CAMBRIDGE
International Education

Cambridge International AS & A Level

DESIGN AND TECHNOLOGY **9705/31**

Paper 3 Written **May/June 2024**

MARK SCHEME

Maximum Mark: 120

Published

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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**	*Would expect use of jigs, templates CAM lathe, Accept detailed 3D printing response with possible additional finishing process* *Detail of CAD drawing and set up for 3D printing*

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: • sales • streamlined production lines • target consumer meetings • market surveys • customer questionnaire/survey • customer product reviews examples / evidence could be • specific company practice • specific customer survey methods *Focus on how manufacturers access information from customers and how they respond to meet demand and need.*

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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**	***compression moulding*** • *2 part mould prepared and heated* • *Preform inserted* • *Heat / pressure* • *Cool – remove flashing* ***hardening and tempering*** • *clean point and heat to cherry red approx.* • *800 °C* • *quench immediately* • *cool and clean the point* • *gently heat until colours appear, quench when* • *yellow / light brwn colour appears approx.400 °C+* • *quench* • *clean up and polish* ***dowelling*** • *mark out holes on both pieces of wood* • *simple drilling jig would ensure exact position of* • *holes* • *accurately drill holes to depth, ensuring 90°* • *drill position on both pieces* • *glue and insert dowels on on piece, gently tap* • *into position* • *apply glue to exposed dowels, position and* • *gently fix together the two parts,wipe off excess* • *glue* • *sash clamp with protective blocks whilst glue* • *sets, clean up joint when set.* *Accept any other correct variations or methods.*

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Question	Answer	Marks	Guidance
3(b)	compression moulding • suitable for thermosetting plastic • high quality finish • very quick process, minimal extra finishing required hardening and tempering • relatively quick process • no expensive equipment required • effective method of balancing hardness with toughness dowelling • limited cost of equipment • very strong joint, good gluing area • relatively quick 2×3	**6**	*Accept other valid explanations, brief outline points max 3*

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Question	Answer	Marks	Guidance
Part B – **Practical Technology**			
4(a)(i)	moments about **RR** $\frac{1800 \times 8 + 2400 \times 6}{2800}$ **1** $\frac{14\,400 + 14\,400}{2800} = \frac{28\,800}{2800}$ **1** **RR** = 10.3N **1** **RL** = 3.7N **1**	**4**	
4(a)(ii)	see **Appendix 1** accurate drawing 2 bows notation used 2 correct responses 2	**6**	
4(b)	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 4	**10**	discussion could include: • product functions as expected, customers will buy • product safe to use • company maintains quality reputation, no bad publicity or returns examples / evidence could be • specific product problems • specific quality control method

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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 quality of explanation • logical, structured 3–4 • limited detail 0–2 supporting examples / evidence 2	**20**	

Question	Answer	Marks	Guidance
6(a)(i)	$I = \frac{V}{R}$ $V = \frac{9}{500}$ **1** = 0.018 A or 1.8 mA **1** correct answer 1 correct unit	**3**	
6(a)(ii)	$\frac{20}{30+20} \times 5$ **1** $= \frac{2}{5} \times 5$ **1** = 2v **1**	**3**	

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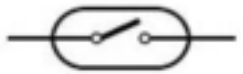
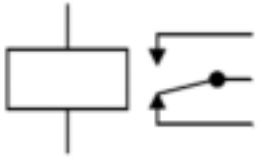
Question	Answer	Marks	Guidance
6(b)	**A** AND  **B** NAND  **C** NOR  **D** XOR  **1** mark for each correct name **1** mark for each correct symbol	**8**	
6(c)	quality of explanation • clear, logical, structured 3 • some detail 2 • limited detail 1 • no creditable response 0 3 × 2	**6**	**reed switch** is an **electromagnetic switch used to control the flow of electricity in a circuit.** They consist of two or more ferrous reeds encased within a small glass tube-like envelope, which become magnetised and move together or separate when a magnetic field is moved towards the switch  Relays are used for **the protecting and switching** of a number of the control circuits and other electrical components. All relays react to voltage or current to open or close the contacts or circuits. 

