



GCE A LEVEL MARKING SCHEME

SUMMER 2023

**A LEVEL
DESIGN AND TECHNOLOGY – PRODUCT DESIGN
A602U10-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2023 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 A LEVEL DESIGN AND TECHNOLOGY

COMPONENT 1: PRODUCT DESIGN

SUMMER 2023 MARK SCHEME

Question 1

Study the image below of a face shield produced by a school in response to the PPE shortage experienced during the Covid19 pandemic.

- (a) Identify **one** specific material that could have been used to produce a part of the face shield and explain why this material is suitable. [3]
- (b) Identify a suitable Computer Aided Manufacturing (CAM) method that could be used to produce a batch of face shields and explain why this method of manufacture is suitable. [5]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
1 (a)	Y					1	2				3

Candidates should demonstrate knowledge and understanding and be awarded up to 3 marks.

One mark for identification of suitable material and two marks for a suitable explanation of why the material is appropriate for use in the face shield. Correct answers could include:

Polypropylene for the headband [1] Good chemical resistance which means the band can be cleaned 'during shift' [1], good fatigue resistance so it will not stretch during use [1], tough so it will not tear or break if subject to sudden impact [1],

Acetate for the clear plastic visor [1] has glass-like clarity making visibility through the visor excellent [1], soft material which can be draped or bent around the headband [1], is suitable for medical applications so is a good choice for use in hospitals and care homes [1]

Acrylic for the clear plastic visor [1] has glass-like clarity making visibility through the visor excellent [1], can be heated and formed into shape [1], is suitable for medical applications so is a good choice for use in hospitals and care homes [1]

PETG for the headband or the visor [1] has particularly good chemical resistance which means it can be cleaned using antibacterial cleansing agents [1], durable material which means it will not wear or stretch during use [1], excellent optical properties giving good clarity which means the user can see through the visor well [1].

Elastic for the strap [1], has the ability to extend to long lengths and then return to original shape this means the strap will extend around user's head and hold the visor in place [1], Good chemical resistance which means the band can be cleaned 'during shift' [1]

Credit any other appropriate response.

Q1	Science	Maths		AO3		AO4						Total
				2a	2b	1a	1b	1c	2a	2b	2a	
1 (b)										1	4	5

Candidates should demonstrate understanding and be awarded up to 5 marks.

Laser cutting [1]

Award *one* mark for each *justified* point up to a maximum of 4.

Laser cutting has low set-up costs allowing schools to start producing visors with very little initial investment [1], staff and students are very well trained in the use of the equipment and could quickly adapt skills to producing batches of visors [1], vector design files could quickly be adapted and developed in response to feedback from the users without incurring any additional cost to production [1], several visors could be cut in one go to speed up production [1], machine operation is very simple with very little opportunity for error, so volunteers could be trained quickly and effectively to help out [1].

OR

3D printing [1]

3D printing has low set-up costs allowing schools to start producing visors with very little initial investment (no new equipment needed) [1], staff and students are very well trained in the use of the equipment and could quickly adapt skills to producing batches of visors [1], .stl design files could quickly be adapted and developed in response to feedback from the users without incurring any additional cost to production [1], several visors could be printed in one go to speed up production [1], machine operation is very simple with very little opportunity for error, so volunteers could be trained quickly and effectively to help out [1].

Credit for identification and justification of one method of CAM only.

Credit any other appropriate response.

Question 2

Product packaging, such as the example shown below, is often made from cellulose-based corrugated board.

(a) Discuss the properties of cellulose-based corrugated board that make it suitable for packaging. [4]

(b) Explain the main stages of processing cellulose-based corrugated board from the primary source to produce a useable stock form. [4]

The dimensions of the surface development for the packaging are shown below. There are three identical surface developments to be die cut from one sheet of board.

Note: Gluing tabs are not included.

