



2012 Product Design

Intermediate 2

Finalised Marking Instructions

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Product Design – Intermediate 2

Within each question, marks are awarded for repetition. This excludes question 1, where repetition is not allowed with parts (a), (b) and (c).

SECTION A

Q1		Marks
(a) (i)	<p>Suitable material (tubular steel):</p> <p>Reasons given could be derived from any of the usual design issues.</p> <ul style="list-style-type: none">• Functional reasons• Ergonomic reasons• Environmental reasons• Durability reason• Safety reasons• Cost reasons• Aesthetics reasons• Material reasons• Manufacturing reasons <p>Two other possible routes of reasoning within this answer. Consumer and manufacturer suitability.</p> <ul style="list-style-type: none">• Light in weight• Good strength to weight ratio• Strong in every direction/not easy to bend (for consumer)• Strong/hardwearing/robust/tough/sturdy• Easily formed (jigs/formers/etc)/easy to bend (for manufacturer)• Inexpensive/cheap• Ease of construction/connecting/jointing/assembly• Can be painted/easy to coat/easy to finish• Readily available• Etc <p>Each row above exemplifies answers that are of a similar nature. Only one response from each row will attract 1 mark.</p> <p>Where the candidate has given two contradicting reasons, these cancel each other out and the remainder of the candidate's response should be marked to a maximum of one mark.</p> <p>Only first 2 responses (excluding repetitions) are marked.</p> <p>1 mark per correct response up to total of 2 marks.</p>	<p style="text-align: center;">2</p>

Q1		Marks
(ii)	<p>Suitable process and reason (thermosetting plastic feet):</p> <p>Process</p> <ul style="list-style-type: none"> • Compression moulding • Injection moulding • 'Moulding' scores zero. <p>Reasons</p> <ul style="list-style-type: none"> • Cheap • Mass produced product • Due to the material (thermosetting plastic) • All the other plastic processes are not suitable • Intricate detail • Any other suitable justification <p>Only first response should be marked for each part of the question.</p> <p>1 mark for correct process and 1 mark for correct reason up to total of 2 marks. Reason and process do not have to match.</p>	2
(iii)	<p>Suitable material (laminated beech):</p> <p>Reasons given could be derived from any of the usual design issues.</p> <ul style="list-style-type: none"> • Functional reasons • Ergonomic reasons • Environmental reasons • Durability reasons • Safety reasons • Cost reasons • Aesthetics reasons • Material reasons • Manufacturing reasons <p>It is assumed that any properties of beech or lamination of beech will fall into one or more of the areas above.</p> <p>Two other possible routes of reasoning within this answer. Consumer and manufacturer suitability.</p> <p>Good strength to weight ratio Strong in every direction/not easy to bend (for consumer) Strong/hardwearing/robust/tough/sturdy Easily formed (jigs/formers/etc)/easy to bend (for manufacturer) Smooth finish Comfortable to sit on/warm Attractive to look at/aesthetically pleasing Durable/lasts a long time (duration) Etc</p> <p>Each row above exemplifies answers that are of a similar nature. Only one response from each row will attract one mark.</p> <p>Where the candidate has given two contradicting reasons, these cancel each other out and the remainder of the candidate's response should be marked to a maximum of one mark. Only first 2 responses are marked.</p> <p>1 mark per correct response up to total of 2 marks.</p>	2

Q1		Marks
(iv)	<p>Foot rest to frame joining and reason</p> <p>Joining (permanent)</p> <ul style="list-style-type: none"> • Welding/mig/tig/arc • Brazing/hard soldering <p>Gluing/soldering/soft soldering score zero</p> <p>Reasons</p> <ul style="list-style-type: none"> • Cheap • Quick • Accurate/can be automated/can be done by a robot • Strong/secure • Material reasons (ferrous metals)/because you can weld steel • Etc. <p>'Permanent' scores zero</p> <p>Only the first response is marked. 1 mark for correct process and 1 mark for correct reason up to total of 2 marks. Reason and process do not have to match Only correct responses attract marks.</p>	2