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Question	Answer	Marks	Guidance
Part C – **Graphic Products**			
7	See **Appendix 2** Isometric 1 scale 1 camera body 4 top detail button 3 view finder 3 flash 1 lens 4 accuracy / line quality 3	**20**	Accept other correct responses to view finder

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 • importance of visual impact to attract • interest / sales • colour and fashion trends • specific product use constraints • material / finish / texture • impression of quality • immediate impact or subtle harmonious examples could be • packaging • magazine covers • specific aesthetic features

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Question	Answer	Marks	Guidance
9(a)	suitable material: • solid white board • duplex board • card with weight above 160 gsm 1 reasons: • solid enough to protect bulb • can be printed on • easy to cut and press form 1 × 2	**3**	*Accept any other suitable material or any other reason appropriate to material choice*
9(b)	quality of description: • fully detailed all / most stages 4–7 • some detail 0–3 • quality of sketches up to 2	**9**	• *prepare accurate development (net)* • *include sufficient tabs* • *include graphics, printed* • *use craft knife, cutting mat and safety rule to cut* • *shape accurately* • *use blunt scribing instrument to create fold lines* • *fold up packaging shape* • *apply glue / double sided tape to tabs and join*
9(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**	• *prepare accurate development (net)* • *produce press form / die cutter* • *include cutting and folding edges* • *appropriate card fixed on roller* • *print using appropriate method (eg. digital* • *prontingy, flexography)* • *cut and form fold lines* • *remove waste for recycling* • *pile for distribution*

