GCSE MARKING SCHEME

SUMMER 2024

GCSE
DESIGN AND TECHNOLOGY – PRODUCT DESIGN
3603U10-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

GCSE DESIGN AND TECHNOLOGY – PRODUCT DESIGN

SUMMER 2024 MARK SCHEME

Question 1

		AO3	AO4	Mark
(a) (i)	Explain how the 'compostable' cutlery can be considered 'greener'.		✓	2
	Answers relating to the compostable cutlery being greener should be awarded up to 2 marks. Guidance: Candidates must be able to explain the environmental benefits of the cutlery being compostable. This negates the usual disposal of plastic take away cutlery, compostable means a much more-friendly product, that can break down into non-toxic components. Reduce landfill Compostable does not mean biodegradable. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* They are more environmentally friendly than plastic cutlery *More detailed response* Compostable cutlery are much more environmentally friendly and will break down into non-toxic components.			0 1 2
(ii)	The food containers are made from cardboard which has a waxed coating applied to the inside. Describe the reason for the waxed coating.		✓	3
	Answers relating to the reason for wax coating should be awarded up to 3 marks. Guidance: Candidates need to provide reasons for the wax lining / coating – this is to waterproof the cardboard, to let it resist moisture from food products / possible sauces / vinegar etc, it prevents the takeaway container from becoming soggy or perforating, the food could spill out. The wax allows foods / meats to be stored appropriately, transported rigidly, and even frozen inside the containers. The wax coating offers some thermal properties. Insulating the food and keeping it warmer for longer and making the container easier to handle, The wax coating also has some non-stick properties stopping the food stick to the box. DO NOT credit statements that refer to recyclability – the wax lining prevents recycling. Wax lined cardboard boxes are still biodegradable however. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* The wax makes the cardboard suitable for food *More detailed response* The wax makes the cardboard more rigid and resistant to liquids / moisture. *A fully detailed response* The wax coating increases rigidity and prevents contents from weakening or softening the container, allowing food to be transported, stored or carried safely.			0 1 2 3

(b) (i)	The food containers have been mass produced using die-cutting. Explain in detail how the die-cutting process is suitable for producing the food container.		✓	4
	Answers relating to explaining how die cutting is suitable for the food container should be awarded up to 4 marks. Guidance: Candidates need to identify that die cutting allows the outline to be cut from sheet cardboard repetitively, and identically for mass production. The outer profile of the die features sharp edges to cut. The die cutting process also uses rounded blades to crease the internal features of the food container for folding. Shapes can be tessellated / arranged to reduce waste. Cuts and scores complex shapes easily. Reduces waste of card therefore costs of materials. Product can be stored easily afterwards as it stays flat. Quick process for mass production. DO NOT credit repetitive statements. Responses for 4 marks must include both cutting / outline and folding / creasing information. *No answer or no relevant information presented or discussed.* 0 *Simplistic or basic response* Allows lots of containers to be made Or Cuts the same shape repeatedly 1 *More detailed response* Allows the same shape to be cut quickly and efficiently Or The food container is quickly cut out of the sheet material in a quick and accurate process. 2 *Detailed explanation or response covering cut lines and fold lines* Die cutting allows the shape to be cut from sheet material and also how the container folds together. 3 *Highly detailed response with explanation of both cut lines and fold lines* Die cutting is a quick, efficient and suitable industrial process for making large numbers of containers. The die is designed to cut out the outline and the slot, and also crease the fold lines so the box can be easily constructed, repeatedly and identically so all boxes are the same. 4			
(ii)	Describe the reason for the packaging feature shown below labelled A.		✓	2
	Answers relating to feature A should be awarded up to 2 marks. Guidance: The responses gaining credit must describe the reason for feature A, naming it as a locking tab is a low-level response. This locking tab labelled feature A will fit into a corresponding slot when the packaging is assembled and the notch helps 'lock' it closed. *No answer or no relevant information presented or discussed.* 0 *Simplistic or basic response* Feature A helps the box to stay closed 1 Or Feature A is a locking tab 1 *More detailed response* This is a locking tab, which helps keep the box closed when the shape fits into the slot on another part of the food container, 2 Or This locking tab closes the package keeping the contents insulated / protected inside. 2			

