wjec cbac

GCE AS MARKING SCHEME

SUMMER 2019

AS (NEW) DESIGN AND TECHNOLOGY - PRODUCT DESIGN 2603U10-1

INTRODUCTION

This marking scheme was used by WJEC for the 2019 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCE DESIGN & TECHNOLOGY

PRODUCT DESIGN - UNIT 1

SUMMER 2019 MARK SCHEME

Question1	Study the photographs below of a popular pen, with reference to the pen lid. Answer the questions that follow.				
		AO3	AO4	Mark	
(a)	The pen lid is manufactured by injection moulding. Give two reasons for using this process.		\checkmark	2	
	The response must explain justify the identification of t method.	he manufa	acturing		
	Incorrect/ no response			0 mark	
	1 Mark for each reason. (Maximum 2 marks for the				
	Examples:				
	 The pen top is manufactured from a polymer- plastic properties of the polymer. Speed of manufacture- 100's can be made in one go. Quality of finish- High quality no need for further finishing. Colour top changes are simple to change red polymer for red tops. Consistent product produced. 				
	Accept any appropriate justified reason.				

		AO3	AO4	Mark
(b)	Using notes and sketches describe the injection moulding process used to manufacture the pen lid.		\checkmark	6
	Candidates will be required to demonstrate an underst process of injection moulding. A candidate must describility injection moulding.	anding of t ibe the pro	the cess of	
	Injection moulding process is a method of forming ther heaters, reciprocating screw and a mould. Polymer gra- into a hopper, which feeds a heated barrel. Inside the b reciprocation screw will transfer the polymer granules a The action of fiction and the heating elements around t cause the polymer to become plastic. Once it is plastic be injected into the appropriate mould.	moplastics anules are barrel is a along the b along the b he barrel v ised it can	s using loaded parrel. will then	
	This process that will allow for a range of complex shap produced quickly and in large quantities, the quality an the mould means that each piece produced will need li finishing. The colour of the pen top can be changed by dyes.	pes to be d surface ttle or no s using diffe	finish of surface erent	
	https://www.toolcraft.co.uk/plastic-injection-moulding/in moulding-process-stage1-356x141.gif	<u>nages/inje</u>	<u>ction-</u>	
	Mould Barrel Heater Reciprocating screw	Hopp	ber	

Guidance to markers Incorrect/no response	0 Marks
Diagram with no explanation maximum 3 Marks. Explanation with no diagram maximum 3 Marks.	
Example:	
 Brief description: Injection moulding process is a method of forming thermoplastic polymers using heat and a mould. This process that will produce a range of shapes. Basic diagram some elements identified. 	1-2 Marks
 More Detailed description: Injection moulding process is a method of forming thermoplastics using heaters, a screw and a mould. Polymer granules are loaded into a hopper, which feeds a barrel. Inside the barrel is a screw will transfer the polymer granules along the barrel. This process will allow for a range of complex shapes to be produced quickly and in large quantities, Simple diagram with less than 3 elements identified 	3-4 Marks
 Detailed description: Injection moulding process is a method of forming thermoplastics using heaters, a reciprocating screw and a mould. Polymer granules are loaded into a hopper, which feeds a heated barrel. Inside the barrel is a reciprocation screw will transfer the polymer granules along the barrel. The action of fiction and the heating elements around the barrel will cause the polymer to become plastic. Once it is plasticised it can then be injected into the appropriate mould. This process that will allow for a range of complex shapes to be produced quickly and in large quantities. The quality and surface finish of the mould means that each piece produced will need little or no surface finishing and again this will be an advantage to the manufacture keeping production costs down. Diagram with key elements listed and notes linked to explanation. 	5-6 Marks

Question 2	Product designers have access to a vast range of both new and traditional materials.				
		AO3	A04	Mark	
(a)	Explain the term 'composite material'.		\checkmark	3	
	The response must demonstrate clear understanding of composite materials. A composite material is one that is manufactured from two or more materials and when combined exhibits the improved characteristics of				
				0 Marka	
	Incorrect/ no response			U Marks	
	1 Mark for each reason. Maximum 3 Marks				
	 Examples: A composite material is one that is manufactured from two or more materials. A composite material exhibits the best characteristics of both materials. Individual materials remain distinct within the new material. Accept any other appropriate response				

AO3	AO4	Mark		
	~	5		
The response must explain justify the identification of an appropriate composite material.				
		0 Marks		
		1 Mark		
s weight rati at of the bil d in all wea roof coatin ge of aeroo ithstand th tive transfe heels to the	o) this ke. ather ng. lynamic e er of e road.	4 Marks		
	AO3 an appropriation an appropriation appr	AO3 AO4 AO3 AO4 AO3 AO4 AO3 AO4		

