

Cambridge International AS & A Level

DESIGN AND TECHNOLOGY**9705/32**

Paper 3 Written

May/June 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.

Cambridge International is publishing the mark schemes for the May/June 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **15** printed pages.

PUBLISHED

| Question | Answer | Marks | Guidance |
|----------|--|-------|---|
| 1(c) | <p>explanation could include:</p> <ul style="list-style-type: none"> • change in process; • change in materials; • use of jigs, formers, moulds; • simplification of design. <p>quality of explanation:</p> <ul style="list-style-type: none"> • logical, structured 4–6 • limited detail 0–3 • quality of sketches up to 2 | 8 | <p><i>Would expect use of jigs, templates CAM lathe, Accept detailed 3D printing response with possible additional finishing process</i></p> <p><i>Detail of CAD drawing and set up for 3D printing</i></p> |

| Question | Answer | Marks | Guidance |
|----------|---|-------|--|
| 2 | <p>examination of issues</p> <ul style="list-style-type: none"> • wide range of relevant issues 4–8 • limited range 0–3 <p>quality of explanation</p> <ul style="list-style-type: none"> • logical, structured 4–8 • limited detail 0–3 <p>supporting examples / evidence 4</p> | 20 | <p>Discussion could include:</p> <ul style="list-style-type: none"> • sales • streamlined production lines • target consumer meetings • market surveys • customer questionnaire/survey • customer product reviews <p>examples / evidence could be</p> <ul style="list-style-type: none"> • specific company practice • specific customer survey methods <p><i>Focus on how manufacturers access information from customers and how they respond to meet demand and need.</i></p> |

PUBLISHED

| Question | Answer | Marks | Guidance |
|----------|--|-------|--|
| 3(a) | <p>description of process</p> <p>fully detailed, all/most stages 3–5</p> <p>some detail 0–2</p> <p>quality of sketches up to 2 2 × 7</p> | 14 | <p>compression moulding</p> <ul style="list-style-type: none"> • 2 part mould prepared and heated • Preform inserted • Heat / pressure • Cool – remove flashing <p>hardening and tempering</p> <ul style="list-style-type: none"> • 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 <p>dowelling</p> <ul style="list-style-type: none"> • 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. <p>Accept any other correct variations or methods.</p> |





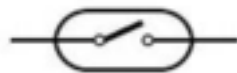
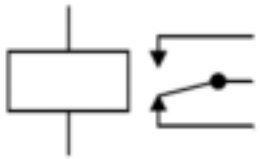
PUBLISHED

| Question | Answer | Marks | Guidance |
|----------|---|----------|--|
| 3(b) | <p>compression moulding</p> <ul style="list-style-type: none"> • suitable for thermosetting plastic • high quality finish • very quick process, minimal extra finishing required <p>hardening and tempering</p> <ul style="list-style-type: none"> • relatively quick process • no expensive equipment required • effective method of balancing hardness with toughness <p>dowelling</p> <ul style="list-style-type: none"> • limited cost of equipment • very strong joint, good gluing area • relatively quick <p style="text-align: right;">2 × 3</p> | 6 | <i>Accept other valid explanations, brief outline points max 3</i> |

PUBLISHED

| Question | Answer | Marks | Guidance |
|----------|---|-------|----------|
| 5 | <p>examination of issues</p> <ul style="list-style-type: none"> • wide range of relevant issues 4–8 • limited range 0–3 <p>quality of explanation</p> <ul style="list-style-type: none"> • logical, structured 4–8 • limited detail 0–3 <p>supporting examples / evidence 4</p> <p>quality of explanation</p> <ul style="list-style-type: none"> • logical, structured 3–4 • limited detail 0–2 <p>supporting examples / evidence 2</p> | 20 | |

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

| Question | Answer | Marks | Guidance |
|----------|---|-------|---|
| 6(b) | <p>A AND </p> <p>B NAND </p> <p>C NOR </p> <p>D XOR </p> <p>1 mark for each correct name 1 mark for each correct symbol</p> | 8 | |
| 6(c) | <p>quality of explanation</p> <ul style="list-style-type: none">• clear, logical, structured 3• some detail 2• limited detail 1• no creditable response 0 <p>3 × 2</p> | 6 | <p>reed switch is an electromagnetic switch used to control the flow of electricity in a circuit.</p> <p>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</p>  <p>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.</p>  |