(c)	Explain how the stainless steel drinking straw provides a 'greener' solution to a world-wide problem.		✓	4
	Answers relating to how the stainless steel straw provides a solution to world wide problems should be awarded up to 4 marks. Guidance: Candidates should identify that throw away plastic straws create huge problems, in waste generation and also ocean eco systems. The stainless steel straw is retractable and fully reusable, built to be reused and long-lasting, portable and prevents a one-use plastic straw being issues by a vendor. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* The stainless steel straw replaces plastic disposable ones. *More detailed response* The stainless steel straw replaces plastic disposable ones, which are thrown away in large numbers creating issues in oceans. *A detailed response* The stainless steel straw replaces plastic disposable ones, which are thrown away in large numbers creating issues in oceans. The stainless steel straw is reusable, and portable, and the user is providing their own straw, cutting down on the need for new straws and waste. *A broad and fully detailed response* The stainless steel straw replaces plastic disposable ones, which are thrown away in large numbers creating damage to ocean wildlife and eco systems and increasing landfill. The stainless steel straw is reusable, and portable and hygienic in its own carry case, and the user is providing their own straw, cutting down on the need for new straws and waste.			0 1 2 3 4
			Total	**15**

Question 2

		AO3	AO4	Mark
(a)	Chair A has been designed for teenage cyclists. Explain how Chair A will appeal to this target market.		✓	2

Answers relating to a typical target market should be awarded up to 2 marks.

Guidance:
The design of Chair A must be considered, and how features fit the target market of teenagers. Responses may include:

- Bright vibrant colour scheme suitable for study, bedroom, or games room.
- The seating position looks quite reclined, suitable for teenagers, reading, relaxing, gaming, online, ergonomics not so appropriate for older users.
- The cycling theme / use of used wheels – many teenagers like cycling, bmx riding, mountain biking, cycling sports so this fits well with their hobbies and interests.
- The low footprint of chair A reusing wheels, reducing waste could be considered cool or desirable and appeal to teenage users.
- Consumers including teens are now more environmentally aware and are picking products that have environmental considerations.

No answer or no relevant information presented or discussed.	0
Simplistic or basic response Chair A will appeal to teenagers because of the used cycle wheels in the structure	1
Or Chair A will appeal to teenagers because of the bright colours	1
More detailed response Chair A is intended to suit sporty teenagers who like reading or relaxing in a comfortable reclined position. The chair is bright, sporty and would fit well in a bedroom, study or games / sports room.	2

		AO3	AO4	Mark
(b)	Describe how Chair B provides an economical benefit to the manufacturer.		✓	3

Answers relating to economic benefit to the manufacturer should be awarded up to 3 marks.

No answer or no relevant information presented or discussed.	0
Simplistic or basic response The chair is made using used materials which saves buying new material.	1
Or The used tyres and seat belts will not be costly to source and retails at £229	1
More detailed response The tyres and seatbelts used are the main materials and will be cheap to source and very little costs to reprocess,	2
Or Selling at £229 should provide a high profit margin as there are low materials sourcing costs	2
A detailed response The tyres and seatbelts are easy to source and are available in large quantities, they are also used as the main materials and will be cheap to source and very little costs to reprocess, Selling at £229 should provide a high profit margin.	3
Or There will always be a evolving target market who will be prepared to purchase this type of Chair – games room, study, bar etc. This will provide a constant need and the supply will secure a consistent profit.	3