Q1		Marks
(b) (i)	<p>“Anthropometrics”</p> <p>eg The seating area width has been designed to suit adult hip breadth (answer showing link between stool part and human dimension).</p> <ul style="list-style-type: none"> • Seating area – hip breadth • Seating area – buttock to knee length • Seating area to foot rest – popliteal height • Back rest height – buttock to shoulder height <p>Any suitable answer relating human dimensions and relevant aspect of the stool should be awarded 1 mark.</p> <p>1 mark per correct response (including both elements of information) up to total of 2 marks.</p> <p>Vague answers which display an appropriate level of knowledge attract one mark.</p> <p>Two marks should be awarded where candidates have given an extended answer, which links one part of the stool to three or more bits of anthropometric data.</p> <p>eg The width of the stool has been designed to fit the 95th percentile adult hip breadth so that almost all potential users can fit on the seat area. (Percentile/user/body dimension/stool part).</p>	2
(ii)	<p>“Physiology”</p> <p>eg The stool has been designed to be lightweight so that it can be easily moved by an adult around the kitchen.</p> <ul style="list-style-type: none"> • Foot rest placement – leg raise, climbing • The stool – moving, lifting, opening, closing, carrying etc <p>Any suitable answer relating to human limitations, linking to part of the stool. The use of physical action verbs linking to the use of the stool are to be looked for here.</p> <p>1 mark per correct response (including both elements of information) up to total of 2 marks.</p> <p>Vague answers which display an appropriate level of knowledge attract one mark.</p> <p>Two marks should be awarded where candidates have an extended answer, which links one part of the stool to three or more justified physiological activities.</p> <p>eg The stool frame has been designed to be opened and closed easily for storage using a small amount of effort and physical strength.</p>	2

Q1		Marks
(b) (iii)	<p>“Psychology”</p> <p>eg The choice of natural wooden materials for the seat and back areas of the stool will ensure that the user thinks the stool will be comfortable to sit on.</p> <ul style="list-style-type: none"> • Frame material – looks easy to move/store/open/close • Wooden material – looks comfortable to sit on • Foot rest replacement – looks to have extra comfort for feet and legs • Thermosetting feet – looks as if it will have good grip on the floor • Rubber grip on footrest – looks to be safe to place feet on <p>NB We are not marking aesthetic qualities of the stool in this question.</p> <p>Any suitable answer relating to human thoughts/feelings/emotions, linking to a part, bit of the entire stool.</p> <p>1 mark per correct response (including both elements of information) up to total of 2 marks.</p> <p>Vague answers which display an appropriate level of knowledge attract one mark.</p> <p>Eg it looks light, vague, 1 mark. (could be light in weight)</p> <p>Two marks should be awarded where candidates have given an expanded answer, which links one part of the stool to three or more justified psychological feelings.</p> <p>eg The rubber grip on the footrest looks like it will add a feeling of comfort and also safety to the user when they sit on the stool. They should feel safe that their feet will not slip off.</p>	2

Q1		Marks
(c) (i)	<p>“surface finishes”</p> <p>The stool has three main component parts, with other smaller parts such as probable standard fixing components and the non-slip footrest covering.</p> <p>Laminated beech seat and backrest Tubular steel frame Thermosetting plastic foot</p> <p>Candidates may choose to state the name of the type of surface finish for a component and state a reason why this is suitable. This mode of response will attract marks as follows.</p> <p>Suitable surface finish for particular named component will attract one mark. Reason given which makes that choice suitable (they must match) will attract one mark.</p> <p>Candidates may choose to state the name of suitable surface finishes for two or more components. In this case one mark may be awarded for each suitable surface finish stated, up to total of 2 marks.</p> <p>Any suitable answer relating to surface finishes, linking to part of the stool attracts 1 mark. Eg seat is varnished: 1 mark/the seat is varnished which makes it durable: 1 mark</p> <p>Vague answers which display an appropriate level of knowledge attract 1 mark.</p> <p>Two marks should be awarded where candidates have given an expanded answer which links one part of the stool to three or more surface finish considerations.</p> <p>The frame could be galvanised and painted which makes it more durable: 2 marks 1 mark per correct response up to total of 2 marks.</p>	<p style="text-align: center;">2</p>

