Cambridge International A Level

Cambridge Assessment International Education
Cambridge International Advanced Level

DESIGN AND TECHNOLOGY **9705/31**

Paper 3 **October/November 2017**

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.

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Section A

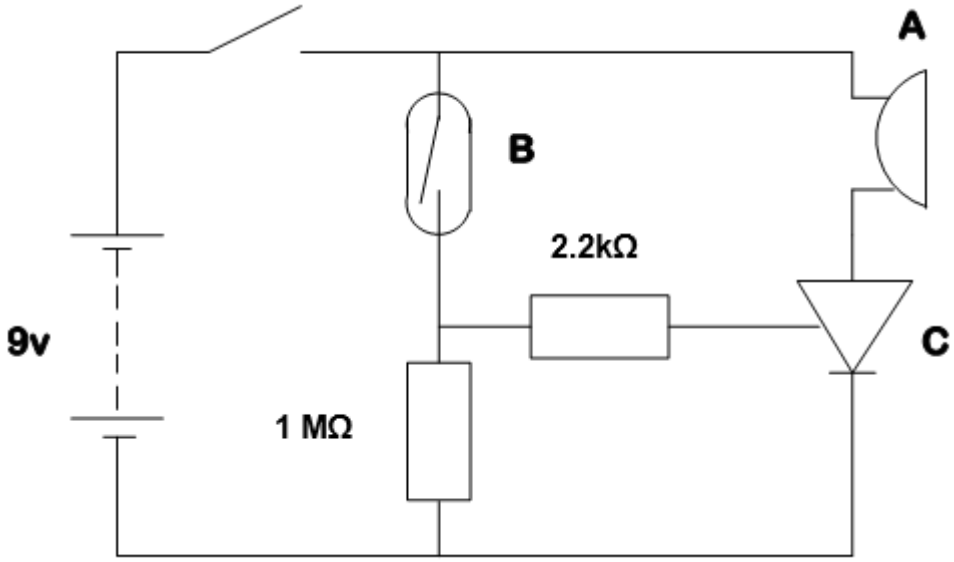
Part A – Product Design

Question	Answer	Marks
1	appropriate example 1 · 4 2D modelling ; computer modelling, exploring shape, card 3D modelling ; exploring form, proportion Mock up ; scaled model of part/whole of concept, possibility Scale prototype ; usually final design model, can be tested for each; quality of explanation: – logical, structured 3–4 – limited detail 0–2 4 · 4	**20**

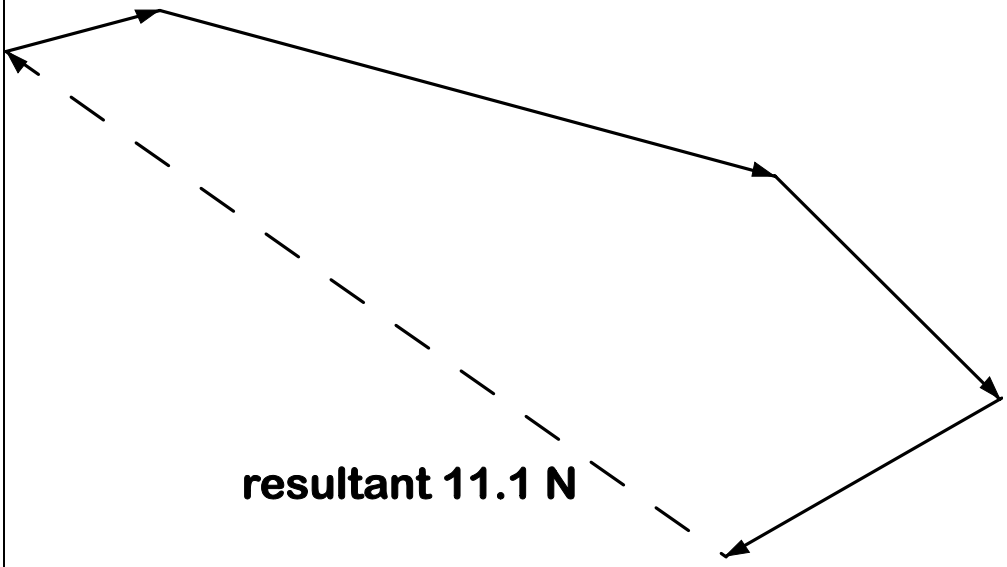
Question	Answer	Marks
2(a)	suitable material: abs/polypropylene/HDPE appropriate hardwood e.g. beech 1 Reason : – robust/take harsh treatment – can be assembled/formed to required shape – not split easy – take a good finish 1 · 2	**3**
2(b)	description to include: quality of description: – fully detailed 6–8 – most stages 3–5 – some detail, 0–2 quality of sketches up to 2	**10**
2(c)	explanation could include: – change in process; – change in materials; – use of jigs, formers, moulds; – simplification of design. quality of explanation: – logical, structured 3–5 – limited detail, 0–2 quality of sketches up to 2	**7**

