CAMBRIDGE
International Education

Cambridge International A Level

DESIGN & TECHNOLOGY **9705/32**

Paper 3 **October/November 2024**

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 descriptions 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.

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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.

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Question	Answer	Marks	Guidance
Section A Part A – **Product Design**			
1(a)	quality of description: – fully detailed all key stages described 9–10 – detailed with most key stages described 6–8 – some detail described 3–5 – limited detail described 1–2 – no creditable response 0 quality of sketches up to 2	**12**	*work secured* *hole drilled, waste piece to support* *further holes drilled in corners of square removed and placed in vice, protect workpiece* *cut out shape using coping saw (pine)* *coping saw, fine blade (acrylic)* *(accept fret saw)* *abrafile, piercing saw (mild steel)* *(accept junior hacksaw)* *file inside edges, smooth or dead smooth flat (accept triangular),* *bevel edged chisels on pine* *reposition as necessary* *use appropriate abrasive wrapped around file to finish*
1(b)(i)	appropriate finish 1 comparison 1 **2** × 2	**4**	*pine weatherproof finish – polyurethane varnish* *– primer exterior paint* *– wax* *mild steel – galvanised* *– primer exterior paint* *– dip coating* *Pine finish could be a wax or PU varnish, which would enable the grain to be seen, however the steel would be metal paint, such as Hammerite. This would enable the part to be coloured, Paint could also be used for the pine if colour required. The metal could also be powder coated or dip coated to prevent it rusting and give it more protection in the outdoor environment, however this would add thickness to the material.* *accept any other appropriate finish*

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Question	Answer	Marks	Guidance
1(b)(ii)	description of process – fully detailed 3–4 – limited detail 1–2 – no creditable response	**4**	*<u>pine</u> (varnish)* – *prepare surface, varying grades of glasspaper* – *clean away dust* – *apply thin coat with brush* – *allow to dry, wire wool or fine abrasive to smooth surface* – *apply second coat* *mild steel (exterior paint)* – *prepare surface, varying grades of emery silicon carbide paper* – *apply coat of primer (unless one coat exterior metal paint is used)* – *allow to dry, smooth with silicon carbide paper* – *apply exterior quality metal paint*

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: – materials with particular aesthetic qualities – manufacturing costs impact upon cost to customer – sustainable responsibility, customer preference examples / evidence could be – specific materials, finishes, – specific environmental consideration – specific reference to product feature *Focus evenly on each of aesthetic qualities, manufacturing costs and environmental considerations for one product*

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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**	***rotational moulding*** – *split mould, preheated* – *measured polymer powder inserted* – *mould rotates in all directions whilst being heated* – *polymer forms shape on inside of mould* – *mould cooled and item removed* ***turning*** – *insert Ø21 bar in 3 jaw chuck* – *turn to fine finish Ø20* – *use shaped tool to create neck* – *use left hand knife and right-hand knife tool for circular shape at end, could use shaped tool* – *use appropriate abrasive* ***die casting*** – *2 part mould prepared including pins for corner holes* – *pouring hole clear* – *zinc or aluminium alloy heated to be able to pour into runner (using gravity or pressure)* – *cooled,* – *casting ejected* – *excess/flash cleared* *Accept any other correct variations or methods.*

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Question	Answer	Marks	Guidance
3(b)	Explanation could include: rotational moulding – large shapes produced – hollow, lightweight products – minimal wastage turning – for round/cylindrical shapes – high quality finish – can be automated for repeated identical shapes die casting – accurate shape produced – minimal wastage – no further finishing required 2 × **3**	**6**	*Accept other valid explanations*

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Question	Answer	Marks	Guidance
Part B – **Practical Technology**			
4(a)(i)	copper, brass, aluminium	**1**	accept any appropriate material
4(a)(ii)	quality of description: – fully detailed all/most stages 4–7 – some detail, 0–3 quality of sketches up to 2	**9**	rolled and hard/silver soldered construction (accept turned and bored)
4(b)(i)	abs, HDPE, polystyrene	**1**	accept any appropriate material
4(b)(ii)	quality of description: – fully detailed all/most stages 4–7 – some detail, 0–3 quality of sketches up to 2	**9**	injection moulded (3D printed)