Question 3	A storage unit is pictured below. This unit is a part of a storage system sold both online and through retail outlets.				
		AO3	AO4	Mark	
(a)	The storage system uses a broad range of bought-in components in its assembly. Explain two advantages of using bought-in components.		\checkmark	4	
	The response can identify advantages for both the main purchaser.	nufacturer	or the		
	Incorrect/ no response			0 Marks	
	1 Mark for each advantage. Maximum 2 Marks 2 Marks for each advantage explained with a reason. Maximum 4 Marks Examples:				
	 Manufacturers benefits: Reduced manufacturing time, the manufacturer does not need to make all the components. Bought-in components produced in parallel by specialist manufacturer. Improved Quality Control, ensures consistency for the the manufacturer Fewer skilled staff required, manufacturer can employ staff skilled in one area of production less specialist equipment needed, only the need for timber manufacturing equipment. Reduced storage as a result of small range of raw materials. 				
	Accept any other appropriate response				

		AO3	AO4	Mark
(b)	Using notes and sketches describe an example of a semi-permanent fixing method that could be used to join the storage system together.		\checkmark	4
	The response must identify and describe the basic ele- suitable Knock Down Fitting.	ments of a		
	Incorrect/ no response			0 Marks
	Diagram with no explanation maximum 2 Marks. Explanation with no diagram maximum 2Marks .			
	Identification of suitable fitting; Barrel nut and Bolt, Cam fitting, T-Nut and bolt, Corner Plate, Screw socket, Screw connector, Chipboard Fastener, Block connector.			1 Mark
	Supporting diagram with relevant details/ information in	dentified.		
	Barrel nut	olt		3 Marks
	Pre-di	rilled hole i	for bolt	

Question 4	Studying the Scaoiattolo Squirrel Nutcracker below and answer the following questions.				
		AO3	AO4	Mark	
(a)	Evaluate the selection of each material used in the nutcracker.		\checkmark	4	
	The response must justify the identified relevant mater	ial propert	ies.		
	Properties are the distinguishing features of the materia	als			
	Incorrect/ no response			0 Marks	
	1 Mark for reason of selection. Maximum 2 Marks 2 Marks for each justified reason for selection. Maximu	um 4 Mark	ſS		
	Examples.				
	 Beech base material. It is very hard and tough, is ideal to be used where it is being bashed around and used often. It has good strength properties and high abrasion resistance. A straight-grained hardwood with a fine texture making it easy to work. Light in colour. 				
	 Nut Cracker Handle. Higher corrosion resistance, necessary for any tool or utensil used in contact with food. High ductility, can be shaped and formed. High strength and hardness, A more attractive appearance, can be polished to achieve a high shine giving the appearance of a high quality prodcut Lower maintenance, easy to keep clean in the household environment. 				

(b) Evaluate the importance of applying appropriate surface finishes to the materials.			4			
Incorrect/ no response 0 Mark						
1 Mark for stating a finish. Maximum 2 Marks 2 Marks for evaluating the suitability of each finish. Maxir	1 Mark for stating a finish. Maximum 2 Marks 2 Marks for evaluating the suitability of each finish. Maximum 4 Marks					
Examples.						
 Beech finishes Sanded or planed to a smooth finish, giving a 'high or pleasant to touch. Wax, Oils, Varnishes & Stains. All the finishes protect the beech from moisture, this splitting or staining of the beech. All the finishes allow: The natural grain of the beech to be seen giving it a nature. The quality of the surface finish of the beech to be appreceed. Stainless Steel Polishing Polished to a smooth finish, giving a 'high quality' ferto touch. Mirror finish gives the impression of and exclusive/exproduct. Polished/smooth finish allows for easy cleaning and hygienic. 	quality' is could o ural appe eciated. eel and p expensi d is very	feel and cause arance. bleasant ve				

Question 5	Many products achieve the status of a 'design classic'			
		AO3	A04	Mark
	Explain the meaning of the term 'design classic' and describe the key features of a named design classic.	\checkmark		8
	Guidance to markers			
	Incorrect/ no response			0 Marks
	Response <u>could</u> be based on:			
	The original Mini Fiat 500 Dieter Rams T3 transistor radio Apples first ipod London underground map Road signs			
	A Design Classic is a manufactured product that has:			
	 Timeless aesthetic appeal. Regardless of the year was produced. Remained desirable regardless of the year of its Attained its status over time. Innovation and has lasting impact on society, tog influence on later designs. Instantly recognisable features and will provoke responses. 	ar or time design. gether wit different o	e period it h emotional	
	 Level 1 The candidate has a simplistic knowledge of the with the question. Limited use of terminology and technical language The candidate has limited knowledge of the aest the product and/ or consideration for the user in the candidate will express basic ideas clearly, if fluently. Answers may deviate from the question Grammar, punctuation and spelling may be weal effective communication. 	issues as ge. hetic qua their desi not alwa or not be k impactii	ssociated lities of gn. ys relevant. ng on	1-2 Marks
	 Level 2 The candidate has a basic understanding of the with the question. Satisfactory use of terminology and technical land The candidate has some general knowledge of t qualities and consideration for the user in the deathey are not always considered in detail. The candidate will express straightforward ideas always fluently. Answers may deviate from the q weakly presented. There may be some errors of grammar, punctuation but is still able to communicate the issues 	issues as iguage. he aesthe sign aspe clearly, i uestion o tion and s	esociated etic ects, but f not r be spelling	3-4 Marks

