



GCSE MARKING SCHEME

SUMMER 2025

**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 2025 MARK SCHEME

Question 1		AO3	AO4	Mark
The images below show how a sports footwear manufacturer has changed the way trainers are packaged.				
(a)	Using two of the SIX Rs of sustainability, identify how designers have made effective changes to previous methods of packaging trainers.		✓	2 x [2]
Answers relating to two of the correctly named Rs should be awarded up to 2 marks each. Guidance: Candidates must be able to identify and name two of the 6Rs and explain how designers have improved packaging, storing and transporting the trainers pictured. (No marks for simple naming the Rs, no marks for explaining without correct naming of each R) No answer or no relevant information presented or discussed. Simplistic or basic response Reduce. Designer has used less materials. Or Refuse. Designer has rejected the traditional cardboard box. Or Reuse. The bag can be used again. More detailed response Reduce. Designer has used less materials in the new package, where there is only one card insert that forms the rigid shape. This is much less than the usual cardboard box. Or Refuse. Designer has rejected the traditional cardboard box, and produced a much lighter, simpler package that is easier to transport, and the consumer can use the red bag multiple times. Or Reuse. The single card insert can be reused (and recycled very easily) and the red bag that acts as the outer sleeve is actually used as the carrying bag and can be reused as a bag after the purchase. Accept responses that relate to any other of the 6Rs e.g. The designer has used Rethink and developed the original cardboard storage box into this new proposal. Award credit in the same way as above.				0 1 2

		AO3	AO4	Mark
(b)	The logo shown is part of the sports footwear manufacturer's policy for producing the new packaging. (i) State what this logo represents (ii) Explain why this may be important to the consumer of the trainers		✓	3
	Answers relating to the Fairtrade logo and how this applies to the consumer purchasing the trainers. No answer or no relevant information presented or discussed.			0
(i)	Correctly named logo Fair Trade			1
(ii)	Guidance: The Fairtrade logo will confirm to the consumer of the trainers that the manufacturer is committed to supporting economically developing countries in partnership by paying a fair price for materials / components for the product, and in turn supporting the development of skills in the workforce and supporting the country's economy. No answer or no relevant information presented or discussed.			0
	Simplistic or basic response The company pays a reasonable price for materials Or Workers are not exploited			1
	More detailed response The consumer is assured that the manufacturer is supporting developing countries and their workforce by investing in their economy and paying workers a fair wage.			2
(c)	Explain the effect the new packaging has on the manufacturer's ecological footprint.		✓	3
	Answers relating to understanding the effect of the new packaging on the ecological footprint should be awarded up to 3 marks. Guidance: The packaging significantly reduces the amount of waste and CO2 emissions that traditional product packaging such as shoeboxes and apparel polyethylene bags generates and underpins the manufacturers target of reducing carbon, energy, water, and waste by 25%, and developing 50% of its international product collections in footwear, apparel and accessories. • Reduced materials, paper and card, less weight to transport, more efficient transportation, less fuel used / greater fuel efficiency. • Smaller packaging, less space, larger quantities shipped. • Use of Recycled materials, one card insert, which has no printing / graphics, easy to recycle or reuse. • No glue / additional processing / chemical required to construct package. • The bag provides water resistant outer cover doubling as a re-usable carrier bag. • Less manufacturing processes – less energy used, less waste. • More economical production system, lower carbon footprint			

	See below Puma suggested improvements on carbon footprint as a result of packaging. 	
	No answer or no relevant information presented or discussed.	0
	Simplistic or basic response The new packaging improves the ecological footprint by creating less waste Or It uses much less material so lighter to transport Or There are much less components so it's more efficient to make	1
	More detailed response The new packaging improves the ecological footprint by creating less waste and using much less material, resulting in a more lightweight product to transport. Or It uses much less material so lighter to transport, which saves fuel and produces less pollution when shipping products. Or There are much less components, using less labour and machinery, less energy and producing products more efficiently.	2
	Detailed explanation or response The new packaging improves the ecological footprint by creating less waste and using much less material, resulting in a more lightweight product to transport. The packaging can be reused or recycled very easily. This reduces the carbon footprint of the product.	3
	Total	10