(c)	Describe how the Life Cycle Analysis strategy has been used to design and develop Chair A and B.		✓	5
	Answers relating to how the LCA strategy has been used to produce the chairs should be awarded up to 5 marks. Guidance: • Life cycle analysis using 'cradle to cradle' principles • Tyres / seat belts at end of their useful life being re-used • Saving sourcing / processing new materials • Improving disposal of waste products • No recycling required / no reprocessing needed. • Avoiding 'cradle to grave' concept • More sustainable product development • Lower environmental footprint • Creative / innovative solution *No answer or no relevant information presented or discussed* Brief description, very little illustration of LCA, simplistic or basic response The chairs have been made from used / waste bicycle parts, wheels and tyres which saves finding new materials. More detailed description showing more understanding of LCA **AND** how this has been used to produce the chair As a result of LCA, when bicycles, or parts like wheels, tyres, and seatbelts come to the end of their useful life, they can be reused / recycled and used in another product. In this case, they are bonded together to create the chair frame / structure. This reduces waste and makes good use of previously used materials. A clear and detailed description of LCA **AND** how this has been used to create the chairs. As a result of LCA, when bicycles, or parts like tyres and wheels, come to the end of their useful life on the bicycle, they can be reused / recycled and used in another product. In this case, there is very little reprocessing of the reclaimed wheels, they are bonded together to create the chair frame / structure. This reduces waste and makes good use of previously used materials, producing a very small environmental footprint for the chairs, using a 'cradle to cradle' approach.			1-2 3-4 5
		Total		**10**

Question 3

		AO3	AO4	Mark
(a) (i)	Give **two** reasons why mild steel is a suitable material for the body of the clothes dryer.		✓	2x [2]
	Answers that describe two reasons for the suitability of mild steel can be awarded up to 2 x 2 marks Guidance: The main benefits of using mild steel include structural strength, rigidity, ability to support the loaded weight of the bars, ability to be coated to reduce corrosion. Mild steel is ideal for the body of the clothes dryer as it can be deformed to the shapes required. Responses relating to colour and finish may also be acceptable. DO NOT credit repetitive responses. *No answer or no relevant information presented or discussed.* 0 *Simplistic or basic response* Mild steel is a strong and durable material 1 Or Mild steel is a rigid material to support the weight. 1 Or Mild steel can be easily shaped for the clothes dryer parts 1 Or Mild steel can be pressed and retain the shape 1 *More detailed response* Mild steel is a strong and durable material that is easily deformed to the shape required which will withstand the forces of a fully loaded dryer without compromise. 2 Or Mild steel provides a rigid structure when deformed that will be corrosion resistant when finished with the coating as shown, providing a reliable and long-lasting product. 2			
(ii)	Explain why a magnet is fitted to the back of the clothes dryer		✓	2
	Answers relating to the magnet holding the sides closed neatly when not in use, preventing them opening or causing potential hazard. *No answer or no relevant information presented or discussed.* 0 *Simplistic or basic response* The magnet holds the sides in 1 Or The magnet stops the sides from opening out 1 *More detailed explanation or response* The magnet is there to hold the sides in the closed position so it saves space when not in use 2 Or The magnet holds the dryer closed because it is made from mild steel and prevents the sides opening causing an obstruction 2			

(a) (iii)	The mild steel body parts have a paint finish applied. Describe two advantages this gives the clothes dryer.		✓	2 x [2]
	Answers relating to two advantages of the paint finish should be awarded up to 2 x [2] marks. Answers must describe two different advantages of the paint finish for the clothes dryer. DO NOT credit repetitive responses. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* Improves the look of the dryer Or Stops the dryer rusting Or Allows different colours to be applied Or Provides a better aesthetic finish *More detailed explanation or response* The paint provides a smooth high quality and consistent finish to the dryer parts making it look very high quality, to fit in with most home environments. Or The paint finish provides protection so that the mild steel dryer parts cannot rust when they are constantly in contact with water and oxygen. Or The paint finish can allow the dryer to blend in less conspicuously in the environment it is intended for. (Or stand out more)			0 1 1 1 1 2 2 2

