidance
1(c)	explanation could include: – change in process; – change in materials; – use of jigs, formers, moulds; – simplification of design. quality of explanation: – logical, structured 4–6 – limited detail, 0–3 quality of sketches up to 2	**8**	*Could be* – *self-assembly arrangement* – *cast, whole or parts* – *injection moulded, blow moulded (parts)* – *costs* – *equipment/skills available* *Full details of moulds required for injection moulding or blow moulding*

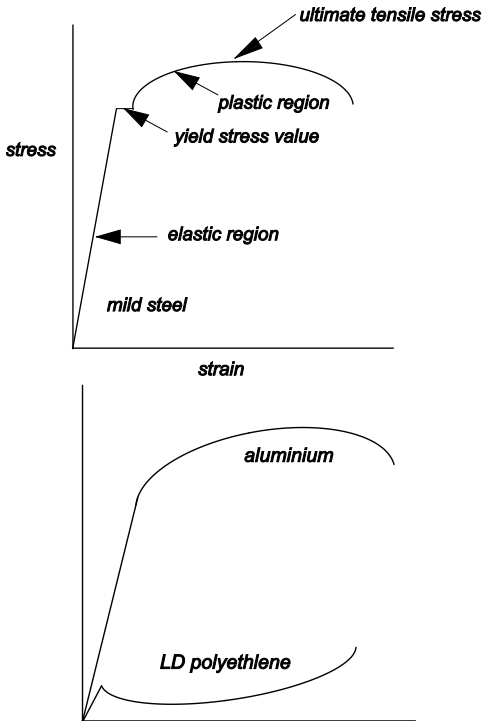
Question	Answer	Marks	Guidance
2	examination of issues – wide range of relevant issues 4–8 – limited range 0–3 quality of explanation – logical, structured 4–8 – limited detail, 0–3 supporting examples / evidence 4	**20**	Discussion could include: – market demand – costs involved – skill demands – speed of production examples / evidence could be – specific products, – specific production examples *Full understanding of the range of quantity unit, batch and mass production systems and reasoning for application*

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 × 7	**14**	***Internal and external threading*** *internal* – *drill Ø 6.8 20 deep hole* – *apply cutting compound* – *use taper the plug M8 tap* – *ensure 90^0* – *.5 rotation anticlockwise to break off chip* *external* – *secure in vice* – *use M8 die in die holder* – *apply cutting compound* – *ensure 90^0* – *thread to length* ***comb (finger) joint*** – *accurately mark out* – *cut on inside of waste line with tenon saw* – *remove waste with coping saw* – *chisel to line* – *fit and adjust if required*  ***calendering*** – *polymer in hopper,* – *released to train of heated rollers to create a plastic sheet to desired thickness* – *cool* – *cut to shape*  *Accept any other correct variations or methods.*

Question	Answer	Marks	Guidance
3(b)	Internal and external threading – difficult to produce any other way – standard tools used comb (finger) joint – joint can be attractive – strong mechanical strength – lots of gluing area calendaring – even thickness, easily set – large lengths of sheet produced / cut to width / length – effective use of material, no wastage 2 × 3	**6**	*Accept other valid explanations, brief outline points max 3*

Question	Answer	Marks	Guidance
Part B – **Practical Technology**			
4(a)	correct monocoque and frame structure 2 – clear explanation of differences 3–4 – explanation of one structure 1–2 – no creditable response 0 quality of sketches up to 2	**8**	*monocoque – loads are supported by an external skin e.g. egg shell, aircraft fuselage* *frame – built up of parts or members to support loads*
4(b)(i)	quality of explanation – logical, structured, well communicated 3–4 – limited detail, 1–2 – no creditable response 0	**4**	*<u>Ribs</u> examples e.g. food trays, gives stiffness, rigidity and stability to shapes, flat sheets* 
4(b)(ii)	quality of explanation – logical, structured, well communicate 3–4 – limited detail, 1–2 – no creditable response 0	**4**	*<u>Braces</u>* add strength to a joint e.g. wall bracket 

Question	Answer	Marks	Guidance
4(b)(iii)	quality of explanation – logical, structured, well communicate 3–4 – limited detail, 1–2 – no creditable response 0	**4**	*<u>Gussets</u> examples e.g. roof truss, strengthen frames, Gusset plates are used to connect beams and columns together or to connect truss members, bolted, screwed or welded.* 
5(a)	See Appendix 1 accurate drawing 2 bows notation used 2 correct response 8.7 N 2	**6**	allow 2 marks for calculated correct response
5(b)	appropriate example 2×1 quality of explanation – logical, structured, well communicated 3–4 – limited detail, 1–2 – no creditable response 0	**6**	egg – cycle helmet honeycomb – doors human skeleton – industrial robots

Question	Answer	Marks	Guidance
5(c)	appropriate graph 2 – key features fully explained 5–6 – most features explained not 3–4 – limited detail 1–2 – no creditable response 0	**8**	key features 