Question	Answer	Marks
3(a)	description of process – fully detailed 3–5 – some detail, 0–2 quality of sketches up to 2 7 · 2	**14**
3(b)	milling – V and slot cuts – quality finish – easy machine set up, change cutter laminating – solid, strong structure – some give/flexibility – low waste/environmentally friendlier compression moulded – range of colours – suitable for thermosetting plastic – limited finishing required 3 · 2	**6**

Part B – Practical Technology

Question	Answer	Marks
4(a)(i)	P = VI 12 · 2.4 (1) 28.8 (1) Watts (1)	**3**
4(a)(ii)	Battery Mains supply Dynamo Photovoltaic 1 · 2 Why used e.g. location, safety 1 · 2	**4**
4(b)(i)	**A** buzzer **B** reed switch **C** thyristor 1 · 3	**3**
4(b)(ii)	 switch sets alarm (1) Alarm activated when reed switch closes (1) – magnet on door frame – (1) Current flows to gate leg of thyristor (1) causing it to switch on (1) Circuit complete (1) Buzzer sounds (1) Thyristor latching device – will stay on (1) until switched off by top switch. Clarity of communication (up to 2)	**10**

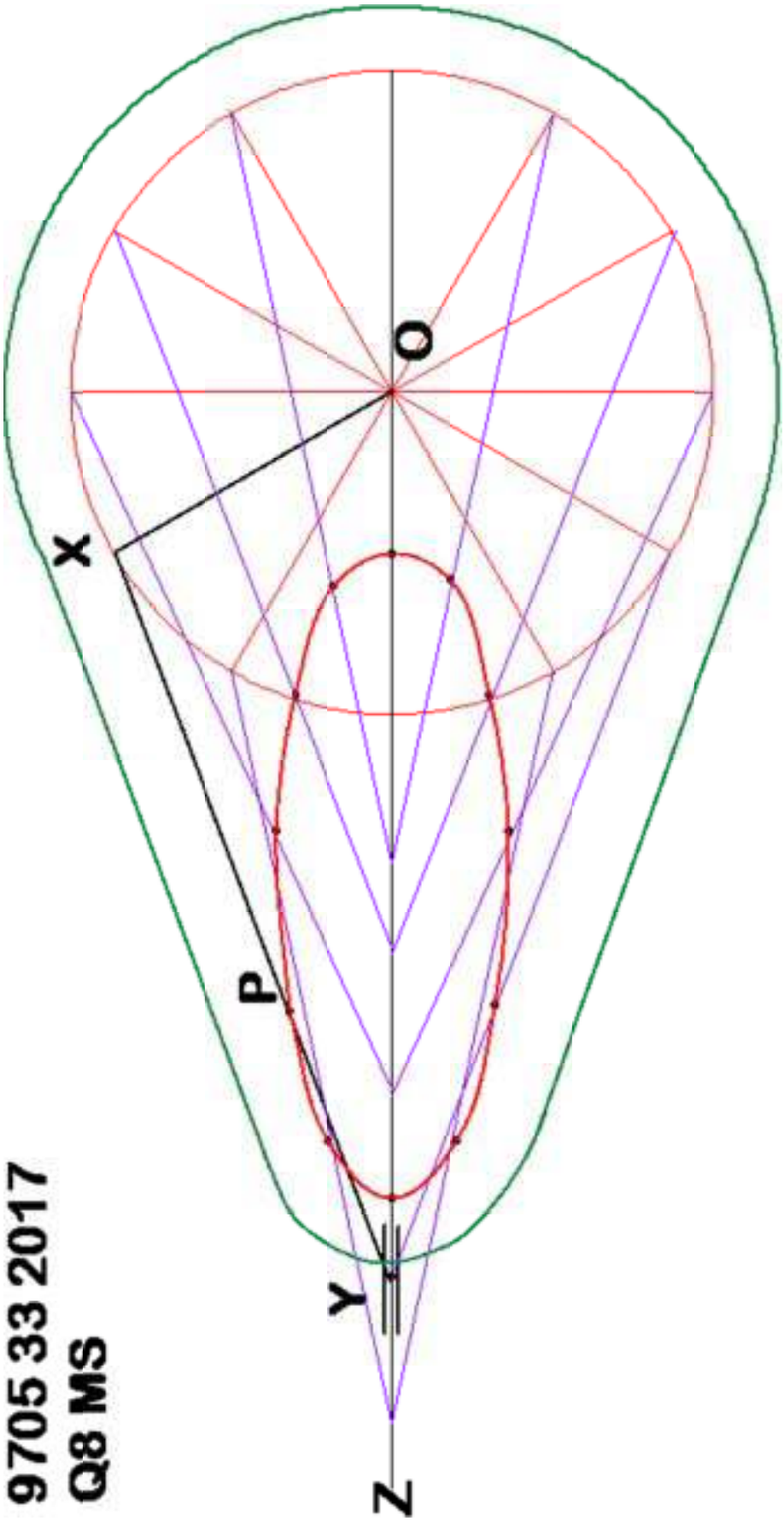
Question	Answer			Marks
5	Discussion could include: – computer functions in designing – accuracy, ability to change, share, forward to CAM – comment on creative capacity/response to quote examination of issues – wide range of relevant issues 5–9 – limited range 0–4 quality of explanation – logical, structured 4–7 – limited detail, 0–3 16 supporting examples/evidence – specific programmes/usage – specific use architecture/engineering 4			**20**

