Cambridge International A Level

Cambridge Assessment International Education
Cambridge International Advanced Level

DESIGN AND TECHNOLOGY **9705/33**

Paper 3 **October/November 2019**

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 2019 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	Discussion could include: • comfort/posture • anthropometrics • inclusivity • material choice examples/evidence could be • specific products • specific anthropometric data • specific furniture items/material choice examination of issues • wide range of relevant issues [5–8] • limited range [0–4] quality of explanation • logical, structured [4–8] • limited detail [0–3] supporting examples/evidence [4]	**20**	Each appropriate example **1** described **1** Up to 2 examples Award up to **4** marks for at least two examples/evidence described to support response

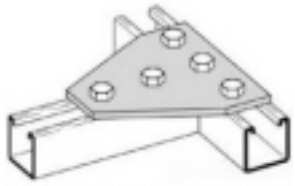
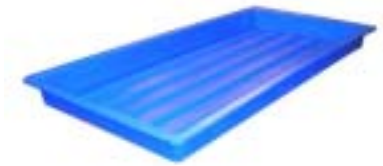
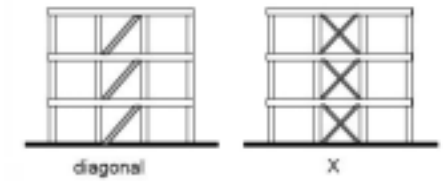
Question	Answer	Marks	Guidance
2(a)	suitable material: • abs/polypropylene • appropriate hardwood for turning • aluminium alloy, brass. copper • mild steel (with finish) • stainless steel reasons: • quality finish/appearance • can be formed to required shape • will not scratch when removing contents • any other reason appropriate to material choice	**3**	
2(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* *Metal, pressed, brazed,* *Plastic formed, moulded* *Sheet selected and heated* *Placed over shaped former* *Press formed and held until cool (Plug and yoke)* *Cut to shape* *Finish edges*

Question	Answer	Marks	Guidance
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**	*Process could be vacuum formed and shaped* *Former prepared (multiple former)* *Placed in vacuum forming machine* *Plastic heated placed over former* *Vacuum applied* *Blow to release plastic when shape formed* *Cut and shape*

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 × 2	**14**	Stages could include: <u>*Rolling*</u> *Ingot prepared and heated* *Roll formers selected* *ingot fed into rollers – reducing in size to final section profile* *cooled, stored and cut to length* <u>*Dovetail joint*</u> *Square ends of pieces* *Mark out wood depth and tails – dovetail template,* *Cut leaving tails* *Place tails on end to mark out pins* *Cut leaving pins* *Test joint – adjust-fit* <u>*Injection moulding*</u> *Injection moulding (must have details of mould for full marks)Mould created – single or multiple Granules in hopper* *Mould heated* *Plastic heated/injected* *Mould cooled* *Gear/s ejected* *Sprue removed*

Question	Answer	Marks	Guidance
3(b)	**rolling** • long lengths of exact section produced • relatively low cost, no wastage • long production run when set up • finish can be applied as part of process hot/cold rolled • maximum grain structure **dovetail joint** • lots of gluing area • very attractive • sense of quality • mechanically strong joint **injection moulding** • high quality finish • long production run • complex accurate shapes produced • high speed production 3 × 2	**6**	

Question	Answer	Marks	Guidance
Part B – **Practical Technology**			
4(a)	R2 × 300 = 20 × 90 + 10 × 150 [1] R2 = $\frac{1800+1500}{300} = \frac{3300}{300}$ [1] R2 = 11 N [1] R1 = 19 N [1]	**4**	
4(b)	Mechanical advantage the ratio of the force that performs the useful work (output) [1] of a machine to the force that is applied to the machine(input) [1] Efficiency Efficiency = (output/input) × 100 [2]	**4**	Correct reference to input and output 2 × 2

Question	Answer	Marks	Guidance
4(c)	 Correct application of gusset **1** quality of explanation up to **2**  correct ribbed structure **1** quality of explanation up to **2**  Correct application of lamination **1** quality of explanation up to **2**  Correct application of brace **1** quality of explanation up to **2** **4** × 3	**12**	

Question	Answer	Marks	Guidance
5(a)	Details could include: <u>solvent cement</u> • clean surfaces • well ventilated area, correct precautions • apply to surfaces (some use capillary action) • hold firm for at least 30 minutes <u>PVA</u> • planed or sanded • surfaces well covered • appropriate clamping whilst curing • wood <u>Contact Adhesive</u> • both surfaces coated, left until tacky • immediate careful application, no clamps required • laminates to wood for each quality of description up to 3 materials [1] 4 × 3	**12**	
5(b)	Welding – filler rod same as materials being joined Brazing – usually lower temp, filler rod brass quality of explanation up to 2 appropriate sketches [1] example [1] 4 × 2	**8**	

Question	Answer	Marks	Guidance
6	Discussion could include: • speed of communication • collaborative working • direct link to manufacturing • researching/simulating/modelling • marketing/advertising/social media examples/evidence could be • specific software usage • specific company use/products • marketing/commercial • specific CAM examination of issues • wide range of relevant issues [5–8] • limited range [0–4] quality of explanation • logical, structured [4–8] • limited detail [0–3] supporting examples/evidence [4]	**20**	Each appropriate example **1** described **1** Up to 2 examples Award up to **4** marks for at least two examples/evidence described to support response

Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7(a)	correct scale [2] correct isometric/orientation [2] body [4] thumb grip [3] tape [2] accuracy/line quality [3]	**16**	
7(b)	Quality of render [4]	**4**	

Question	Answer	Marks	Guidance
8	Discussion could include: • clear understanding of style • clear understanding of fashion • clear understanding of trends examples/evidence could be • seasonal products • celebrity led • specific designers/brands • specific products/items examination of issues • wide range of relevant issues [5–8] • limited range [0–4] quality of explanation • logical, structured [4–8] • limited detail [0–3] supporting examples/evidence [4]	**20**	Each appropriate example **1** described **1** Up to 2 examples Award up to **4** marks for at least two examples/evidence described to support response

Question	Answer	Marks	Guidance
9(a)(i)	side elevation appropriate scale [1] accuracy/line quality [2]	**3**	
9(a)(ii)	plan Appropriate scale [1] correct construction of front edge [2] accuracy/line quality [2]	**5**	
9(b)	Projection symbol [1] correct projection [1]	**2**	
9(b)	development construction [3] correct outline [2] front face [3] accuracy/line quality [2]	**10**	

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. **Exploration** Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection. [0–5] 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 [0–7] **Evaluation** Written evaluation of the final design solution. [0–5]	**80**	