(b) (i)	Explain why the 'U' shape feature is necessary, and what would happen if this was not present		✓	4
	Answers relating to the reason for the U shape feature, and what would happen if this was not present should be awarded up to 4 marks. DO NOT credit repetitive responses Guidance: The U-shaped feature in needed to allow the sides to rotate the 90 degrees when opening and closing, despite the aluminium bars. The U shape allows the bars some 'movement' otherwise the aluminium bars would 'jam' as the sides open and close. The U shape caters for the diameter of the rods and the amount of movement required, and also stops the bars from going too far backwards or forwards, locking them into place. *No answer or no relevant information presented or discussed.* 0 *Simplistic or basic response* To keep the bars in the right place 1 Or Stop the bars falling out 1 More detailed response about the U-shaped feature OR what would happen To allow the steel wings to pass over the aluminium bars when opening or closing. 2 A detailed explanation about the U-shaped feature and what would happen This U-shaped feature allows the bars to be retained and the steel wings to fold inwards or outwards with the rigid aluminium bars in place, without the aluminium bars becoming 'stuck'. 3 A highly detailed response which fully explains the need for U feature and what would happen if it was not present. This U-shaped feature allows the bars to be fixed in the correct position and the steel wings to fold inwards or outwards with the rigid aluminium bars in place, without the aluminium bars becoming 'stuck'. Without the U-shaped feature, the aluminium bars would become jammed and the dryer would not be able to close. 4			

(b) (ii)	Explain **two** benefits of using a bending jig during the manufacturing process.		✓	2 x [2]
	Answers explaining two different benefits of using a bending jig should be awarded up to 2 x [2] marks. Guidance: DO NOT credit repetitive responses. The bending jig will increase efficiency and accuracy / reduce errors or mistakes, the wings will all be identical (left and right), non-skilled workers may be used (reducing costs), scale of production can be increased, replacement parts can be readily available, large numbers can be produced quickly, quality control / quality assurance is easier to secure, less waste as defects are minimised. No answer or no relevant information presented or discussed. *Simplistic or basic response* A bending jig will control the shape better Or Using a jig will make the process easier or quicker (than by hand) *More detailed explanation or response* The bending jigs will increase the speed at which the parts can be made and ensure that they are the correct shape every time. Or Using the bending jig will ensure repeatability and provide increased quality control / assurance as there will be no decisions made by workers / operators.			0 1 1 2 2
(c) (i)	Explain how the grooved finish has improved the performance of the aluminium bars		✓	3
	Answers explaining the impact of the grooved finish to the aluminium bars should be awarded up to 3 marks. No answer or no relevant information presented or discussed. Simplistic or basic response To avoid the bar rotating Or To grip the clothes More detailed explanation or response The groves provide a more tactile surface for the clothes to stay draped over. Or The bar will be less likely to rotate and clothes slip off due to the grooves providing traction. A fully detailed explanation or response The groves provide a more tactile surface for the clothes to stay draped over the bar, and the bar will be less likely to rotate and clothes slip off due to the grooves providing friction. Or The groves provide a more tactile surface for the clothes to stay draped over the bar. The grooves reduce the surface area of the bars making the product close easier reducing friction and resistance on the moving parts.			0 1 1 2 2 3

(c) (ii)	Each aluminium bar has been tested and guaranteed to hold up to 3kgs of clothing. Describe how this could influence sales.		✓	2
	Answers explaining the influence of the tested and guaranteed ability of the bars to hold 3kgs of clothing should be awarded up to 2 marks. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* This could appeal to users because it is reliable Or This could give purchasers more confidence *More detailed explanation or response* The purchaser would be reassured that the dryer could hold a washing machine load of wet laundry Or The approval provides peace of mind for the buyer that the dryer will perform as expected. Or Providing piece of mind to the consumer, Influencing more people to buy the product and increasing sales and profits.			0 1 1 2 2 2
(d) (i)	Describe why a locking nut has been used.		✓	2
	Answers describing the selection of the stainless steel M5 locking nut should be awarded up to 2 marks. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* To hold the back, side and wing together using the bolt Or To allow the dryer to be hinged to open and close *More detailed explanation or response* To provide a reliable hinge for the dryer to be opened and closed without the nut loosening or becoming undone. Or The locking nut retains its tightness and will not loosen as the dryer is opened and closed repeatedly.			0 1 1 2 2
		Total		**25**

