Cambridge Assessment International Education

Cambridge International A Level

DESIGN & TECHNOLOGY **9705/32**

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.

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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:

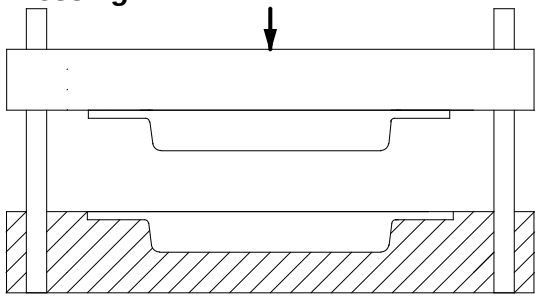
Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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	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 research • appropriate price • one off or volume production issues • safety considerations • cultural issues • anthropometrics examples / evidence could be • specific markets • specific products

Question	Answer	Marks	Guidance
2(a)	**A** knurled adjusting handle suitable material: • aluminium alloy, brass, mild steel 1 reasons: • can be turned • can be knurled • can be threaded 1×2 **or** **B** stem suitable material: • aluminium alloy, brass, mild steel • appropriate hardwood • abs, polypropylene, nylon, acrylic 1 reasons: • is rigid • can be shaped easily • looks attractive 1×2	**3**	*Accept any other suitable material or any other reason appropriate to material choice*

Question	Answer	Marks	Guidance
2(b)	quality of description • fully detailed all/most stages 4–7 • some detail 0–3 quality of sketches up to 2	**9**	***A knurled adjusting handle**. Could be:* *select bar, approx. 70 out from chuck turn to Ø40* *knurl close to chuck for approx 18* *use knife tool to turn Ø8 × 45* *set tool to chamfer Ø8 end* *part off 59 length* *turn around in chuck to chamfer Ø40 end* *removed and threaded* ***B stem**.Could be:* *prepare 260 × 30 × 10 strip* *mark out* *drill two Ø 10 holes at ends of cut out* *coping saw or rout out waste* *cut and shape R15 end* *finish edges* *drill Ø 18 hole* *fit Ø 8 dowel* *apply finish if necessary* *Must show most key stages of manufacture for full marks*
2(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**	*Full details of mould required for injection moulding* *Full details of CAD drawing and set up for 3D printing*

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**	***Pressing***  • *prepare aluminium sheet* • *set correct formers in press tool* • *feed sheet and position* • *guards closed* • *high and rapid force applied* • *top former rises sheet is removed, press tool* • *may also cut outline (blanking)* • *trimmed and finished*

Question	Answer	Marks	Guidance
3(a)			***profile forming*** • *prepare softwood section to size* • *plough plane could be used for groove* • *rebate plane for tongue* • *could be routed using hand router or spindle* • *moulder* • *ensure all safety precautions are applied* ***enamelling*** • *shape the copper blank,* • *clean and dry the copper blank* • *apply base coat colour (powder/enamel paint)* • *fire in kiln or carefully using brazing torch from* • *underneath* • *allow to cool, clean surface* • *apply shape in second colour, stencil or paint* • *fire, allow to cool – polish* *Accept any other correct variations or methods.*

Question	Answer	Marks	Guidance
3(b)	pressing • one operation process, other methods require • considerable skill and range of techniques • very fast process • large numbers can be produced profile forming • consistent accuracy • assembly method time consuming • very quick once set up and for large numbers if • using machine profiling enamelling • minimal equipment required • very attractive finish • relatively quick process • no further finishing required 2×3	**6**	*Accept other valid explanations, brief outline points max 3*

Question	Answer	Marks	Guidance
Part B – **Practical Technology**			
4(a)(i)	Transistor 1 Switch closed very small current runs through base of transistor via resistor. 1 Transistor turns on allowing a larger current through its collector via the lamp 1	**3**	
4(a)(ii)	Clear detail and communication of appropriate modification 3 Some detail of appropriate modification 2 Limited detail and communication of appropriate modification 1 No creditable response 0	**3**	
4(b)	Appropriate casing with all features considered 8–10 Appropriate casing with most features considered 5–7 Outline casing with some features considered 1–4 No creditable response 0 Quality of communication Clear sketches with sufficient annotation 3–4 Limited detail, insufficient annotation 1–2 No creditable response 0	**14**	casing features should include: • ability to change battery • beam direction • control switch relevant ergonomic consideration