(c) Calculate the amount of waste stock produced in one sheet of cellulose-based board and calculate the amount as a percentage. Show all calculations [6]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
2 (a)	Y							4			4

Candidates should demonstrate knowledge and understanding and be awarded up to 4 marks.

- Cellulose is extracted from trees and so the source material is renewable this is important given the volume of packaging pieces being produced [1],
- It is lightweight making it cheaper to transport from the paper processing plant in stock form and when it is part of the final product [1],
- Cellulose board can be fluted so that it is better suited to absorb impact [1],
- The cellulose fibres can be bleached allowing for a white substrate, this is perfect for printing on as colours will be vibrant and true [1],
- They can be cut and shaped quickly using a die cutter, therefore designs can be tessellated onto a sheet to save material [1],
- Cellulose board is durable, its hardwearing nature means the product is protected until it reaches the consumer [1].

Do not accept 'strong' on its own, the candidate must discuss the type of strength within the context of the question.

Credit any other appropriate response.

2 (b)								4			4
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Candidates should demonstrate knowledge and understanding and be awarded up to 4 marks.

The tree is felled, debarked and chipped [1],
 Chemical pulping is used to break down lignin which results in the pulp [1],
 Acetic acid is used to break down lignin bonds in the fibres [1],
 Bleaching agents are used to whiten the fibres [1],
 Internal sizing agents and fillers are added to make the surface smooth and give desired properties [1],
 Stock moves through rollers (calendars) to first remove moisture and then press sheets and provide a smooth surface [1],
 External sizing agents are added to improve the surface ready for printing, layers are laminated and cut to size [1]

Credit any other appropriate response.

Q2	Scienc	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
2 (c)		6						6			6

Candidates should demonstrate understanding and be awarded up to 6 marks based on appropriate mathematical calculations, such as:

Stage 1

Work out the area of one surface development (net)

Base

$$175 \times 145\text{mm} = 25,375\text{mm}^2$$

Sides

$$175 \times 115\text{mm} = 20,125\text{mm}^2$$

Ends

$$145 \times 115\text{mm} = 16,675\text{mm}^2$$

1 mark for correct calculation of surface areas of relevant rectangles

Multiply by number of surfaces and add together:

$$\text{Base} \times 2 \text{ (base and top)} = 50,750$$

$$\text{Sides} \times 2 = 40,250$$

$$\text{Ends} \times 2 = 33,350$$

1 mark for multiplication according to number of sides

Surface area of the surface development:

$$124,350\text{mm}^2$$

1 mark for adding together to get total surface area

Stage 2

Surface area of the sheet

$$1189 \times 841\text{mm} = 999,949\text{mm}^2$$

1 mark

Stage 3

Waste material

$$124,350 \times 3 = 373,050\text{mm}^2$$

$$999,949 - 373,050 = 626,899$$

1 mark

Stage 4

Waste as a percentage

$$999,949 - 626,899 \times 100 = 62.69$$

Percentage of waste material = 62.69% (2 decimal places)

1 mark

Do not penalise for errors carried forward. Continue to award marks if you can clearly see the mathematical method used by the candidate.

Accept any other mathematical method to achieve the final answer.

Question 3

The image below shows a disassembled smart watch.

- (a) The smart watch has been manufactured using a range of permanent and temporary fixings. Explain why temporary fixings are used when assembling the smart watch. [2]
- (b) Explain how disassembling an existing product can help a designer when generating and developing design ideas. [4]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
3 (a)						2					2

Candidates should demonstrate knowledge and be awarded up to 2 marks.

Do not accept a response that would be considered a permanent fixing.

Correct answers could include:

- A temporary joint is one which is intended to hold components together but can be removed easily without causing too much damage to the main product. Temporary fixings also allow for easier product maintenance [1], and allow for easy replacement of parts such as batteries by a specialist [1], or so that parts, such as the strap, can be changed/personalised by the consumer [1].

Credit any other appropriate response.

3 (b)									4		4
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Candidates should demonstrate knowledge and be awarded up to 4 marks.