Question 4

		AO3	AO4	Mark
(a) (i)	Describe **one** way that the bottles can be considered ergonomic.		✓	2
	Answers relating to describing one way that the bottle can be considered ergonomic should be awarded up to 2 marks. Guidance: Ergonomic refers to how successfully the user can interact with the bottle, i.e. hold, refill, carry, operate, use. Answers may relate to lifting the sports cap, unscrewing the fruit chamber, refilling with water, carrying a full bottle etc. *No answer or no relevant information presented or discussed.*			0
	Simplistic or basic response The shape is easy to hold			1
	Or Bottle fits in the user's hand			1
	More detailed response The 'groove' provides good grip and prevents the bottle slipping out of the users hand when carrying or drinking.			2
	Or The flip up end cap looks easy and simple to 'pop' up to access the water whilst providing a secure way preventing spillage / contamination			2
(ii)	Explain how providing a variety of colours benefits the manufacturer		✓	2
	Answers relating to the benefits to the manufacturer of providing a variety of colours and mix and match options can be awarded up to 2 marks. *No answer or no relevant information presented or discussed.*			0
	Simplistic or basic response Users will buy more bottles			1
	Or Manufacturer can appeal to different tastes / styles / colour schemes.			1
	More detailed response The manufacturer is likely to sell more bottles because users can choose from a greater range of colours to find one which suits them.			2
	Or The manufacturer will have a more popular product / greater market share because the product is flexible and can be altered to suit the purchaser.			2

(a) (iii)	The website where bottles can be purchased includes the 'Officially Certified' logo. Explain how this may influence potential consumers.		✓	3
	Answers relating to the confidence offered to customers by the 'officially certified' logo should be awarded up to 3 marks. *No answer or no relevant information presented or discussed.* *One simplistic or basic response* The logo means the bottles have been tested Or The bottles are safe to use *More detailed explanation or response* The bottles have been tested and are fit for purpose *A fully detailed explanation* The customer can be confident that the bottles are safe and fit for purpose because they have been repeatedly tested and deemed fit for intended use and therefore approved by a recognised body. Credit responses that refer to building the consumer's 'trust' in the product when they see the logo displayed.			0 1 1 2 3
(iv)	Explain the reasons for the website encouraging purchasers to review the product through Trustpilot.		✓	3
	Answers relating to reasons for the website encouraging purchasers to review the product through Trustpilot should awarded up to 2 marks. DO NOT credit repeat responses. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* So other potential customers can see what the product is like Or To build up a good reputation for the product *More detailed explanation or response* So other potential customers will purchase the product as a result of other purchasers opinions. Or To build up a good reputation for the product which will increase sales and profit margins. *A fully detailed explanation or response* The reviews will build up a reputation for the product, and other customers will scrutinise these before making purchasing decisions. Having positive reviews for the product will increase sales and profit margins for the company.			0 1 1 2 2 3

(b) (i)	Analyse why the design team would produce a range of different sports caps during the development stages.	✓		5
	Answers analysing why the design teams would produce a range of sports caps during the development stages should be awarded up to 5 marks. Guidance: • During development, the ideas would need to be tested • There would be several 'possible' solutions and these would require prototyping • The target market / users would be given the physical prototypes as user trials, and feedback used to refine ideas • Physical outcomes would be produced to realise ideas • Function tests would be carried out to see how the different caps worked • Results of testing would be analysed and lead to modifications and further improvement. • Aspects that fail would be removed / altered to improve the design. • The iterative cycle requires testing of ideas in order for solution to be fully evolved / developed. *No answer or no relevant information presented or discussed* *Brief description, very little analysis, simplistic or basic response* The design team would want to test a physical outcome so would make a prototype to carry out testing. *More detailed analysis showing more understanding of reasons why a range of sports caps would be produced during development.* The design team would produce prototypes of ideas that they thought had potential. These would be tested, used in user trials, and the results analysed to improve any defects. *A clear and detailed analysis of the reasons the design team would produce a range of different sports caps during the development stages.* The design team would produce physical prototypes of ideas that they thought had potential. These would then be fully tested, used in user trials, and the results analysed to improve any defects. This would allow a chosen sports cap to be finalised and remove any defects prior to production.			0 1 2-3 4-5