Q1		Marks
(c) (ii)	<p>“safety”</p> <ul style="list-style-type: none"> • Complete stool – securely assembled • Complete stool – smooth surface/edges/no sharp edges. • Standard components – non hazardous • Complete stool – folding mechanism, no finger traps • Complete stool – passed BIS testing • Plastic feet – non slip • Surface finishes – non toxic • Complete stool – wide base for stability • Complete stool – to avoid litigation/suing if users are injured • Etc. <p>Any suitable justification relating to safety, linking to part of the stool.</p> <p>Vague answers which display an appropriate level of knowledge attract 1 mark.</p> <p>Two marks should be awarded where candidates have given an expanded answer which links one part of the stool to three or more surface finish considerations.</p> <p>1 mark per correct response (including both elements of information) up to total of 2 marks.</p>	2
(iii)	<p>“economics”</p> <p>Candidates may choose to refer to the following areas when responding to this question:</p> <p>Materials – choice of suitable materials Manufacturing techniques – scale of production/method of production</p> <p>Any other suitable justification relating to economics (cost/value for money/omparison to other products/consumer demand), linking to part of the (or entire) stool.</p> <p>Vague answers which display an appropriate level of knowledge attract 1 mark.</p> <p>Two marks should be awarded where candidates have given an expanded answer which links one part of the stool to three or more economics considerations.</p> <p>1 mark per correct response (including both elements of information) up to total of 2 marks.</p> <p>Note: The marking scheme for question 1 (b) and (c) is as follows One part + one justification = one mark One part + two justifications = one mark One part + three justifications = two marks Two separate parts + two separate justifications = two marks Vague, incomplete/extended responses may attract one mark</p>	2 (20)

SECTION B

Q2		Marks
(a)	<p>Flat-pack furniture</p> <ul style="list-style-type: none"> • Instant purchase • Easy to assemble • No delivery waiting • Low cost • Satisfaction of building • Easy to transport • Easy to store prior to assembly • Disassembly option, when not in use • Access to difficult property areas, such as up narrow staircases • Etc. <p>Only first 2 responses are marked.</p> <p>1 mark per correct response up to total of 2 marks.</p>	2
(b)	<p>'beech veneer chipboard rather than solid beech'</p> <ul style="list-style-type: none"> • Low cost • Environmental reasons • Uniformity of thickness • Smooth surface • Easy to machine • Wide flat boards • Knock Down Fittings are compatible • Uses materials that might be considered as waste • Etc. <p>Aesthetic responses zero marks. Eg 'looks nice'</p> <p>Only first 2 responses are marked.</p> <p>1 mark per correct response up to total of 2 marks.</p>	2

Q2		Marks
(c)	<p>'Knock down fittings'</p> <p>Candidates may choose to name parts of a KDF in their answer such as screw, bolt etc. They may draw a KDF and this would attract 1 mark</p> <p>Special fittings to join furniture parts together Mechanical fixing using standard components Non-permanent fixings Etc.</p> <p>Naming KDF attracts 1 mark</p> <p>Nut and bolt/two part KDF Screw and nut</p> <p>'Woodscrew' scores zero 'Screw' scores zero</p> <p>1 mark for correct response.</p>	<p>1 (5)</p>

Q3		Marks
(a) (i)	<p>Consumers start to buy the product in large numbers (zero marks), because any potential problems have been addressed by the manufacturer. The product starts to get noticed. Consumers have confidence in the product. Marketing and advertising techniques are now having an effect on sales. The product has been on the market for a (short) while and the price may be reduced. Growth not as rapid as expected, therefore promotional price. Etc.</p> <p>Description of market activity marked on a 2-1-0 scale. 'Growth' plus description scores 2 marks.</p>	2
	<p>(ii) Consumers stop buying the product (zero marks). A similar product is released by another company. An upgraded model is available from the same (or other) company. Most consumers who want one already have one. The product has become obsolete. Etc.</p> <p>Description of market activity marked on a 2-1-0 scale. 'Decline' plus description scores 2 marks.</p> <p>No marks should be awarded for simply stating what is happening in the graph.</p>	2
(b)	<p>All the same quality/available at low cost/supplied by another manufacturer/maintenance is easier to do/replacement parts are easier to source/manufacturer does not need to make them/Just-in-time considerations. Etc</p> <p>Explanation marked on a 2-1-0 scale.</p>	2
(c)	<p>High volume packaging: poor for the environment/energy used to manufacture/fossil fuels used/transportation of packaging/landfill sites/some plastics cannot be recycled/packaging offer is not recycled. Etc</p> <p>Explanation marked on a 2-1-0 scale.</p>	2 (8)