- Disassembling a product allows the designer to see how components in a similar product have been organised [1], allowing the designer to replicate or improve on the existing layout [1],
- The designer will be able to identify temporary and permanent fixing methods which will provide knowledge to use in own design [1],
- The designer will be able to better identify manufacturing methods providing information on how the product was made [1],
- Disassembling the product will allow the designer to identify strengths and weaknesses in the design [1]. The designer can build on the strengths and solve any weaknesses/faults [1]
- Allows the designer to assess issues of maintainability, so that easier or more efficient maintenance by user/manufacture can be 'designed in' [1],

Credit any other appropriate response.

Question 4

Tools are often used to carry out quality control checks during production.

- (a) Explain how the digital vernier calliper pictured below can be used to check that dimensions are within stated tolerances [3]

'Go' and 'no-go' gauges such as the one shown below are used in manufacturing on larger production runs to test tolerances.

- (b) Explain how this gauge helps speed up quality control checks. [3]

- (c) A student has designed the simple side table shown below.

- (i) A working drawing shows the table must be 350 mm from the ground to the top of the table. The height must be manufactured with a $\pm 2\%$ tolerance.

Calculate the maximum and minimum height the table can be. [2]
Show all calculations

- (ii) A working drawing of the design states that the legs must be made from 25 mm diameter aluminium tube with a tolerance of $\pm 1\text{mm}$. A supplier catalogue contains 25 mm aluminium tube $\pm 2.5\%$.

Calculate whether the tube in the catalogue will be suitable. [2]
Show all calculations

- (iii) Calculate the mass of the oak tabletop. Express your answer in kilograms. [5]
Show all calculations (correct to 2 decimal places, note $\pi = 3.14$)

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
4 (a)						3					3

Candidates should demonstrate knowledge and be awarded up to 3 marks.

The inside jaws are used to measure the inside diameter of a hole, the outside jaws can be used to measure the diameter of circular stock forms or material thickness [1]. There is also a depth gauge which is positioned at the bottom of the rule [1]. First the user needs to '0' the scale, as the jaws move apart the LCD screen displays the distance between the jaws [1]. The position of the jaws can be locked into position if required to make checking consistency of material thickness quicker and easier [1].

Credit any other appropriate response.

Q4	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
4 (b)						3					3
Candidates should demonstrate knowledge and be awarded up to 3 marks. A go/ no-go gauge is designed to test the upper and lower limits of the accepted tolerance [1]. During production components are passed through the gauge [1]. If the product passes through the 'go' section and not through the 'no go' section then it is within accepted tolerances [1]. Having the gauge set for the accepted tolerance means callipers do not need to be adjusted and read each time a QC check is done [1]. This saves time as more checks can be done in a shorter space of time [1]. <i>Credit any other appropriate response.</i>											
4 (c) (i)		2					2				2
Candidates should demonstrate understanding and be awarded up to 2 marks based on appropriate mathematical calculations, such as: Do not penalise for errors carried forward. Calculate maximum variance: $2/100 \times 350 = 7\text{mm}$ 1 mark Calculate maximum and minimum height to be within tolerance: Minimum height: $350 - 7 = 343\text{mm}$ Maximum height: $350 + 7 = 357\text{mm}$ 1 mark Do not penalise for errors carried forward. Continue to award marks if you can clearly see the mathematical method used by the candidate. Accept any other mathematical method to achieve the final answer.											
4 (c) (ii)		2					2				2
Candidates should demonstrate understanding and be awarded up to 2 marks based on appropriate mathematical calculations, such as: Do not penalise for errors carried forward Calculate maximum and minimum diameter tube sizes: $2.5/100 \times 25 = 0.625$ 1 mark Tube would be in tolerance because $\text{max } 0.625 < 1$ 1 mark Do not penalise for errors carried forward. Continue to award marks if you can clearly see the mathematical method used by the candidate. Accept any other mathematical method to achieve the final answer.											