(b) (ii)	Evaluate the benefits of additive manufacturing processes.	✓		5

Answers evaluating the impact additive manufacturing processes can have when rapid prototyping should be awarded up to 5 marks.

Guidance:

- Additive processes, like 3D printing, generate very little waste.
- Lead in time is very short / reduced.
- CAD files are converted quickly into CAM data / physical outcomes.
- Very difficult shapes, like the sports cap, can be created quickly
- Various sports caps can be produced in one-go / in one process for testing or realising the designs
- Additive machines are very versatile and can make different shapes and forms
- Colours can be changed easily and inexpensively
- Additive machines can be left unattended / overnight for longer processes
- Following expensive purchase, prototypes are produced relatively cheaply, which allows mistakes to be less costly than in full manufacture
- Ideas can be tested with the target market quickly, with regular reviews, modifications and iterations

No answer or no relevant information presented or discussed	0
Brief description, very little evaluation, simplistic or basic response The additive process allows an idea to be physically produced quickly for testing, and modifications can be made quickly and easily / cheaply.	1
More detailed evaluation showing more understanding of impact of additive manufacturing processes when rapid prototyping. Additive processes produce very little waste and can create multiple identical or different complex shapes quickly and inexpensively. Additive processes can be easily adapted for different colours by changing the source material.	2-3
A clear and detailed evaluation of impact of additive manufacturing processes when rapid prototyping. Additive manufacturing machines produce physical outcomes from CAD data quickly and efficiently. Initial costly investment of purchasing the machine is made, the production of items is very low. Additive processes produce very little waste and can create multiple identical or different complex shapes quickly and inexpensively. Additive processes can be easily adapted for different colours by changing the source material.	4-5

Total	**20**

Question 5

		AO3	AO4	Mark
(a)	Analyse the meaning of 'User Centred Design' and how this has influenced the 'Smart Home' device.	✓		5

Answers analysing the meaning of user centred design' and how this has influenced the 'Smart Home' device should be awarded up to 5 marks.

Guidance

- User centred design is about designing a product to fit the needs and wants of the target market
- The requirements will be established before designing
- For the 'Smart Home' device, the target market will have been integral to the iterative design process
- User feedback will be used throughout designing and development
- The shape of the device – slimline, circular / cylindrical, white / grey and other aesthetics will be pre-determined
- Functions like Wi-Fi connectivity, Bluetooth, tactile buttons
- Powered by 240V mains power
- Ease of connectivity to home Wi-Fi and other devices.

Note: Detailed knowledge of 'Alexa' or 'Echo Dot' is not critical.

No answer or no relevant information presented or discussed	0
Brief description, very little analysis, simplistic or basic response The smart home device has been designed with the user in mind to ensure that all of the requirements of the user are met by the final product. No reference to user centred design just a list of the products features with little explanation of their benefits to the user.	1
More detailed analysis showing more understanding of 'User centred design' and this influencing the smart home device. Placing the user at the forefront, the device will be designed with the specific needs and wants of the target market as the driving forces. This will result in the device functioning and looking exactly how the user expects / requires, because the designers will ensure that the device matches all of the requirements set out. List of features with some qualification of how these help the user.	2-3
A clear and detailed analysis of 'User centred design' and this influencing the smart home device. Placing the user at the forefront, the device will be designed with the specific needs and wants of the target market as the driving forces. This will result in the device meeting the expectations of the user in terms of quality, style, shape, function, materials, aesthetics, connectivity and compatibility with other devices. User centred design ensures that the target market is included at every point during the product's development, so that feedback allows the product to be refined ensuring it's eventual success.	4-5

(b)	Evaluate how the ability to control multiple home accessories provides an innovative solution	✓		5

Answers relating to evaluating how the ability to control multiple home accessories provides an innovative solution should be awarded up to 5 marks. QWC is also assessed here.

