



2014 Product Design

Advanced Higher

Finalised Marking Instructions

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Part One: General Marking Principles for: Product Design Advanced Higher

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

- (a)** Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader/Principal Assessor.
- (b)** Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

GENERAL MARKING ADVICE: Product Design Advanced Higher

The marking schemes are written to assist in determining the “minimal acceptable answer” rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates’ evidence, and apply to marking both end of unit assessments and course assessments.

Part Two: Marking Instructions for each Question

Question		Expected Answer/s	Max Mark
1	(a)	<p>1 mark for each suitable explanation of the suitability of each type of materials – max 2 marks.</p> <p>Explanations may include the following:</p> <p><u>Elastomer</u> –</p> <ul style="list-style-type: none"> • Improving the comfort of the handle • Enhancing the grip of the handle • Durability issues <p><u>Polymer</u> –</p> <ul style="list-style-type: none"> • Provides structural strength to the handle, • Light weight (Strength to weight ratios) • Durability issues <p>Any other suitable response</p> <p>Generic answers, eg suitable for mass production, different colours, must be backed up by explanation to receive marks.</p>	2
1	(b)	<p>1 mark for each valid justification of a suitable manufacturing process (up to a maximum of 2) No marks awarded for simply stating the process.</p> <p>Ideally the candidate will have identified that the casings were <u>dual shot moulded</u> and have justified the suitability of this.</p> <p>Justifications may include:</p> <ul style="list-style-type: none"> • The complexity of the form • No secondary processing requirement • Issues related to accuracy and repeatability • Combinations of two types of materials • Economies of scale (large volume production) <p>Any other suitable response</p> <p>Alternatively the candidate may have identified injection moulding as the process, in which case many of the justifications above will be similar to those above.</p>	2

Question		Expected Answer/s	Max Mark				
1	(c)	<p>Marks will be awarded from the range statement below for the description of issue which have influenced the assembly methods.</p> <table border="1"> <thead> <tr> <th>0–2</th> <th>3–4</th> </tr> </thead> <tbody> <tr> <td> <p>1 issue identified and described, displaying:</p> <ul style="list-style-type: none"> Limited understanding of contributing issues/ assembly methods. Little or no reference to products used to illustrate & support the answer. The answer is simply too thin (lacking detail). </td> <td> <p>2 or more issues identified and described, displaying:</p> <ul style="list-style-type: none"> Clear understanding of contributing issues/ assembly methods. Examples clearly used to illustrate & support the answer. </td> </tr> </tbody> </table>	0–2	3–4	<p>1 issue identified and described, displaying:</p> <ul style="list-style-type: none"> Limited understanding of contributing issues/ assembly methods. Little or no reference to products used to illustrate & support the answer. The answer is simply too thin (lacking detail). 	<p>2 or more issues identified and described, displaying:</p> <ul style="list-style-type: none"> Clear understanding of contributing issues/ assembly methods. Examples clearly used to illustrate & support the answer. 	4
0–2	3–4						
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1	(d)	<p>1 mark for each valid description of suitable methods for ensuring the economic and efficient manufacture of products (up to a maximum of 5.)</p> <p>Methods may include:</p> <ul style="list-style-type: none"> Reduction in the number of materials used (ease of in house recycling) Reducing any secondary processing requirements The use of standard components The use of JIT production Manufacture close to the retailers / distribution centres / rail & road links Detailed QA policies (reducing / stopping quality issues before they become a problem) Highly trained / specialised workforces Highly automated manufacturing centres (reducing wage bill & opportunity for human error) Economies of scale (large volume production) Outsourcing <p>Any other suitable response</p>	5				
			(13)				