Question	Answer	Marks	Guidance
6	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**	Discussion could include: – repeated accuracy – speed of production – training requirements – equipment costs examples / evidence could be – specific CAM applications, – specific product examples

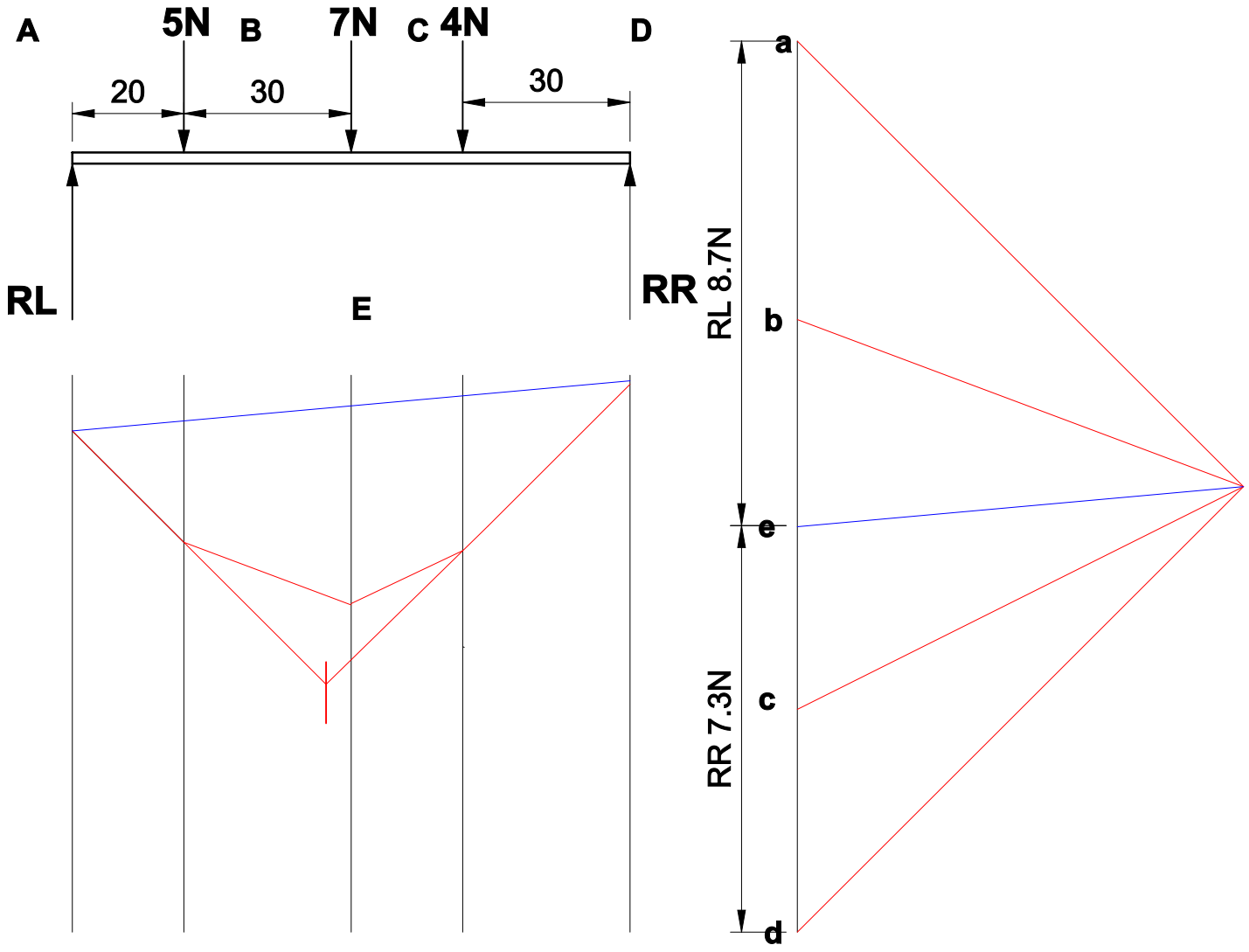
Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7	isometric 1 handle 2 collar 2 threaded insert 2 frame 3 blade adjuster 2 slotted pins 2 pin holder 1 correct exploded alignment 2 thick and thin 3	**20**	

Question	Answer	Marks	Guidance
8	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**	Discussion could include: – security – focal points, main items – flow, circulation – balance of products, images, prices – staff available examples / evidence could be – specific exhibition features – specific ways of dealing with security etc

Question	Answer	Marks	Guidance
9	See Appendix 2 scale 2 correct projection 2 completed front elevation 5 completed end elevation 3 plan 6 accuracy/line quality 2	**20**	

Question	Answer	Marks	Guidance
Section B			
10, 11 and 12	**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** B *Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection.* range of ideas annotation related to specification marketability, **[0–5]** innovation **[0–5]** evaluation of ideas, **[0–5]** 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.* Development **[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**	

Appendix 1 Q5a



Appendix 2 Q9