Q4	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
4 (c) (iii)		5						5			5

Candidates should demonstrate understanding and be awarded up to 5 marks based on appropriate mathematical calculations, such as:

Do not penalise for errors carried forward.

Stage 1

Calculate volume of the cylinder:

$$V = \pi r^2 h$$

$$3.14 \times 30,625 \times 15 = 1,442,437.5 \text{ mm}^3$$

1 mark

Stage 2

Convert answer from stage 1 to m³

There are 1,000,000,000 mm³ in 1m³ therefore

1 mark

$$1,442,437.5 \text{ mm}^3 = 0.0014424375 \text{ m}^3$$

1 mark

Stage 3

Convert given formula and apply formulae

$$0.0014424375 \times 720 = 1.03855$$

1 mark

Stage 4

Present as kg

$$1.04 \text{ kg}$$

1 mark

Do not penalise for errors carried forward. Continue to award marks if you can clearly see the mathematical method used by the candidate.

Accept any other mathematical method to achieve the final answer.

Question 5

The 'bird kettle' shown below is considered by many to be an iconic design.

- (a) Explain what makes a product 'iconic'. You may refer to the kettle below or other iconic designs in your answer. [5]
- (b) The picture below is of a contemporary digital radio. Explain how historic influences have affected the aesthetic detailing of this product. [5]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
5 (a)									5		5

Candidates should demonstrate knowledge and be awarded up to 5 marks.

When a value or meaning of design is understood, shared and mutually agreed by a group of people, it becomes iconic [1], The bird on the spout is a whimsical feature that whistles when it boils and is a nod back to the days of the old stove kettles [1], The kettle aims to enlighten a mundane task by injecting fun and amusement into it, an approach quickly adopted by its competitors [1] Simple clean lines reminiscent of the modernist movement, with colours associated with post modernism were quickly embraced and have influenced kettle design since [1], The cone shape of the body of the kettle is sleek, yet warm and friendly (this shape also enables the water inside it to boil more quickly) [1].

Credit any other appropriate response.

5 (b)									5		5
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Candidates should demonstrate knowledge and be awarded up to 5 marks.

Designers often look for historical influence and cues when designing new products [1], This proves popular with consumers as new products can bring about nostalgic memory and encourage familiarity [1], timing of historic influence is often seen as the key; the age range of potential customers can indicate which era will encourage the comforting feeling of nostalgia [1], Material pallet takes it's cues from 1930's design with leather wrap and brass fittings [1], Lacquered wood panelling combined with cream coloured volume and 'tune' controls [1], large brass speaker grill has clearly been influenced by early 'wireless' designs [1].

Credit any other appropriate response.

Question 6

Companies such as Dyson use collaboration as a design strategy to generate and develop design ideas.

Explain why collaboration is a useful strategy when designing products such as the hairdryer pictured below. [5]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
6							5				5

Candidates should demonstrate knowledge and be awarded up to 5 marks.

Collaboration allows designers to get immediate feedback on their work from other design or engineering professionals [1], Designers with a different skill set often approach a problem from a different angle, providing invaluable insight [1], Diversity of skill set, experience and point of view can lead to innovative solutions [1], Collaborative working feeds into an iterative design process as ideas generated by the group can be scrutinised by the group once developed [1], different members of the group can take on different roles and champion different viewpoints meaning nothing is forgotten [1].

Credit any other appropriate response.

Question 7

Large commercial brands spend a lot of time and use many techniques when conducting research before developing specifications and design ideas.

- (a) Analyse the effectiveness of research data when gathered from a focus group. [4]
- (b) Evaluate ways in which quantitative data can be used to judge the success of a design. [4]
- (c) Explain the importance of a specification when developing design ideas. [4]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
7 (a)				4							4

Candidates should show evidence of logical reasoning or deconstructing information and applying this to be awarded up to 4 marks.