 Level 3 The candidate demonstrates a clear understanding of the issues associated with the question. Good use of terminology and technical language. The candidate has demonstrated real knowledge about the aesthetic qualities, linked to the products discussed. There are descriptive comments about some elements of the needs of the end user. The candidate will express moderately complex ideas clearly and fluently, through well-linked sentences and paragraphs. Answers will be generally relevant and structured. There may be occasional errors of grammar, punctuation and spelling. 	5-6 Marks
 Level 4 The candidate demonstrates a specific ability to analyse questions, considers a wide range of factors and has a clear understanding of the issues associated with the question. Very good use of terminology and technical language. The candidate has demonstrated detailed knowledge about the aesthetic qualities, linked to the product s identified. There are detailed descriptive comments about specific elements of the needs of the end user. The candidate will express complex ideas extremely fluently. Sentences and paragraphs will follow on from each other smoothly and logically. Answers will be consistently relevant and structured. There will be few, if any, errors of grammar, punctuation and spelling. Only Level 1 credit for stating a definition of the term Design Classic 	7-8 Marks

Question 6	"Bethan Gray has a bright future-she has an exquisite appreciation of the materials that she works with and a fine attention to detail"				
	Sir Terence Conran, The Times June 2012.				
		AO3	AO4	Mark	
(a)	With reference to the statement above and the images shown, analyse how the work of Bethan Gray could influence you when designing and making new products.	\checkmark		8	
	Guidance to markers				
	The response must focus the work of Bethan Gary				
	Response should be based on:				
	 A discussion of Bethan Gray's: Use of materials in her furniture/products. Detailing of furniture/products. Finish of products. Attention to the market for her products. Cost of her products for the purchaser. 	ve aspecti	s to the		
	design of wearable/ portable technology. 7/8 mark response will name and identify specific products I	Bethan Gr	av has		
	designed.				
	Incorrect/no response			0 Marks	
	 The candidate has very little knowledge of Bethan Gray's we Candidate does not discuss any of her products. 	ork		1-2 Marks	
	 The candidate has a basic knowledge of Bethan and her work The candidate will make reference to some of Bethan Gray's work, highlighting some key features. The candidate will make few links between the work of Bethan Gray a design task 				
	 The candidate demonstrates an understanding of the work of Bethan Gray. The candidate has discussed some of Bethan Gray's products. The candidate will make relevant reference to Bethan Gray's work, highlighting many key features. The candidate will link the ideas displayed in Bethan Gray's work and a design task. 				
	 The candidate demonstrates a sound understanding of the v Gray. The candidate has discussed some of Bethan Gray's The candidate will make relevant reference to Bethan highlighting relevant key features. The candidate will suitable and relevant comments lin demonstrated in Bethan Gray's work and a design tas 	work of Be products f Gray's wo king the pl k.	ithan luently. ork, rinciples	7-8 Marks	

		AO3	AO4	Mark
(b)	Taking inspiration from Bethan Gray's work design a Bluetooth music speaker.		\checkmark	16
	Your design proposal must:			
	 reflect the work of Bethan Gray be no bigger than 100mm x 100mm x 200mm be freestanding and stable when in use. 			
	In the space below, use the specification points to produce a design proposal for the Bluetooth music speaker.			
	You are required to use a mixture of 2D and 3D freehand drawings.			
(i)	An inspirational design that reflects the form, style and Gray.	ispirational design that reflects the form, style and work of Bethan		
	The response must contain a possible design for a Bluetooth spearker. You are required to use a combination of 2D and 3D freehand drawings. Together with evidence of consideration of user interface, function and style.			
	Incorrect/ no response			0 marks
	 2D or 3D images that have very little detail and no reference to the work of Bethan Gray. Idea developed with both 2D and 3D illustrations, some supporting annotation that is relevant and links the proposal to the work of Bethan Gray. Ideas developed with both 2D and 3D illustrations, supporting annotation is relevant to the design and indicates a clear understanding Bethan Gray's design work. 			1-2 marks
				3-4 marks
				5-6 marks
	Innovative ideas developed with both 2D and 3D illustrations, supporting annotation is relevant to the designs user interface, form, details and materials which demonstrates a detailed understanding, and displays clear links to the work of Bethan Gray.			7-8 marks
(ii)	Annotating your design to show how it meets the last t proposal.	wo points i	n the	
	Guidance to markers No mention of specific specification points.			0 Marks
	1 mark for identification of each point.			
		laximum 4	4 Marks	