Question 2

The kitchen product pictured below has been developed to help cut vegetables during food preparation.		AO3	AO4	Mark
(a)	Describe how the designer could use CAD (Computer Aided Design) when developing the kitchen product.		✓	2
	Answers that describe how the designer could use CAD when developing the kitchen product can be awarded up to 2 marks Guidance: There are many ways that the designer of the kitchen product could use CAD. Solid modelling of shape, laser cutting card / polymers to test shape / ergonomics, CAD software for rendering, CAD drawing for 3D printing or CAM preparation. No answer or no relevant information presented or discussed.			0
	Simplistic or basic response Designer could use CAD to simulate the shape Or Designer could use CAD to model the shape and form			1
	More detailed response Designer could use CAD to simulate the shape, to see whether it meets the user needs, wants and values. Or Designer could use CAD to model the shape and form to make any alterations in order to improve the design.			2
(b)	A one-off prototype of the kitchen product is produced. Explain what the designer would do with this prototype prior to launching full-scale production.		✓	3
	Answers relating to function testing the product and exposing the concept to the target market / potential users to gain feedback or production / manufacturing can be awarded up to 3 marks. Guidance: DO NOT credit repetitive responses. No answer or no relevant information presented or discussed.			0
	Simplistic or basic response The prototype would be tested to see if it works properly.			1
	More detailed response The prototype could be tested cutting food products to see if there is anything wrong that would need to be improved.			2
	Detailed explanation or response The prototype would be tested with the target user in a kitchen environment to cut food products as intended. The results could be analysed, and further improvements made before mass producing.			3

	Prior to selling the kitchen product in the UK, the manufacturer must achieve approval in the form of the CE mark.	AO3	AO4	Mark
(c)	Explain what this means to the consumer of the kitchen products.		✓	2
	Answers relating to understanding that the CE mark provides assurance that the product has been tested, fit for purpose and approved providing the consumer with guaranteed safety can be awarded up to 2 marks. Guidance: Do not credit definition of CE mark. The response must relate to how the consumer is affected. technically, products sold in the UK must now achieve approval in the form of a UKCA (United Kingdom Conformity Assessed) mark, although a CE mark is also acceptable: <i>“The government has laid legislation to continue recognition of current EU requirements for a range of product regulations, including the CE marking (Conformité Européene, or European Conformity marking) for a range of product regulations. This means businesses will have the flexibility to use either the UKCA (UK Conformity Assessed) or CE marking to sell products in Great Britain (GB).”</i> (https://www.gov.uk/guidance/ce-marking) No answer or no relevant information presented or discussed.			0
	Simplistic or basic response Tells the consumer that the product is safe to use Or Shows that the product has been tested and is safe			1
	More detailed response The CE mark provides assurance that the product has been tested and fully approved as fit for intended use.			2

		AO3	AO4	Mark
(d)	Describe how the Consumer Rights Act protects the customer purchasing the kitchen product.		✓	3
	Answers relating to understanding that the Consumer Rights Act 2015 mark provides assurance that the product has been tested, fit for purpose and approved providing the consumer with guaranteed safety can be awarded up to 3 marks. Guidance: Response could cover 3 initial expectations. • Satisfactory quality • Fitness for purpose • As described / advertised Consumers purchasing a product may need to make a faulty goods claim if the product is not performing as expected or as intended. Consumers have 30 days from the purchase date to return goods which do not measure up to expectations. This allows the consumer to get a full refund (unless the product is a download / e product, where a replacement would be provided instead.) Outside the first 30-day period, consumers can give the retailer (not manufacturer) one opportunity to repair or replace service. If repair or replacement is unsuccessful. The consumer can then claim a refund or a price reduction if you wish to keep the product. You're entitled to a full or partial refund instead of a repair or replacement if any of the following are true: the cost of the repair or replacement is disproportionate to the value of the goods or digital content a repair or replacement is impossible a repair or replacement would cause you significant inconvenience the repair would take an unreasonably long amount of time. If a repair or replacement is not possible, or the attempt at repair fails, or the first replacement also turns out to be defective, you have a further right to receive a refund of up to 100% of the price you paid, or to reject the goods for a full refund. If you don't want a refund and still want your product repaired or replaced, you have the right to request that the retailer makes further attempts at a repair or replacement.			
	No answer or no relevant information presented or discussed.			0
	Simplistic or basic response If the product does not work properly, the consumer can take it back to the retailer. Or The product can be refunded or exchanged if it is not working			1
	More detailed response If the product does not work as advertised, the consumer can take it back to the retailer, and within 30 days of purchase receive a full refund. Or The product can be refunded or exchanged if it is not working as intended. It can be returned to the retailer and not the manufacturer.			2
	A fully detailed response If the product does not work as advertised, then it is considered unfit for purpose, and the consumer can take it back to the retailer, and within 30 days of purchase receive a full refund. After the 30-day period, a repair or replacement could be offered. Or The product can be refunded or exchanged if it is not working as intended. It can be returned to the retailer and not the manufacturer within 30 days of purchase for a full refund, or outside this time, a repair or replacement.			3
		Total		10