Guidance:

- Multiple devices can be centrally controlled using Smart Home device over Wi-Fi / Bluetooth
- These can be voice controlled and remotely using App
- The ability to control lighting, heating, curtain and blinds etc provides flexibility and effective autonomy for users.
- Economical use of resources / save money on energy / fuels
- The ease of managing devices without physically moving / operating them
- The ability to add / remove additional devices makes the system very clever / useful
- Provides opportunities to reduce costs / increase security at home
- Gives home owner greater control of devices
- Allows technology to provide a simpler / effective means of control

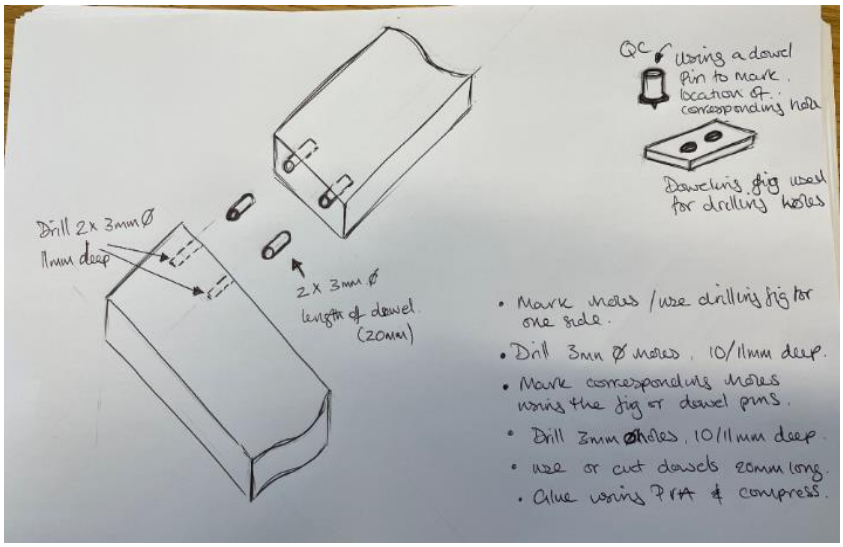
(Note – not all of this indicative content is required to access 5 marks!)

No answer or no relevant information presented or discussed.	0
Brief description, very little detail of evaluating how the ability to control multiple home accessories provides an innovative solution. Quality of Written Communication is basic, presenting occasionally appropriate material with some coherence, some errors of grammar, punctuation and spelling.	1
Some detail with some evaluating how the ability to control multiple home accessories provides an innovative solution. Quality of Written Communication is good, presenting mainly appropriate material in a coherent manner, few errors of grammar, punctuation and spelling.	2-3
A highly clear and fully detailed evaluating how the ability to control multiple home accessories provides an innovative solution. Quality of Written Communication is excellent, presenting wholly appropriate material in a coherent and logical manner, no errors of grammar, punctuation and spelling.	4-5