Question	Answer		Marks
6(a)	 Direction and magnitude 3 Resultant 1		**4**
6(b)	RL 4,2 N 1 RR 5.8 N 1		**2**
6(c)	correct notation 1 Load diagram 3 Transfer to main diagram 3 Strut/ties 4 Accuracy 3		**14**

Question	Answer	Marks
7(a)	(i) cashaft diameter 24 1 (ii) in line flat follower 1 (iii) minimum distance of 24 from the flat follower to camshaft centre 1 (iv) clockwise direction 1 (v) 0 °–180 ° rise 30 simple harmonic motion 4 (vi) 180 °–210 dwell 2 (vii) 210–360 ° fall with simple harmonic motion 3 Accuracy 2	**15**
7(b)	ratchet described, pawl identified 4 Example 1	**5**

Question	Answer	Marks
8(a)(i)	size/scale 2 Circle divided (angular or trammel) 1 Loci plotted 3 Accuracy 2	**8**
8(a)(ii)	accurate guard profile up to 4	**4**
8(b)	isometric 2 Exploded parts in line 3 Accuracy rendering 3	**8**

Question	Answer	Marks
9	Discussion could include: – materials (e.g. smart) – printing technologies – virtual reality examination of issues – wide range of relevant issues 5–9 – limited range 0–4 quality of explanation – logical, structured 4–7 – limited detail, 0–3 16 supporting examples / evidence – specific CAD/Internet/simulation VR etc. programmes/usage – specific printing/manufacturing technologies – specific consumer/manufacturer examples 4	**20**



Section B

Question	Answer	Marks
	Analysis	**80**
	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.	
	– 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	