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**DESIGN AND TECHNOLOGY****9705/31**

Paper 3

**October/November 2017**

MARK SCHEME

Maximum Mark: 120

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**Published**

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This document consists of **8** printed pages.

## Section A

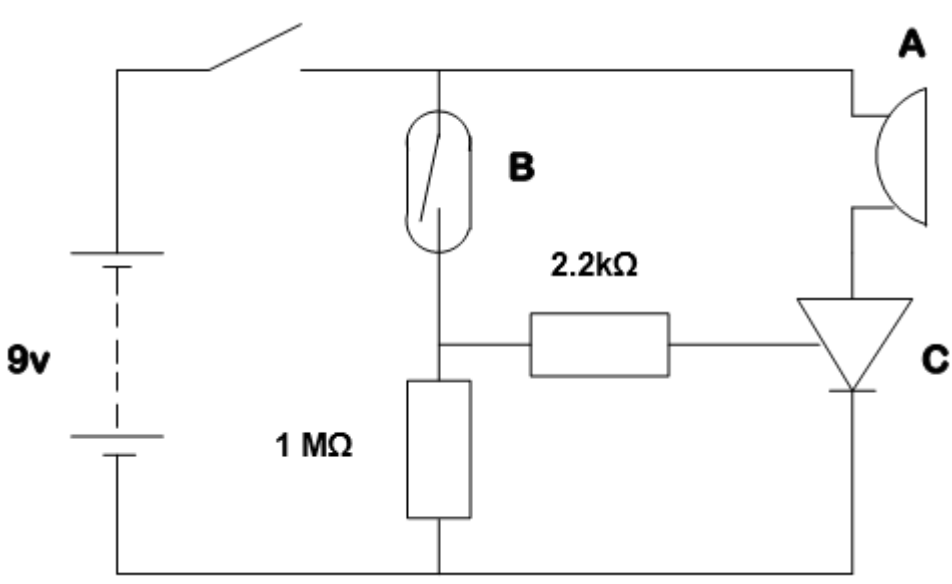
## Part A – Product Design

Question	Answer	Marks
1	<p>appropriate example</p> <p>2D modelling ; 3D modelling ; Mock up ; Scale prototype ;</p> <p>computer modelling, exploring shape, card exploring form, proportion scaled model of part/whole of concept, possibility usually final design model, can be tested</p> <p>for each; quality of explanation:</p> <ul style="list-style-type: none"> <li>– logical, structured</li> <li>– limited detail</li> </ul>	<p>1 × 4</p> <p>20</p> <p>3–4 0–2</p> <p>4 × 4</p>

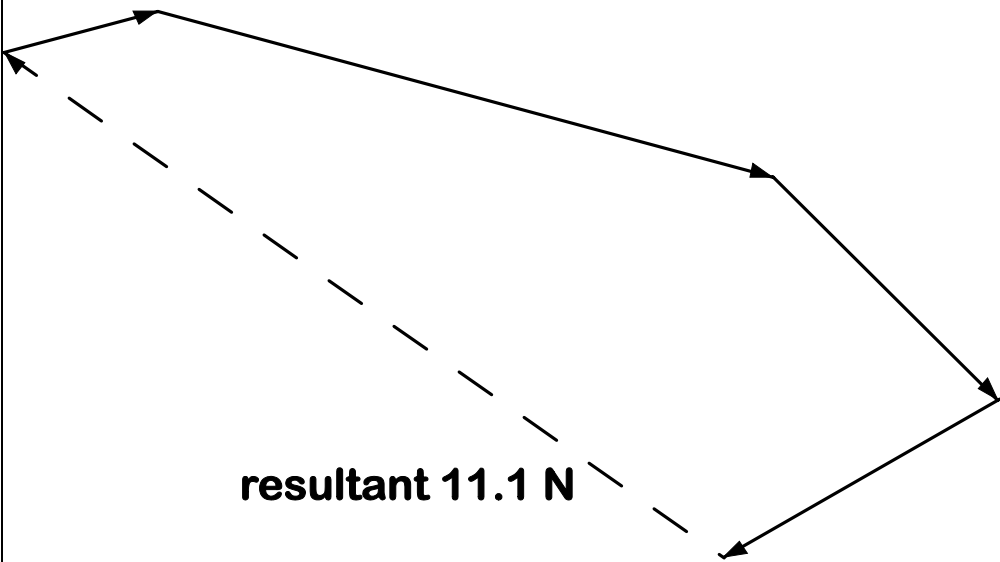
Question	Answer	Marks
2(a)	<p>suitable material:</p> <p>abs/polypropylene/HDPE appropriate hardwood e.g. beech</p> <p>Reason :</p> <ul style="list-style-type: none"> <li>– robust/take harsh treatment</li> <li>– can be assembled/formed to required shape</li> <li>– not split easy</li> <li>– take a good finish</li> </ul>	<p>1</p> <p>1 × 2</p> <p>3</p>
2(b)	<p>description to include:</p> <p>quality of description:</p> <ul style="list-style-type: none"> <li>– fully detailed</li> <li>– most stages</li> <li>– some detail,</li> </ul> <p>quality of sketches</p>	<p>6–8 3–5 0–2 up to 2</p> <p>10</p>
2(c)	<p>explanation could include:</p> <ul style="list-style-type: none"> <li>– change in process;</li> <li>– change in materials;</li> <li>– use of jigs, formers, moulds;</li> <li>– simplification of design.</li> </ul> <p>quality of explanation:</p> <ul style="list-style-type: none"> <li>– logical, structured</li> <li>– limited detail,</li> </ul> <p>quality of sketches</p>	<p>3–5 0–2 up to 2</p> <p>7</p>