Q4		Marks
	Product A: Rotational Moulding Product B: Turning Product C: Sand Casting Product D: Extrusion Product E: Press Forming 1 mark per correct response up to total of 5 marks.	(5)

Q5		
	<p>A different technique must be used for each aspect</p> <p>Candidates should be awarded one mark for naming an appropriate evaluation technique.</p> <p>Candidates should be awarded one mark for describing their named evaluation technique.</p> <p>Where candidates incorrectly describe a named evaluation technique, this may attract one mark where the description of the technique relates to the question.</p> <p>To gain two marks candidates should correctly describe their named technique.</p> <p><i>Generic descriptions of methods of evaluation may attract 2 marks.</i></p>	
(a)	Ease of use – candidates may refer to user trials/user trip/internet research Description of evaluation activity marked on a 2-1-0 scale.	2
(b)	Aesthetics – candidates may refer to surveys/questionnaires/internet research Description of evaluation activity marked on a 2-1-0 scale.	2
(c)	Battery life – candidates may refer to testing/test rigs/comparison to other products/internet research Description of evaluation activity marked on a 2-1-0 scale. Extended response gains 2 marks on the 2-1-0 scale. Technique must match activity	2 (6)

Q6		Marks
(a)	<p>Candidate responses may overlap from parts a), b) & c). It must be noted that no marks are awarded for repetition; however similar responses may be given.</p> <p>Two possible routes of reasoning within this answer. Consumer and manufacturer suitability.</p> <ul style="list-style-type: none"> • Heavy • Strong/hardwearing/robust/tough/sturdy • Manufacturing method adds to the strength • Ease of connecting/jointing/assembly • Readily available • Durable/lasts a long time (duration) • Etc. <p>Where the candidate has given two contradicting reasons, these cancel each other out and the remainder of the candidate's response should be marked.</p> <p>Only first 2 responses are marked.</p> <p>1 mark per correct response up to total of 2 marks.</p>	2
(b)	<p>Repetition of candidate response from part a) attracts no marks in part b)</p> <p>Eg</p> <ul style="list-style-type: none"> a) Strong b) Strong <ul style="list-style-type: none"> • Can be modified/formed into required shape/malleable/easy to shape, form, manufacture • Colour choice/in-build colour/no need to paint • Weatherproof/waterproof • Shock proof/impact resistant/shock absorbing properties/has ability to 'deflect without snapping' • Strong/hardwearing/robust/tough/sturdy • Durable/lasts a long time • Inexpensive/cheap • Safe (must be justified) • Easily cleaned • Maintenance free • Good strength to weight ratio • Ease of connecting/jointing • Environmental link/no tress used • Etc. Relevant + true <p>Candidates may refer to properties of the shaft rather than properties of the material. This will also attract marks in this section.</p> <p>Where the candidate has given two contradicting reasons, these cancel each other out and the remainder of the candidate's response should be marked.</p> <p>Only the first 2 responses are marked.</p> <p>1 mark per correct response up to total of 2 marks.</p>	2

Q6		Marks
(c)	<p>Candidates may seem to be repeating their response from parts a) & b). This should be looked at closely as the context may be different.</p> <p>Candidates may choose to answer this question in a number of ways. The appeal of the product can be related to any of the recognised design issues as shown below:</p> <p>Functional appeal, multi-purpose and hanging loop. Ergonomic appeal, warm, easy grip handle. Environmental appeal, recyclable parts. Durability appeal, alloy steel. Safety appeal, black and yellow handle. Aesthetic appeal, use of contrasting colours. Material appeal, rubber grip/shock resistant handle.</p> <p>Functional appeal: 'can be used to put screws in' scores zero/any link to screws scores zero.</p> <p>Other issues such as branding or market niche appeal may be discussed.</p> <p>Description of consumer appeal marked on a 2-1-0 scale.</p>	<p style="text-align: center;">2</p> <p style="text-align: center;">(6)</p>

[END OF MARKING INSTRUCTIONS]