Focus groups are used to gather detailed information from a group of people who are representative of the target market [1]. They allow for more detailed information to be gathered than surveys as there is an opportunity to quiz the target market on their comments [1]. While the information can be detailed and useful, it is possible for strong personalities to 'sway' the opinion in the group leading to skewed data [1]. A researcher acts as a facilitator to ensure every member of the group has the opportunity to share their opinion [1]. They can provide valuable insight into consumer's reaction to a new design concept or proposal so that the most promising ideas can be further developed [1]. When used later in the design process, a focus group can be used to validate decisions which may have been made during design development [1].

Credit any other appropriate response.

7 (b)					4						4
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Candidates should show clear evidence of appraisal and/or making judgements and applying this to technical principles to be awarded up to 4 marks.

Quantitative data is the expression of a certain quantity, range, measurement or capacity. It is measurable and not subjective [1]. When research which yields measurable results is gathered during the design process, the resulting analysis can identify an optimum quantity/value for the newly designed product [1]. As the measure is objective and not subject to opinion then the data can be used to track the progress of a design against measures to help judge its success [1]. If the product/component is within tolerable range then it is accepted, if not then it must be adapted to fit [1].

Credit any other appropriate response.

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
7 (c)						4					4
Candidates should show clear evidence of <u>appraisal</u> and/or <u>making judgements</u> and <u>applying</u> this to technical principles to be awarded up to 4 marks. The specification is the design checklist [1] which has been generated as a result of both primary and secondary research [1]. It provides a checklist of features that can be used to judge the success or otherwise of a product during and at the end of the design process [1]. It consists of qualitative and quantitative points which must be addressed by the design solution [1]. It is used by the designer, client and all stakeholders as a common checklist that also helps manage project scope [1]. As well as product function, the specification also considers the specific user needs and wants [1]. <i>Credit any other appropriate response.</i>											

Question 8

Two acoustic guitars are shown below. One is a one-off handmade piece and the other is mass produced.

Explain, in relation to time, quality and cost the differences you would expect to find between the two guitars. [9]

	Science	Maths		AO3		AO4					Total
				2a	2b	2a	2b	2c			
8				6				3			9

Candidates should provide evidence of logical reasoning or deconstructing information and applying this to be awarded up to 9 marks. The focus should be on analysis of the factors, though candidates are expected to apply knowledge and understanding of designing and making principles in the deconstruction of information and discussion.

All three areas must be considered for the candidate to attain full marks. Indicative content below though points may be considered in different 'groups'.

Time

- Time dedicated to design and manufacture is considerably longer with the handmade guitar. There will be a linear process where one specialist works on the product from start to finish. With the mass produced guitar, it is likely that several workers will be involved in the process each with responsibility for a part of the product. Considerably less time will be spent on each component,
- Less automation will be evident in the manufacture meaning greater use of hand processing techniques which will lead to longer production times.
- Time to market will be quicker with the mass produced guitar. Customers will have to wait much longer lead times for handmade versions.
- Making updated versions is likely to be quicker with handmade products as simple changes to templates, formers etc can be made easily whereas changes to automated processes for mass production will take much longer and likely to include changes to QC standards which staff will need to be trained on.

Cost

- Hand crafted guitar required lower set-up costs. Lower cost hand tools are likely to be used rather than automated manufacturing techniques,
- Much higher cost for one-off production as the production is more labour intensive.
- Mass production allows for economy of scale in purchase of materials and finishes, but requires greater demand from the market to make production viable.

Quality

- It is possible that the handmade guitar could be customised to allow for changes in preference relating to aesthetic detailing, finishes, or ergonomic features.
- Hand crafted design will be subject to continuous quality checking and 'ownership' of the design by the manufacturer. There is a greater sense of pride in the final outcome and so the quality will be higher.
- The one-off product will most likely be produced by a highly skilled crafts person who has extensive knowledge of how it will finally be played. Often crafts people working on instruments talk about the 'soul' of the product. They can make small changes and adjustments to fine tune the product to get the optimum result. This is not possible with mass produced products,
- The mass produced guitar will generally be produced to a lower standard.