Question	Answer	Marks
3(a)	description of process  – fully detailed 3–5 – some detail, 0–2 quality of sketches up to 2	<b>14</b>  $7 \times 2$
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	<b>6</b>          $3 \times 2$

**Part B – Practical Technology**

Question	Answer	Marks
4(a)(i)	$P = VI$ $12 \times 2.4$ (1) 28.8 (1) Watts (1)	<b>3</b>
4(a)(ii)	Battery Mains supply Dynamo Photovoltaic Why used e.g. location, safety	<b>4</b> 1 × 2 1 × 2
4(b)(i)	<b>A</b> buzzer <b>B</b> reed switch <b>C</b> thyristor	<b>3</b> 1 × 3
4(b)(ii)	 <p>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.</p> <p>Clarity of communication (up to 2)</p>	<b>10</b>

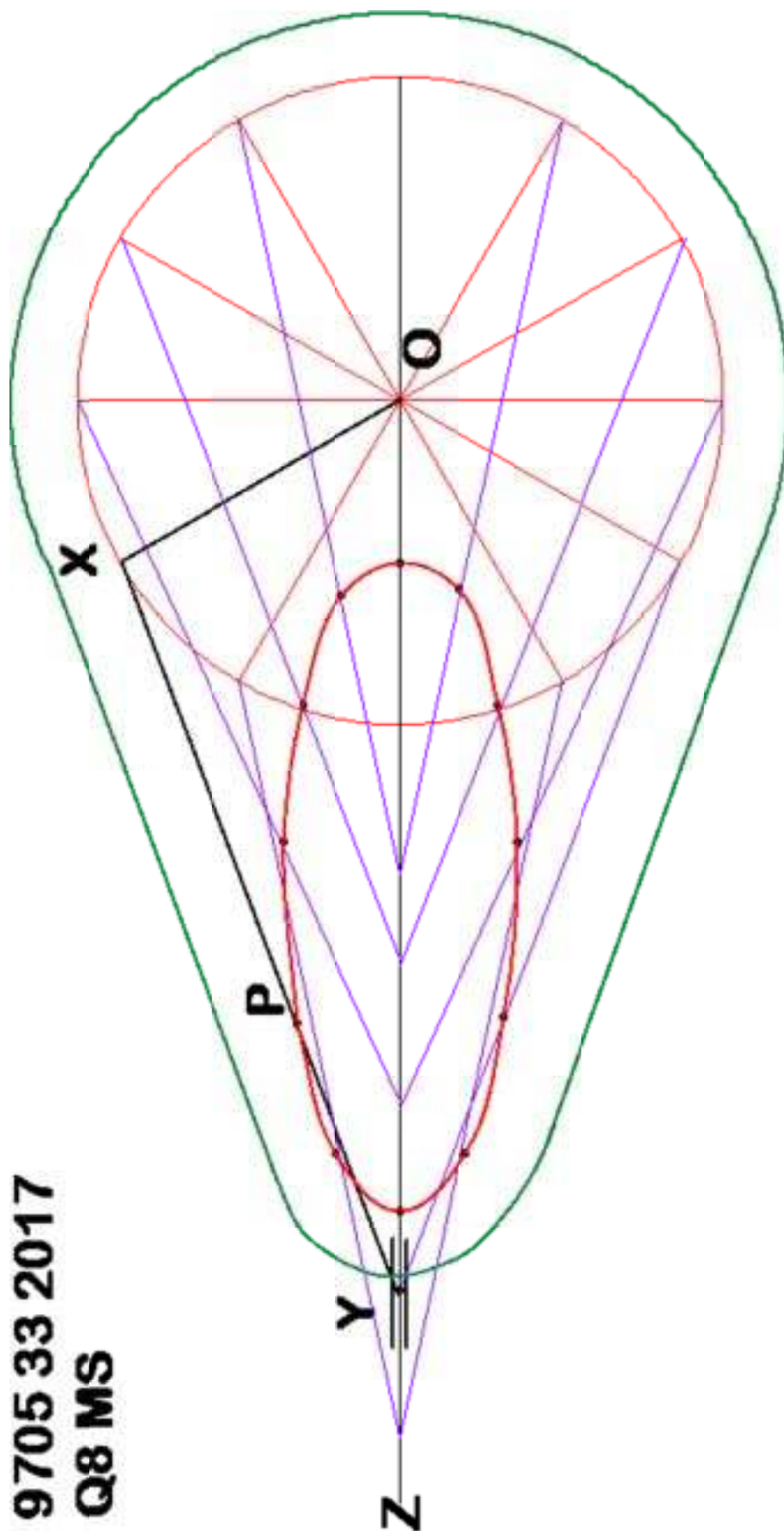
Question	Answer	Marks
5	<p>Discussion could include:</p> <ul style="list-style-type: none"> <li>– computer functions in designing</li> <li>– accuracy, ability to change, share, forward to CAM</li> <li>– comment on creative capacity/response to quote</li> </ul> <p>examination of issues</p> <ul style="list-style-type: none"> <li>– wide range of relevant issues 5–9</li> <li>– limited range 0–4</li> </ul> <p>quality of explanation</p> <ul style="list-style-type: none"> <li>– logical, structured 4–7</li> <li>– limited detail, 0–3</li> </ul> <p>supporting examples/evidence</p> <ul style="list-style-type: none"> <li>– specific programmes/usage</li> <li>– specific use architecture/engineering</li> </ul>	<p><b>20</b></p> <p>16</p> <p>4</p>

Question	Answer	Marks
6(a)	 <p><b>resultant 11.1 N</b></p> <p>Direction and magnitude 3                      Resultant 1</p>	4
6(b)	<p>RL 4,2 N 1                      RR 5.8 N 1</p>	2