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: – ensure quality – safety requirements – customer trust and loyalty – value for many – reliability and fit for purpose examples / evidence could be – specific testing procedures – specific product examples relating to testing

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Question	Answer	Marks	Guidance
6(a)	examples could be: brittleness – glass front of alarm case corrosion resistance – aluminium building cladding electrical conductivity – copper wire in a circuit plasticity – mild steel strip to create a hoop for each appropriate example 1 quality of explanation – logical, structured 2–3 – limited detail 0–1 4 x 4	**16**	*<u>brittleness</u> is **the property of a material that fractures when subjected to stress but has a little tendency to deform before rupture.** Brittle materials are characterised by little deformation, poor capacity to resist impact* *<u>corrosion resistance</u> is defined as the ability of a material (metallic or non-metallic) to withstand corrosion damage caused by oxidation or other chemical reactions.* *<u>electrical conductivity</u> relates to the capability of the material to pass the flow of electric current.* *<u>plasticity</u> is **the propensity of a material to undergo enduring deformation under load when compressed.** It is the quality or state of being plastic; especially the capacity for being moulded or altered.*
6(b)	reinforcement could be: – gussets – ribs – braces quality of description: – detailed well communicated 3–**4** – limited detail, reasonable communication 1–3 – no creditable response 0	**4**	*<u>Ribs</u> examples e.g. food trays, gives stiffness, rigidity and stability to shapes, flat sheets* *<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.* *<u>Braces</u> E.g. In building construction, braces are used to stabilise a structure against lateral forces.*

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Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7(a)	see **App. 1** correct scale 2 assembly 2 accuracy of drawings 4 sectioning accuracy 3 elevation 3 1 for each elevation, 1 for positioning line quality 2	**16**	
7(b)	dimensions 2 projection symbol 2	**4**	

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: – choice of materials – choice of manufacturing processes – consider packaging reduction – simplify product, reduce functions – quality reduction examples / evidence could be – specific products – specific practices

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Question	Answer	Marks	Guidance
9(a)	see **App. 2** correct perspective 2 correct assembly 2 scale 1 proportion/accuracy of drawing 2 line quality 1 thick and thin 2 rendering 2	**12**	
9(b)	below horizon line covered 1 on horizon line covered 1 above horizon line covered 1 quality of explanation – detailed, well communicated 4–5 – limited detail, some communication 1–3 – no creditable response 0	**8**	answer should include details of each perspective type reasons why used could be: – best view of object/product – impression created – realism, – intended viewpoint – purpose – advertising/promotion give impression of size/scale, differing viewpoints can serve different purposes, advertising a male fragrance to make it appear like a powerful skyscraper

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Question	Answer	Marks	Guidance
Section B			
10, 11 & 12	**Analysis** Analysis of the given situation/problem. **[0–5]** **Specification** 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. 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**	