Credit any other appropriate response.

Band	Marks	AO3 2a	Marks	AO4 2c
3	5-6	Excellent analysis of time, cost and quality in relation to the products. A thorough discussion, which deconstructs information and demonstrates logical connections and reasoning throughout. Well-considered discussion relating back to production scales.	3	Applies a thorough knowledge and understanding of production methods, with well-considered, broad ranging relevant factors identified.
		There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.		
2	3-4	Good analysis of time, cost and quality in relation to the products. A generally sound discussion, which deconstructs information and provides adequate connections and reasoning. Generally well-considered discussion relating back to production scales.	2	Applies a generally sound knowledge and understanding of production methods, with generally well-considered factors identified.
		There is a line of reasoning which is generally coherent, mainly relevant and with some evidence and structure.		
1	1-2	Limited analysis of time, cost and quality in relation to the products. Little evidence of deconstructing information and limited connections are made. Few factors are identified.	1	Applies a basic knowledge and understanding of production methods.
		There is limited evidence of relevant examples or structure.		
	0	No response or work that is worthy of a mark.		

Question 9

Explain how closed loop systems use feedback to enhance the functionality of smart products like the ones shown below.

[9]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2b	2c	
9							5		4		9

Candidates should demonstrate knowledge and understanding of technical principles and designing and making principles and apply this to be awarded up to 12 marks.

Indicative content:

An open-loop system, also called a non-feedback system, is a type of system which does not measure conditions or feed data back into the system. Once activated they will continue until stopped by an external factor.

A closed loop system is, by contrast, a system that can regulate itself automatically to achieve and maintain a predefined condition. It relies on data received from input sensors in order to 'feedback' information to a processor which will decide, based on the parameters programmed by the user, what output action to take. In general, closed loop systems are more expensive to set up and maintain than open loop systems as they are more complex and are made up of more components.

Devices such as the smart plug and other smart devices can be part of a much larger smart system where a number of different input and outputs are possible.

Candidates may make reference to the following features in their answer:

Energy monitoring – some smart plugs can monitor how much energy your appliance is using and send alerts to your smartphone when energy levels exceed a pre-programmed level.

Surge protection – automatically cut power to protect the appliance if a power surge is detected.

Dimming – through the use of a smartphone as an input device, a smart plug can be used to dim lights.

Some smart plugs monitor light levels and turn the power on when light level drops below a predetermined level. This is useful when used with lamps.

Smart watches monitor user's vitals such as heart rate, oxygen levels etc and can be set to alert the user if parameters are exceeded.

Some smart bulbs monitor ambient light levels and can turn themselves on and adjust light levels.

The candidate may also make reference to other close loop systems.

Candidates may make reference to additional close loop systems such as:

Home thermostat

When the room temperature drops below the predetermined level, the control mechanism closes the circuit starting the boiler and raising the temperature. The boiler-activating circuit is then turned off as the temperature reaches the correct level. By using this type of system, a temperature can be maintained avoiding overheating a home (e.g. turning the heating on and just letting the boiler run even though the desired temperature has been reached).

Credit any other appropriate response.

Band	Marks	AO4 1b and 1c	Marks	AO4 2b and 2c
3	4-5	Demonstrates and applies a thorough knowledge and understanding of technical principles in the systems theme. Well-considered, relevant wider issues identified.	3-4	Demonstrates and applies a thorough knowledge and understanding of designing and making principles considering open and closed loops, drawing upon well-considered, relevant examples.
		There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.		
2	2-3	Demonstrates and applies a generally sound knowledge and understanding of technical principles to the systems theme. Generally well-considered, relevant issues identified.	2	Demonstrates and applies a generally sound knowledge and understanding of designing and making principles considering open and closed loops. Generally well-considered examples are provided.
		There is a line of reasoning which is generally coherent, mainly relevant and with some evidence and structure.		
1	1	Demonstrates and applies a basic knowledge and understanding of technical principles to the systems theme. Few issues are identified.	1	Demonstrates and applies a basic knowledge and understanding of designing and making principles considering open and closed loops. Few examples are provided.
		There is limited evidence of relevant examples or structure.		
	0	No response or work that is worthy of a mark.		