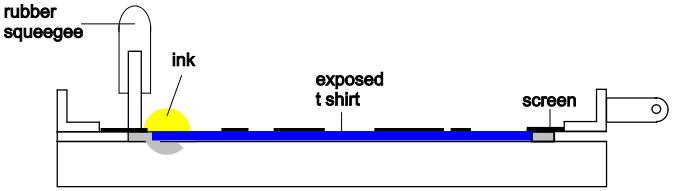
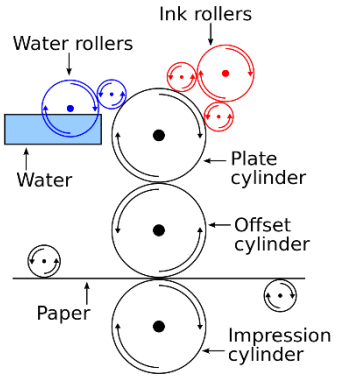
Question	Answer	Marks	Guidance
5	examination of issues: • wide range of relevant issues 4–8 • limited range 0–3 quality of explanation: • logical, structured 4–8 • limited detail 0–3 supporting examples / evidence 4	**20**	Discussion could include: • researching • CAD CAM • collaboration • marketing and promoting examples / evidence could be • specific examples • specific company practice

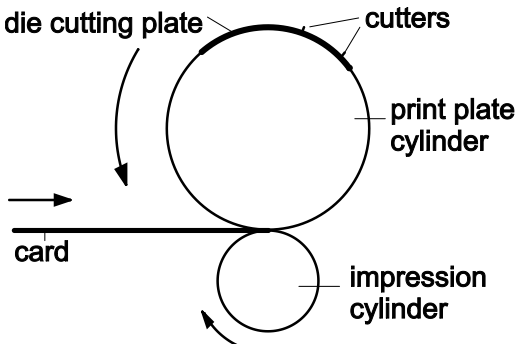
Question	Answer	Marks	Guidance
6(a)	quality of explanation: • logical, structured, well communicated 3–4 • limited detail, reasonable communication 1–2 No creditable response 0	**4**	aesthetic features and properties could be: • polystyrene often white but can be many colours • stainless steel can have intricate pressings • high volume polystyrene teaspoons can have unsightly flashing
6(b)	quality of explanation: • clear details of appropriate process, including reference to properties 7–8 • some detail of appropriate process with some reference to properties 4–6 • limited detail of process and reference to properties 1–3 No creditable response 0 quality of communication: • clear sketches with sufficient annotation 2 • limited detail, insufficient annotation 1 No creditable response 0	**10**	

Question	Answer	Marks	Guidance
6(c)	quality of explanation: • logical, structured, well communicated 4–6 • limited detail, reasonable communication 1–3 No creditable response 0	**6**	Consider costs, environmental impact

Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7	See Appendix 1 Scale 2 correct projection 1 fully correct elevation **A** 2 fully correct elevation to right of **A** 6 fully correct elevation **B** 6 accuracy/quality of line 3	**20**	fully correct elevation to right of **A** dimensionally correct 1 clear construction 2 accuracy of cut area 3 fully correct elevation **B** dimensionally correct 1 clear construction 2 accuracy of cut area 3

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: • material/production cost • volume of production • type of product • target market • energy and other costs supporting examples / evidence • specific products • specific materials/manufacturing methods • specific details of market

Question	Answer	Marks	Guidance
9(a)	description of process • fully detailed, all/most stages 3–5 • some detail, 0–2 quality of sketches up to 2 2 × 7	**14**	process for printing logo onto 50 T shirts could be • screen printing  • transfer printing process for printing a batch of 10 000 fashion catalogues could be • offset lithography • plate making • wetting • inking 

Question	Answer	Marks	Guidance
9(a)			• digital printing • laser technology • high resolution output accept modern flexography and rotogravure process for manufacturing a batch of 1000 card document holders could be: • die cutting (line) 
9(b)	printing logo onto 50 T shirts • relatively cheap process, not expensive equipment • choice of colours • print onto a range of sizes. surfaces printing a batch of 10 000 fashion catalogues • high volume production • cost effective • high quality outcome manufacturing a batch of 1000 card document holders • accurate • consistent • once set up, high volume run 2×3	**6**	

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** *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.* 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 Q7