Question		Expected Answer/s	Max Mark				
2	(a)	<p>1 mark for each valid explanation of how ergonomics influenced the design of the rickshaw (up to a maximum of 6)</p> <p>Issues may include:</p> <ul style="list-style-type: none"> • Width of the rickshaw seat in relation to the hip width of 2 people • Height of the rickshaw seat in relation to the popliteal height of people • Height of backrest on the rickshaw seat in relation to the back length of people • Width of handlebars in relation to shoulder width (of driver) • Diameter of handlebar grip in relation to grip size (of driver) • Range of adjustability of seat (height, fore & aft) in relation to leg length and reach of driver • Gearing in relation to (Strength) physiology of the driver • Crank length in relation to leg length & strength of the driver <p>Any other suitable response</p>	6				
2	(b)	<p>Marks will be awarded from the range statement below for the discussion of the balance between aesthetics and function.</p> <table border="1"> <thead> <tr> <th>0-2</th> <th>3-4</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Demonstrates little knowledge or understanding of balance between Aesthetics & Function. • There is little or no reference to aspects the rickshaw. • The answer is simply too thin (lacking detail). </td> <td> <ul style="list-style-type: none"> • Demonstrates clear knowledge & understanding of balance between Aesthetics & Function. • There are detailed references to aspects the rickshaw. </td> </tr> </tbody> </table>	0-2	3-4	<ul style="list-style-type: none"> • Demonstrates little knowledge or understanding of balance between Aesthetics & Function. • There is little or no reference to aspects the rickshaw. • The answer is simply too thin (lacking detail). 	<ul style="list-style-type: none"> • Demonstrates clear knowledge & understanding of balance between Aesthetics & Function. • There are detailed references to aspects the rickshaw. 	4
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Question			Expected Answer/s	Max Mark
2	(c)	(i)	<p>1 mark for each valid description of safety issues that would influence the design of modern rickshaws (up to a maximum of 3)</p> <p>Issues may include:</p> <ul style="list-style-type: none"> • Strength - of frame to enable the safe carriage of passengers and driver • Visibility – making the rickshaw visible for other road users • Passenger Security – the use of seat belts / restraints for passengers • Impact resistance – design of the passenger area to ensure the passengers are safe should the rickshaw be hit from the side • Durability of Tyres – ensuring they can withstand the stresses of the weight of carrying heavy loads • Breaking power – ensuring brakes are powerful enough to stop the rickshaw <p>Any other suitable response</p>	3
2	(c)	(ii)	<p>1 mark for each valid description of steps a company could take to ensure products are safe prior to their launch (up to a maximum of 2)</p> <p>Steps may include:</p> <ul style="list-style-type: none"> • The use of outside agencies for safety testing – BSi / Kite mark • Reliable QA policy – testing raw materials & increased random sampling throughout the manufacture process • Through testing of concepts prior to manufacture – Computer simulation <p>Any other suitable response</p>	2
				(15)

Question		Expected Answer/s	Max Mark						
3	(a)	<p>Marks will be awarded from the range statement below for the description of how the TaG mask has been influenced by specialists</p> <table border="1"> <thead> <tr> <th>0-2</th> <th>3-4</th> <th>5-6</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Limited understanding of the how specialists have influenced the mask. Limited understanding of the role of played by specialists Limited reference to aspects of the mask is made in the answer. </td> <td> <ul style="list-style-type: none"> Clear understanding of the how specialists have influenced the mask. Clear understanding of the role of played by specialists Clear reference to aspects of the mask is made in the answer. </td> <td> <ul style="list-style-type: none"> Strong understanding of the how specialists have influenced the mask. Strong understanding of the role of played by specialists Meaningful reference to aspects of the mask is made in the answer. </td> </tr> </tbody> </table>	0-2	3-4	5-6	<ul style="list-style-type: none"> Limited understanding of the how specialists have influenced the mask. Limited understanding of the role of played by specialists Limited reference to aspects of the mask is made in the answer. 	<ul style="list-style-type: none"> Clear understanding of the how specialists have influenced the mask. Clear understanding of the role of played by specialists Clear reference to aspects of the mask is made in the answer. 	<ul style="list-style-type: none"> Strong understanding of the how specialists have influenced the mask. Strong understanding of the role of played by specialists Meaningful reference to aspects of the mask is made in the answer. 	6
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Question		Expected Answer/s	Max Mark
3	(b)	<p>1 mark for each valid description of the benefits offered by other visualisation techniques (up to a maximum of 4 marks in total)</p> <p>Benefits may include:</p> <ul style="list-style-type: none"> • CAD Models <ul style="list-style-type: none"> ○ Increased accuracy (testing if parts fit together) ○ Ability to integrate with CAD CAM setups ○ Ability to simulate ○ Ability to apply a range of coloured textures / finishes (easily) for presenting to the client ○ Ease of sharing ideas for review purposes (via email) ○ Easy storage of finished items <p>Any other suitable response</p> <ul style="list-style-type: none"> • Sketching <ul style="list-style-type: none"> ○ Quick ○ No necessity for specialist equipment (low cost) ○ Can be done where ever the inspiration occurs ○ Not constrained by the necessity for specialist skills ○ Freedom to experiment / be creative <p>Any other suitable response</p>	4
3	(c)	<p>1 mark for each valid description of the steps a company could take to maintain a high level of quality assurance (up to a maximum of 3)</p> <p>Steps may include:</p> <ul style="list-style-type: none"> • Sampling of raw materials • Random sampling of products as they progress through the manufacturing process • Ensure their work force is highly trained • Employ the use of Jig, Fixtures & templates to reduce opportunities for human error • Investment in specialist inspection / measuring equipment • The use of ICT prior to manufacture to calculate where errors may occur in the process, allowing for targeted sampling of high risk areas • Total Quality management <p>Any other suitable response</p>	3
			(13)