6(c)	<p>correct notation 1                      Load diagram 3                      Transfer to main diagram 3                      Strut/ties 4                      Accuracy 3</p>	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  supporting examples / evidence – specific CAD/Internet/simulation VR etc. programmes/usage – specific printing/manufacturing technologies – specific consumer/manufacturer examples 4	20



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## Section B

Question	Answer	Marks
	<p><b>Analysis</b></p> <p>Analysis of the given situation/problem. 0–5</p> <p><b>Specification</b></p> <p>Detailed written specification of the design requirements. At least five specification points other than those given in the question 0–5</p> <p><b>Exploration</b></p> <p>Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection.</p> <ul style="list-style-type: none"> <li>– range of ideas 0–5</li> <li>– annotation related to specification 0–5</li> <li>– marketability, innovation 0–5</li> <li>– evaluation of ideas, selection leading to development 0–5</li> <li>– communication 0–5</li> </ul> <p><b>Development</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>– developments 0–5</li> <li>– reasoning 0–5</li> <li>– materials 0–3</li> <li>– constructional detail 0–7</li> <li>– communication 0–5</li> </ul> <p><b>Proposed solution</b></p> <p>Produce drawing/s of an appropriate kind to show the complete solution.</p> <ul style="list-style-type: none"> <li>– proposed solution 0–10</li> <li>– details/dimensions 0–5</li> </ul> <p><b>Evaluation</b></p> <p>Written evaluation of the final design solution. 0–5</p>	80