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Question	Answer	Marks	Guidance
Section B			
10, 11 and 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** 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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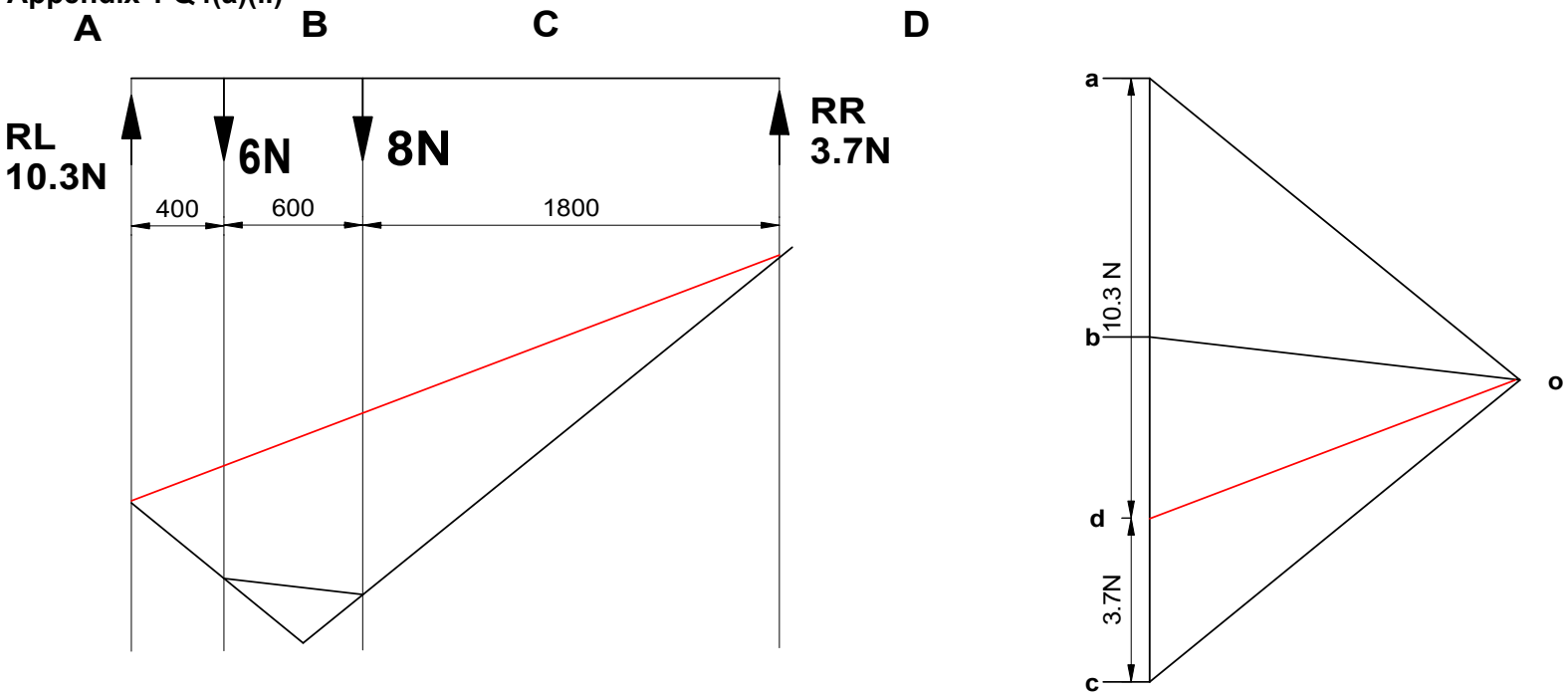
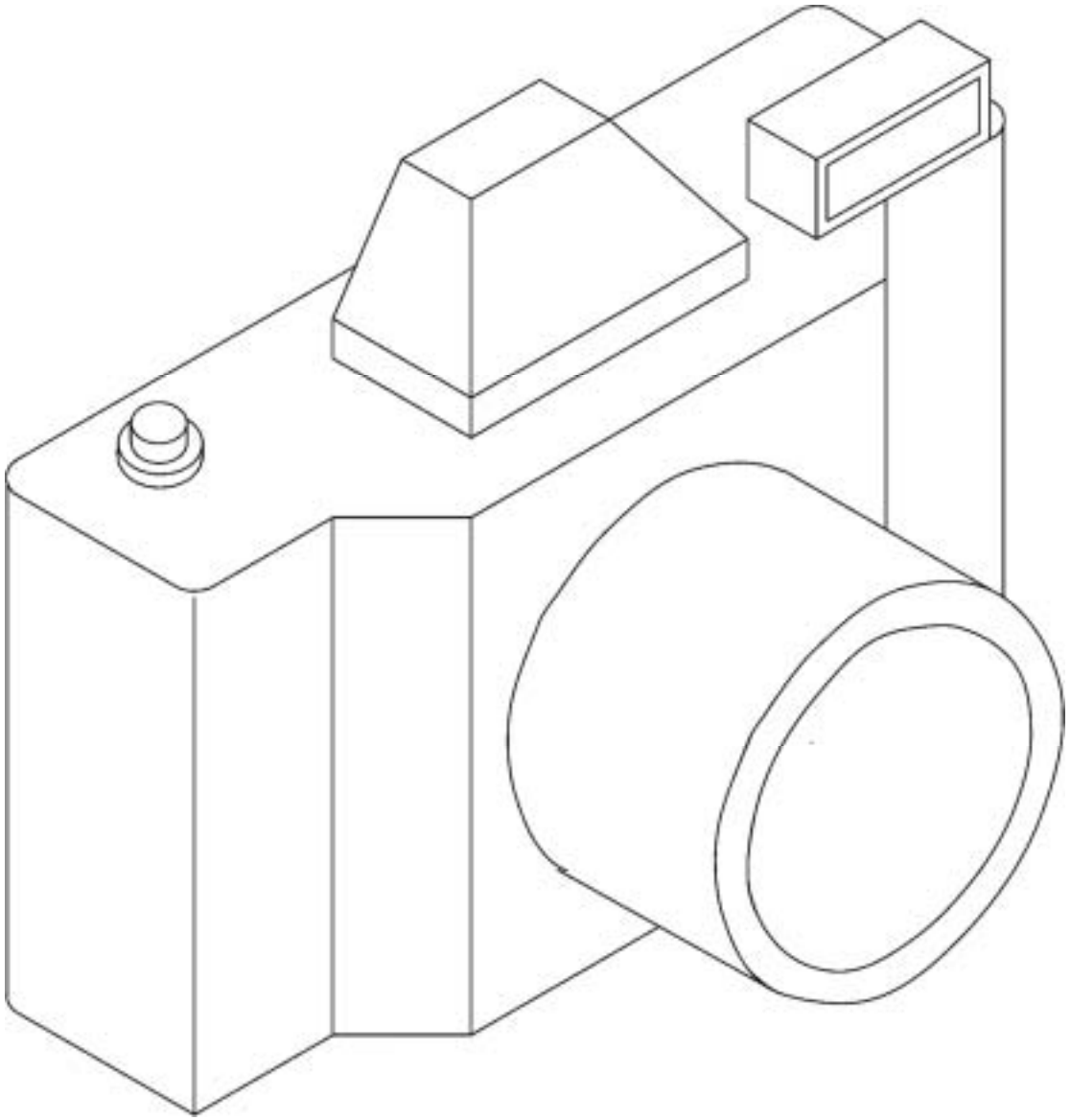
Appendix 1 Q4(a)(ii)



accurate drawing			2
bows notation used			2
correct response	10.3 N	3.7 N	2

Appendix 2 Q7

isometric	1
scale	1
camera body	4
top detail	
button	3
view finder	3
flash	1
lens	4
accuracy/line quality	3



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