Question		Expected Answer/s	Max Mark
4	(a)	<p>1 mark for each valid statement leading to a clear explanation of possible advantages and disadvantages of using standard components in new products.</p> <p>Candidates must consider both advantages and disadvantages to gain full marks (max 3 marks for each, max total 4 marks)</p> <p>Answers could include:</p> <p>Advantages</p> <ul style="list-style-type: none"> • Less risk of component failure • Less research and development • Reduction of lead time • Economy of scale • Availability • Cost reduction <p>Disadvantages</p> <ul style="list-style-type: none"> • Limited choice • Based on existing technology • Creativity limited • Restyling rather than redesign. <p>Reliant on supplier</p>	4
4	(b)	<p>1 mark for each valid description of information gained from field and desk research.</p> <p>Answers may include information about:</p> <ul style="list-style-type: none"> • Buying trends • Costings • Material specifications • Legislation • Environmental impact • Restrictions and limitations <p>Any other suitable response</p>	3

Question		Expected Answer/s	Max Mark				
4	(c)	<p>Marks will be awarded from the range statement below for the description of how research has influenced their design decisions.</p> <table border="1"> <thead> <tr> <th>0-2</th> <th>3-4</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Description of the influence of research on design decisions is vague and lacks detail • References are vague • The answer is simply too thin (lacking detail). </td> <td> <ul style="list-style-type: none"> • Description of the influence of research on design decisions is clear and detailed • References are clear </td> </tr> </tbody> </table>	0-2	3-4	<ul style="list-style-type: none"> • Description of the influence of research on design decisions is vague and lacks detail • References are vague • The answer is simply too thin (lacking detail). 	<ul style="list-style-type: none"> • Description of the influence of research on design decisions is clear and detailed • References are clear 	4
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4	(d)	<p>Candidates will be awarded 1 mark for each relevant point leading to a clear explanation as to the benefits to a company of a non-profit approach.</p> <p>Answers could include:</p> <ul style="list-style-type: none"> • Enhanced reputation • Gaining publicity • Diversification • Freedom and creativity • Collaboration <p>Any other suitable response</p>	4				
			(15)				

Question			Expected Answer/s	Max Mark
5	(a)		<p>Candidates will be awarded 1 mark for each valid point leading to a clear description as to the advantages and disadvantages of adopting a radical approach to design. Candidates must consider both advantages and disadvantages to gain full marks (max 2 marks for each, max total 3 marks)</p> <p>Answers could include:</p> <p>Advantages</p> <ul style="list-style-type: none"> • Improving market share • Improving reputation • Increasing sales • Maintaining consumer interest • More creativity <p>Any other suitable response</p> <p>Disadvantages</p> <ul style="list-style-type: none"> • Risks associated unknown sales • Risks associated with consumer reactions • Risks associated with production and manufacture • Costs associated with research and development • Set-up costs • Re-tooling • Staff training/skills <p>Any other suitable response</p>	3
5	(b)	(i)	<p>Candidates will be awarded 1 mark for each valid point leading to a clear description as to how external factors or events have influenced the evolution of products.</p>	3
5	(b)	(ii)	<p>Candidates will be awarded 1 mark for each valid point leading to a clear description as to how external factors or events may influence future developments of products.</p>	3

