Cambridge International A Level

Cambridge Assessment International Education
Cambridge International Advanced Level

DESIGN AND TECHNOLOGY **9705/32**

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(a)	Description of process • fully detailed, all/most stages [3–5] • some detail, [0–2] Quality of sketches up to 2 2 × 7	**14**	Stages could include: *<u>Compression moulding</u> plug socket* *2 part mould prepared and heated* *Preform inserted* *Heat/pressure* *Cool – remove flashing* *<u>Milling</u> bracket* *Firmly attached to bed – vice/clamps* *Horizontal miller could be used for faces and edges* *Vertical miller used for recess and slot* *Lift from bed or sacrificial piece for slot* *<u>Turning</u> egg cup* *Outside shape achieved, between centres or using 3-jaw chuck* *Both ends faced off to high finish* *3 jaw or egg cup chuck used to drill/bore out* *Apply appropriate finish*

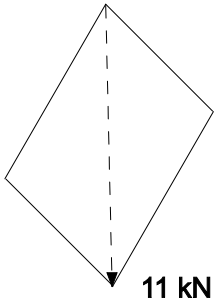
Question	Answer	Marks	Guidance
1(b)	Compression moulding • suitable for thermosetting plastic • high quality finish • very quick process, minimal extra finishing required milling • high quality, accurate finish • easily cut shallow recess • range of cutters for different operations turning • accurate finish on cylindrical/curved shapes • high quality finish obtained • all operations carried out on lathe 2 × 3	**6**	

Question	Answer	Marks	Guidance
2(a)	Suitable material: • abs, polypropylene, • appropriate hardwood • aluminium alloy, brass. • mild steel (with finish) [1] Reasons: • rigid, will not bend • will accept screw thread • accept finish appropriate for application 2 × 1	**3**	Award marks for any other acceptable answer

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**	*Dependant on material chosen – could be* *<u>Handle</u> – main part* *Cut to length/turned/faced off* *centre drilled, drilled and tapped M8* *centre punched, held securely for drill hole for – bar* *Cut to length/turned/faced off* *Threaded or glued to main part*
2(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**	*Process could be injection moulding – must have details of mould for full marks* *Mould created – two or more parts* *Granules in hopper* *Mould heated* *Plastic heated/injected* *Mould cooled* *Handles ejected*

Question	Answer	Marks	Guidance
3	Discussion could include: • target market – range/variety of products • capital costs – equipment/premises • marketing options • wages/material costs Examples/evidence could be • specific markets • specific reference to quantity production methods • specific products • marketing methods, promotions- celebrities, BOGOF 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**	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 B – **Practical Technology**			
4(a)	**Blow moulding** – Understanding of blow moulding up to 3 marks **Rotational moulding** Understanding of rotational moulding up to 3 marks Comparison/contrast up to 2 marks Product 1 mark 2 × 1	**10**	Blow moulding - features could be: *Usually heated plastic extruded parison* *Mould encloses, seals bottom* *Air applied* Rotational moulding – features could be: *Powder inserted into mould* *Rotated/heated* *Sealed hollow product*
4(b)	Discussion could include: • globalisation • new processes • wages/automation examples/evidence could be • specific technologies • specific reference working conditions • specific products • consumer benefits examination of issues • wide range of relevant issues [3–4] • limited range [0–2] quality of explanation • logical, structured [3–4] • limited detail, [0–2] supporting examples/evidence [2]	**10**	Effort – is the force applied [1] to move a load.[1] Velocity ratio – The ratio of the distance moved through by the point of application of the effort [1] to the corresponding distance for the load in a machine. [1]

Question	Answer	Marks	Guidance
5(a)	 **11 kN** 1 mark Direction 1 mark	**2**	
5(b)	Effort – up to 2 marks Velocity ratio – up to 2 marks 2×2	**4**	
5(c)(i)	Anti-clockwise 1 mark	**1**	
5(c)(ii)	gears A and B ratio 3:1 1 mark gears C and D ratio 4:1 1 mark $\frac{3}{1} \times \frac{4}{1} = \frac{12}{1}$ 12:1 1 mark	**3**	

Question	Answer	Marks	Guidance
5(d)	Discussion could include: • benefits – braking systems, movement (pulleys) • drawbacks – wear, heat, noise, lubrication needed examples/evidence could be • brakes/pedals/steering wheel • lubrication • specific engine parts/components examination of issues • wide range of relevant issues [3–4] • limited range [0–2] quality of explanation • logical, structured [3–4] • limited detail, [0–2] supporting examples/evidence [2]	**10**	

Question	Answer	Marks	Guidance
6	**Light Dependent Resistor** Resistance falls when exposed to light e.g. Fridge/cupboard lights/alarms **Strain gauge** strain sensor based on deformation that results in a change in resistance e.g. bridge/building structural checks **Reed switch** Magnetic switch, e.g. .door/burglar alarms **Thermistor** Resistance changes with change in temperature. Can also prevent current surge e.g. Greenhouse sensors, fire alarms **Darlington Pair** Darlington pair uses two transistors are connected to obtain large gains e.g. Audio amplifier, LED driver **Schmitt trigger** a comparator circuit applying positive feedback to the noninverting input of a comparator or differential amplifier. It is an active circuit which converts an analogue input signal to a digital output signal. Gives a sharp action in response to a gradually changing input Prevents repeated triggering e.g. Amplifier, clean up analogue device signal Explanation up to 3 Application 1 5 × 4	**20**	

Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7(a)	Front elevation [2] Plan [2] End elevation [2] Intersection on front elevation [4] Line quality/accuracy [2]	**12**	
7(b)	accurate net [6] appropriate scale/quality [2]	**8**	

Question	Answer	Marks	Guidance
8(a)	2D/3D modelling Explore ideas, mechanisms, proportions Scale models accurate to test final idea Quality of description • fully detailed [3–4] • some detail, [0–2] 2 × 4	**8**	
8(b)	Benefits could be: Speed Accuracy Collaborative working Quality of explanation up to 3 Example 1 mark 2 × 4	**8**	

Question	Answer	Marks	Guidance
8(c)	Importance of research could include: Up to date info, trends Specific data e.g. anthropometric Existing products Quality of explanation • fully detailed [3–4] • some detail, [0–2]	**4**	

Question	Answer	Marks	Guidance
9(a)	correct 2–point perspective [2] correct proportion [2] main shelter [3] seats [3] roof/windows [2] windows [2] overall quality [2]	**16**	
9(b)	quality of render Representation of wood/clear plastic [4]	**4**	

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** B 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**	