PUBLISHED

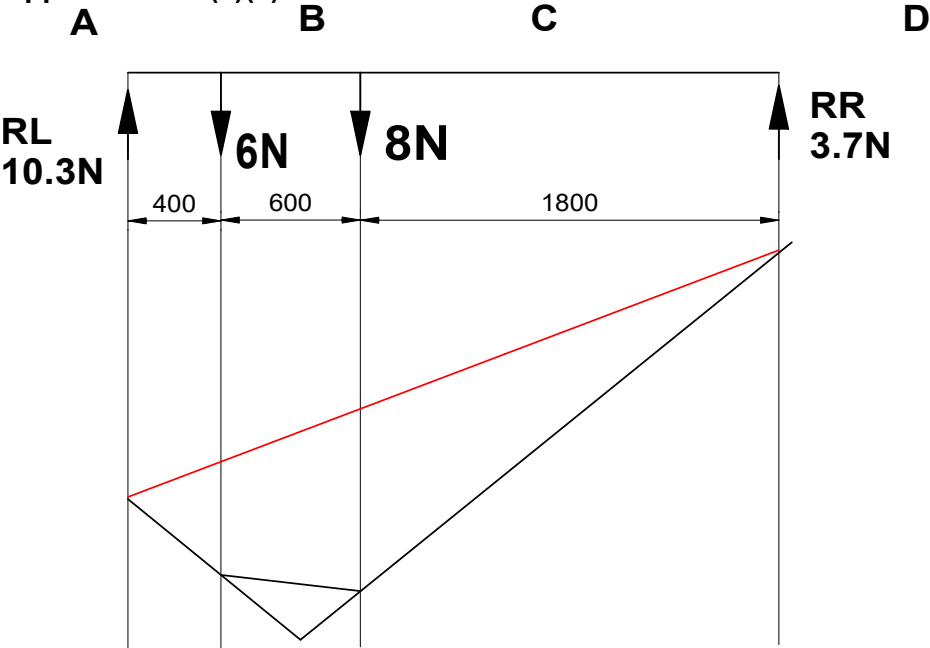
| Question | Answer | Marks | Guidance |
|----------------------------------|--|---|---|
| Part C – Graphic Products | | | |
| 7 | See Appendix 2 Isometric scale camera body top detail button view finder flash lens accuracy / line quality | 1 1 4 3 3 1 4 3 20 | Accept other correct responses to view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

| Question | Answer | Marks | Guidance |
|----------|--|--|--|
| 8 | examination of issues • wide range of relevant issues • limited range quality of explanation • logical, structured • limited detail supporting examples / evidence | 4–8 0–3 4–8 0–3 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 |

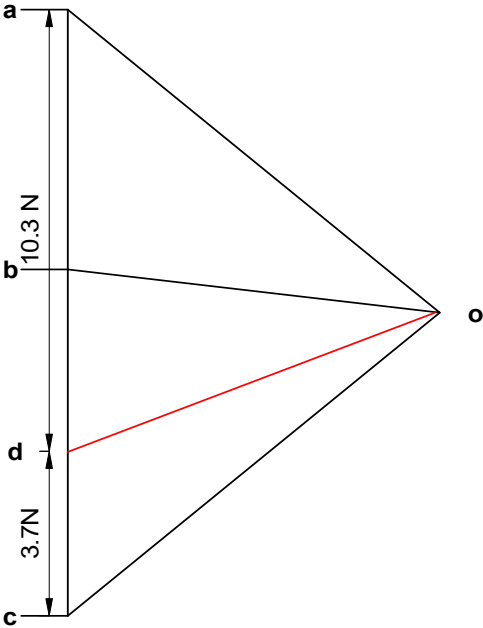
PUBLISHED

| Question | Answer | Marks | Guidance |
|------------------|--|-----------|----------|
| Section B | | | |
| 10, 11 and 12 | <p>Analysis Analysis of the given situation / problem [0–5]</p> <p>Specification Detailed written specification of the design requirements. At least five specification points other than those given in the question. [0–5]</p> <p>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]</p> <p>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]</p> <p>Proposed solution Produce drawing/s of an appropriate kind to show the complete solution. proposed solution [0–10] details / dimensions [0–5]</p> <p>Evaluation Written evaluation of the final design solution. [0–5]</p> | 80 | |

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 |