(iii)	The quality/presentation and communication of your 2D/3D drawings.	
	There MUST be a mixture of 2D and 3D design sketches generated. Sketches should include annotation. Candidates are not expected to <i>render, colour or shade your design work.</i>	
	Guidance to markers The emphasis is on the quality of communication and presentation of design ideas.	
	Idea developed with 2D illustrations and limited annotation.	1 Mark
	Idea developed with both 2D and 3D illustrations, illustrations provide limited information. Some supporting annotation that is relevant to the design.	2 Marks
	Ideas developed with both 2D and 3D illustrations, illustrations highlight many design details for the design. Supporting annotation is relevant to the design and indicates a detailed understanding of the problem.	3 Marks
	Creative use of both 2D and 3D illustrations, illustrations demonstrate all details fully explain the design. Supporting annotation is relevant to the designs form, details and materials which demonstrates a detailed understanding of the problem.	4 Marks

		AO3	AO4	Mark
(c)	If a prototype of your design was manufactured describe in detail:		\checkmark	8
(i)	One physical test you could perform to accurately damage.	assess im	npact	
	The response must identify an appropriate test that can on the design to establish its ability to resist impact dat	n be carrie mage.	d out	
	Guidance to markers			
	No mention of specific impact test.			0 Marks
	Identifying a test.			1 mark
	Describing the key elements of the tests.			3 marks
	Maximum 4 Marks			
	 Maximum 4 Marks Examples PENDULUM TESTING A pendulum of a known weight is hoisted to a known height on a swinging arm around a pivot point. By calculating the acceleration due to gravity, the tester knows that the weight falling from a set height will contain a certain amount of impact energy at the bottom of the swing. Clamping or supporting a specimen on the bottom, the sample can be released to strike and break/dent the specimen. Samples don't have to shatter to be considered failures. Failure can be defined by deformation, crack initiation, or complete fracture, depending on the requirements DROP WEIGHT IMPACT TEST A weight is dropped in a vertical direction, with a tube or rails to guide it during the "free fall." The height and weight known, impact energy can be calculated allowing for acceleration due to gravity. Falling weight impact has several key advantages over other methods. It is applicable for molded samples, molded parts etc. Samples don't have to shatter to be considered failures. Failure can be defined by deformation, crack initiation, or complete fracture, depending on the requirements 			

(ii)	How you could accurately assess the aesthetic qualities.	
	Guidance to markers	
	No potential tests identified.	0 Marks
	Target market identified as subjects for the test.	1 Mark
	Potential test identified with justified details	3 Marks
	Maximum of 4 marks.	
	The response must identify a range of appropriate method of testing that can be carried out on the design to establish its aesthetic qualities.	
	 Example: Prototype given to a sample from the Target Market. Target market then asked to complete feedback forms to identify the product suitability for the market. The feedback can be in a range of forms; 	
	Open-ended preference explanation : Ask users to explain why they like a design. Gives the responder greater freedom but the responses can be difficult to analyse.	
	Open word choice : Ask users to list 3 to 5 words that describe the design. Limits the answers from the responder and can provide a wide range of responses.	
	Closed word choice : Provide users with a list of terms and ask them to pick the words which best describe the design. Limits the answers that will be received but gives clear defined response to the questions.	
	Numerical ratings : Collect numerical ratings about how much the design exhibits aesthetic qualities. Limits the answers that will be received but gives clear defined data that can be mathematically analysed in response to the questions.	
	Information analysed	
	Accept any other appropriate response.	

		AO3	AO4	Mark
(d)	Describe and justify a research strategy to gather relevant information on the internal workings of the Bluetooth speaker		\checkmark	8
	Guidance to markers			
	Response should be based on a method of finding detail information on the design and manufacture of the internal elements of a blue tooth speaker:			
	Methods suitable:			
	Reverse engineering			
	Deconstruction			
	Patent search's			
	Example			
	Reverse engineering key points.			
	 Legal method of studying the below the line properties (Materials and internal design) of a competitor's blue tooth speaker. Disassemble an existing blue tooth speaker. To discover the potential methods involved in manufacture in order to produce a blue tooth speaker. Identify suitable materials and construction techniques. Identify internal construction details. Save time and money, the new product is not being developed from scratch. 			
	No research strategy identified.			0 Marks
	1 Mark for each point identified. 2 Marks for each point identified and advantage explained.			
	Maximum of 8 marks.			
	Accept any other appropriate response.			

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