Total	**10**

Question 6

		AO3	AO4	Mark
(a) (i)	Describe **two** properties of MDF that make it suitable for the sides of the tray.		✓	2 x [2]
	Answers relating to the properties of MDF that make it suitable for the sides of the tray should be awarded up to 2 x [2] marks. Do not credit repetitive responses Guidance: • MDF is structurally suited to create the 4 sides for the tray • No grain for paint finish • Suitable for CNC machining (to create sides for tray) • Able to be glued / dowelled for secure and durable construction for tray • MDF is a sustainable choice of material / reduces product footprint • Multiple products made from large (8x4) sheet • Rigid – strength/weight ratio • No grain – easy to paint finish • Able to be used with a range of fixtures and fittings • Do not credit responses that suggest 'cheap' we are looking for physical properties. *No answer or no relevant information presented or discussed*			0
	Simplistic or basic response MDF is a solid material so the tray will be sturdy			1
	Or MDF is a manufactured board suitable for painting			1
	More detailed explanation or response MDF is a sustainable and readily available material with no grain. It is rigid and has good strength-weight ratio and able to be cut / shaped / joined for the tray sides			2
	Or MDF is a manufactured board with no grain, suitable for taking a paint finish as required with the tray.			2
(ii)	The legs of the tray are constructed using a dowelled butt joint. In the space below, produce a labelled sketch showing how you would manufacture a dowelled butt joint.		✓	4
	Answers showing a labelled sketch of a dowelled butt joint should be awarded up to 4 marks. *No answer or no relevant information presented or discussed*			0
	Simple sketch with limited details of dowelled butt joint			1
	Reasonable sketch showing some clarity, with labelling showing some understanding of a dowelled butt joint			2
	A clear sketch with clear details of how to achieve a dowelled butt joint			3

	A full and clear sketch supported by precise details of how to achieve a dowelled butt joint for the sides of the tray.  			4
(b) (i)	Explain the role of the spring fitted to the centre of the hinge.		✓	3
	Answers describing the role of the spring should be awarded up to 3 marks. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* The spring pushes the two sides of the hinge apart *More detailed explanation or response* The spring forces the opposite sides of the hinge apart keeping the tray flat *A clear and detailed response* The spring forces the opposite sides of the hinge apart keeping the tray flat, because the legs are kept under the tray. When hooked over the arm of the chair, this helps to keep the tray held in place.			0 1 2 3
(ii)	Explain the reason for the four pilot holes.		✓	2
	Answers explaining the reason for the four pilot holes should be awarded up to 2 marks. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* The four-pilot hole guide the screws into place *More detailed explanation or response* The four pilot holes provide a guide for the screws when attaching the hinge, preventing the MDF from splitting.			0 1 2

(iii)	The hinges and screws are bought-in components. Explain how this benefits the manufacturer when producing the tray using high volume production.		✓	4
	Answers explaining how bought-in hinges and screws benefits the manufacturer when producing the tray using high volume production should be awarded up to 4 marks. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* The manufacturer will only order the number of screws and hinges needed *More detailed explanation or response* The manufacturer will only order and stock enough screws and hinges to produce the number of trays ordered / in demand. *A detailed explanation or response* The manufacturer will only order and stock enough screws and hinges to produce the number of trays ordered / in demand. This means it costs less, and there are no surplus items leftover, requiring additional storage space. *A fully detailed and clear explanation or response* The manufacturer will only order and stock enough screws and hinges to produce the number of trays ordered / in demand. This allows the company to divert investment to other areas of the company, distributing assets more evenly. Costs will be lower (JIT) There are no surplus items leftover, requiring additional storage space. It keeps the manufacturing process lean and efficient, and the bought-in items are quality assured allowing the manufacturer to focus on the manufacture of the other parts.			0 1 2 3 4
(c)	Explain the difference between the red and black lines on the CAD drawing when manufacturing the tray handles using the CAM router.		✓	3
	Answers describing the reason for the red lines should be awarded up to 3 marks. *No answer or no relevant information presented or discussed.* *Simplistic or basic response* The red lines show where the tray needs to be cut *A more detailed explanation or response* The red lines show where the tray sides need to be cut for the tool path for the CNC router *A detailed explanation or response* The red lines are contour lines which show where the centre of the CNC toolpath will be, allowing the black outline (tray side) to be cut accurately. If there were no red lines, the black lines used as a tool path would produce a smaller tray side (dependent on the diameter of the cutting tool)			0 1 2 3
		Total		**20**