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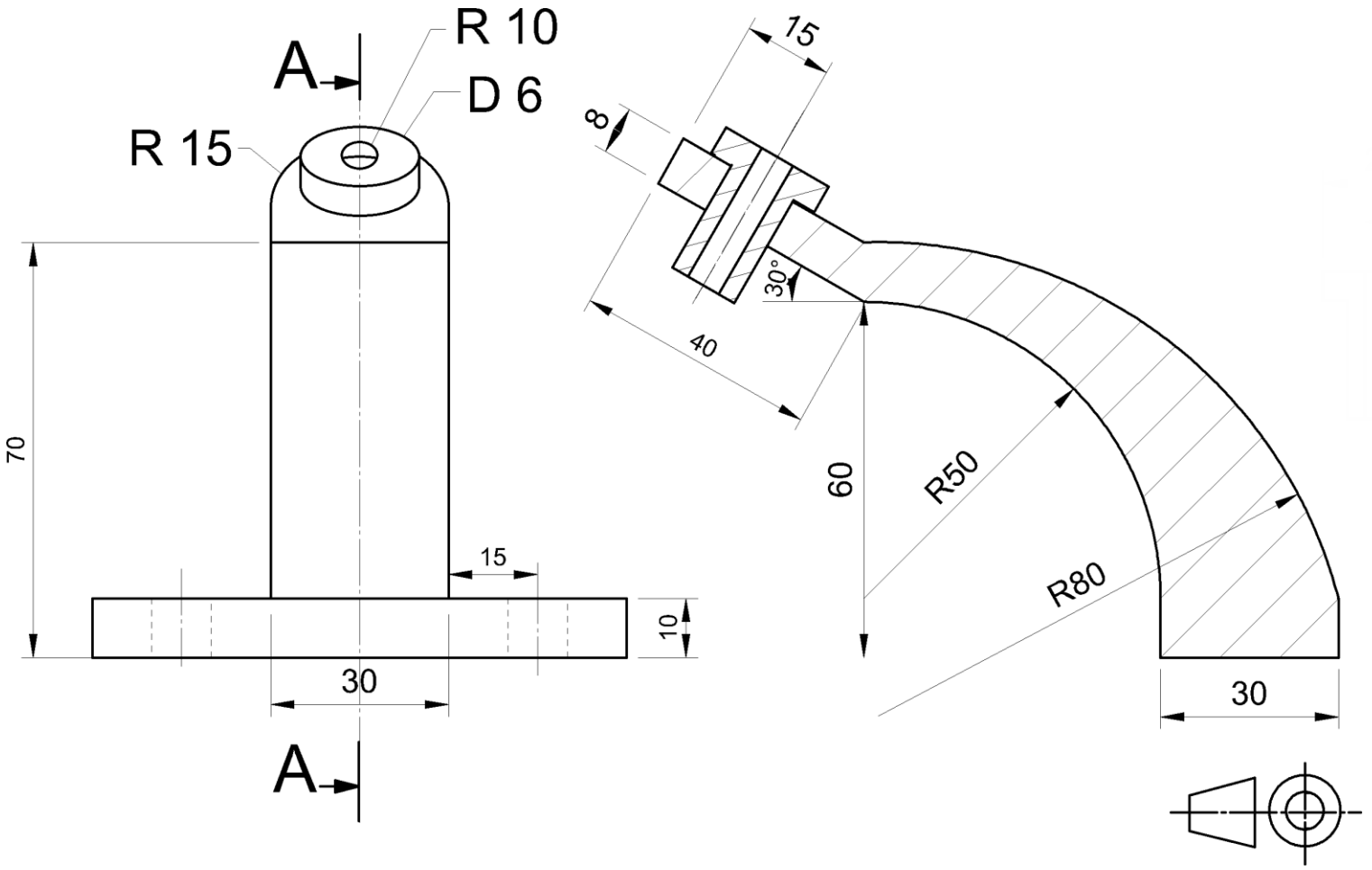
App. 1 Q7



correct scale	2
assembly	2
accuracy of drawings	4
sectioning accuracy	3
elevation	3
line quality	2
dimensions	2
projection symbol	2

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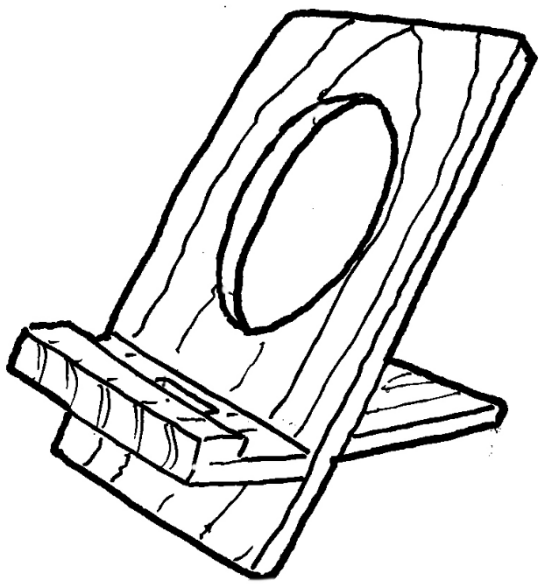
App. 2 Q 9

correct perspective	2
correct assembly	2
scale	1
proportion/accuracy of drawing	2
line quality	1
thick and thin	2
rendering	2



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