Question 10

Global companies such as *Ikea*, *Coca-Cola* and *Apple* design for a global market but often tailor their designs and brand imagery to suit local markets. Evaluate the impact cultural trends can have on products designed for a global market. [12]

	Science	Maths		AO3		AO4					Total
				2a	2b	1a	1b	1c	2a	2b	
10					6			6			12

Candidates should provide evidence of either their appraisal and/or making judgements and applying this to be awarded up to 12 marks.

Candidates may make reference to the brands given in the question but allow for additional examples and credit all correct answers.

Indicative content

- Use of colour e.g. black in western culture can symbolise death, mourning or funerals where in eastern cultures it can symbolise prosperity, wealth and health. Red in western cultures can mean warning or love and in some eastern cultures means good luck.
- Useability, western cultures read left to right and top to bottom when reading text, however this varies in countries and regions around the world. Global companies often have to tailor written communication not only by language but by layout as well to ensure good consumer understanding.
- Use of symbols. This is seen in product advertising campaigns. Or example, a dozen roses can mean romance in some countries but a funeral in others (in Russia an even number of flowers are only used in funerals). In Bulgaria nodding your head up and down means 'no', turning left to right means 'yes', opposite to the UK
- Adaptations to brand names (Lays vs Walkers, Vauxhall vs Opel, Dove chocolate Vs Galaxy). This could be for a number of reasons including alternative meanings when translated into local dialect, 'local' brand may have a similar name and therefore global companies may need to change names for the local area to avoid consumer confusion.
- Advertising straplines often need to be adapted for local markets as features which make a product successful in one area, may not be the same for others. Having local knowledge of customs and traditions will mean a brand's message is not lost in translation.
- Size and proportion of vehicles – vehicles that are more commercially successful in the US market tend to be physically larger. Vehicles designed for the European market tend to be smaller, more compact.
- Fuel consumption of vehicles is seen as a greater reason to buy in some regions, this is driven by attitudes to environmental challenges but also relative fuel costs. Where fuel is expensive like in the UK there is greater emphasis on purchasing fuel efficient vehicles. In countries where fuel is cheaper, fuel efficiency is less of a driving factor.
- Accessibility, some countries & regions place greater emphasis on and regulate for greater accessibility for all customers and this can include specific disabilities.
- Companies such as IKEA who have made great success in higher GDP countries by positioning themselves as low-price and mass market have to adapt their offer in countries where low price is already the norm. In these countries/regions they target affluent customers by offering comprehensive room solutions under one roof.
- Apple often adapt their products to allow for different power supply specifications.

Credit any other appropriate response.

Band	Marks	AO3 2b	Marks	AO4 1c
3	5-6	Excellent evaluation of cultural effect on design. A thorough discussion, which appraises and/or makes judgements about the effectiveness of local considerations. Well-considered, relevant wider issues used as a context for the discussion.	5-6	Applies a thorough knowledge and understanding of technical principles related to global design. Well-considered, relevant wider issues identified.
		There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.		
2	3-4	Good evaluation of cultural effect on design. A generally sound discussion, which appraises and/or makes judgements about local considerations. Generally well-considered, relevant issues used as a context for the discussion.	3-4	Applies a generally sound knowledge and understanding of technical principles related to global design. Generally well-considered, relevant issues identified.
		There is a line of reasoning which is generally coherent, mainly relevant and with some evidence and structure.		
1	1-2	Limited evaluation of cultural effect on design. Little evidence of appraising or making judgements about local considerations. Few issues are identified.	1-2	Applies a basic knowledge and understanding of technical principles related to global design
		There is limited evidence of relevant examples or structure.		
	0	No response or work that is worthy of a mark.		