Question			Expected Answer/s	Max Mark
5	(c)	(i)	<p>Candidates will be awarded 1 mark for each relevant issue described that may have been considered when developing the Mojito shoe for commercial manufacture.</p> <p>Answers could include:</p> <ul style="list-style-type: none"> • Tooling costs • Production methods • Assembly methods • Workforce skills and training • Specialisation • Materials • Life expectancy • Production runs • Predicted sales • Competition <p>Any other suitable response</p>	3
5	(c)	(ii)	<p>Candidates will be awarded 1 mark for each relevant point describing strategies that may have been used to resolve conflicting issues during the development of the Mojito shoe.</p> <p>Answers could include:</p> <ul style="list-style-type: none"> • Use of modelling – ergonomics v's aesthetics • Continual evaluation – issues meeting design specification • Sketching - shape, form v's fashion, style and the target market • Computer simulation – function v's construction/assembly • Expert appraisal – materials v's production <p>Any other suitable response</p>	3
5	(c)	(iii)	<p>Candidate will be awarded 1 mark for each justification in support of the appropriate target market identified. No marks for stating the target market.</p>	2
				(17)

Question			Expected Answer/s	Max Mark
6	(a)	(i)	<p>Candidates will be awarded 1 mark for each valid point leading to a description as to how materials and manufacturing technologies are being used to reduce the impact of products on the environment. Candidates must consider both materials and manufacturing technologies to gain full marks (max 3 marks for each, max total 4 marks)</p> <p>Answers could include:</p> <p>Materials</p> <ul style="list-style-type: none"> • Use of bio plastics • Use of biodegradable plastics • Use of recycled materials • Reducing materials • Sustainable materials <p>Any other suitable response</p> <p>Manufacturing technologies</p> <ul style="list-style-type: none"> • Reduce pollution • Quality control • Reduce waste • Labelling materials • Use if sustainable energy <p>Any other suitable response</p>	4
6	(a)	(ii)	<p>Candidates will be awarded 1 mark for each relevant point leading to a clear explanation of the potential risks associated with using new materials in the design of products.</p> <p>Answers could include:</p> <ul style="list-style-type: none"> • No previous knowledge about performance • Uncertainty about suitability for manufacturing process • Risks of long term failure • Effects on the environment • Health risks <p>Any other suitable response</p>	3

Question			Expected Answer/s	Max Mark
6	(a)	(iii)	<p>Candidates will be awarded 1 mark for each valid point that clearly describes methods, other than materials and manufacturing technologies, which can be used to reduce a product's impact on the environment.</p> <p>Answers could include:</p> <ul style="list-style-type: none"> • Reduce transportation • Local manufacture/assembly • Flat pack design • Design efficient products • Design products to be maintained • Avoid redundant features • Increase the product's life span <p>Any other suitable response</p>	4
6	(b)		<p>Candidates will be awarded 1 mark for each valid point that describes the activities a design company could use to generate creative and innovative products.</p> <p>Answers could include:</p> <ul style="list-style-type: none"> • Effective market research • Suitable idea generation techniques • Research into materials and technologies • Use of design teams. <p>Any other suitable response</p>	4
				(15)

Question 7

This question is set to test the candidate's ability to present a reasoned discussion about a design issue. Although there is an underlying body of design knowledge required to answer it there is a very wide range of possible answers. Therefore the question is marked holistically. The features which are looked for are knowledge of the subject matter, ability to comprehend the question and to construct an answer which uses clear examples to support the points made.

The table below is designed to assist with the placing of answers within the full mark range.

0-3	4-6	7-9	10-12
<p>An answer which falls into this category may do so for a number of reasons. It could be that:</p> <ul style="list-style-type: none"> • It demonstrates very little knowledge or understanding of the subject matter. • There is little or no reference to products. • Very few points are made. • Much of it does not answer the question. • The answer is simply too thin. 	<ul style="list-style-type: none"> • Knowledge of the subject matter and a secure understanding of the main aspects will be demonstrated. • The answer will be relevant to the question. • Reference to at least one product. • Although examples are used points made are unclear. 	<ul style="list-style-type: none"> • Knowledge of the subject matter and a secure understanding of the main aspects will be demonstrated. • The answer will be relevant to the question and demonstrate a good level of comprehension. • Reference to a few products or selected references to a number of products. • Several clear points are made and examples are used to support them. 	<ul style="list-style-type: none"> • Detailed knowledge of the subject matter and a secure understanding of all aspects will be demonstrated. • The answer will be relevant to the question demonstrating a high level of comprehension. • Very detailed reference to a few products (even a single product) or selected references to a wide range of products. • Examples are clearly used to illustrate and support points.

(Total 12 marks)

[END OF MARKING INSTRUCTIONS]