Question 3

The images below show a miniature smartphone tripod stick.		AO3	AO4	Mark
(a)	(i) Explain why the tripod stick can be classed as miniature.		✓	2
	Answers relating to describing how the tripod stick can be folded into a compact portable size should be awarded up to 2 marks No answer or no relevant information presented or discussed.			0
	Simplistic or basic response It is a small product Or It folds up small			1
	More detailed response The tripod stick can be reduced to a very small and compact package which is easy to transport in a pocket or bag.			2
	(ii) Give two different reasons why an aluminium alloy is a suitable material for the telescopic body of the tripod stick.		✓	2 x [2]
	Answers relating to the suitability of aluminium alloy can be awarded up to 2 marks each. DO NOT credit repetitive responses. Guidance: Responses should identify typical properties and characteristics of aluminium alloy that make it appropriate for the telescopic body. Good strength weight ratio so the fully extended body can support the weight of a smartphone, and provide a lightweight body for lifting, carrying etc. Aluminium alloy is suitable for outdoor use and will resist corrosion in wet / rainy conditions. Aluminium alloy comes in a wide variety of stock diameters, so different sizes can be readily available to make the body telescopic. Accept that aluminium alloy is relatively easy to spray finish and allows a 'self-lubricating' finish to help fold up the telescopic body. No answer or no relevant information presented or discussed.			0
	Simplistic or basic response Aluminium alloy is light. Or Aluminium alloy will not rust			1
	More detailed response Aluminium alloy is light so easy to carry around and also stays in a rigid shape when extended. Or Aluminium alloy will not rust, and the tripod stick will need to be used outdoors in all weather conditions. Or Aluminium alloy stays in a rigid shape when extended, supporting the smartphone or camera device securely. It is available in different size diameter sections, so the telescopic feature is easily achievable. Or Aluminium is a strong lightweight material which is easy to clean / maintain. Aluminium alloy is available in lots of diameter sections to allow lengths of different diameters to fit inside each other creating the telescopic body.			2

	AO3	AO4	Mark
(iii) The aluminium alloy has been spray painted for a chrome effect. Describe why this is a suitable finish.		✓	3
Answers relating to chrome spray providing a suitable finish should be awarded up to 3 marks. Guidance: • chrome plating can be used to add the chrome effect to Aluminium, but it is more difficult, expensive and time consuming. • Spraying is much quicker / simpler and involves less processing (dipping / cleaning etc) • Chrome spray will provide an improved aesthetic appearance. • Spraying dries quickly and provides a hard wearing and durable finish. • The chrome finish will appear shiny, and make the aluminium look more expensive. • The chrome finish will 'fit in' with chrome on the devices used with the tripod stick i.e. phone, camera etc.			
No answer or no relevant information presented or discussed.			0
One simplistic or basic response Looks much nicer than untreated alloy Or It will look and feel much better than bare alloy			1
More detailed explanation or response The spray finish is a simple, quick and effective finish to apply to the alloy. It will make the telescopic body look much better.			2
A fully detailed explanation The chrome finish will look much more aesthetic and desirable than the natural alloy finish. Spraying to achieve a chrome finish is easier than plating, and will provide a hard wearing, durable, and long-lasting finish compatible with the accessories used with the tripod stick.			3

	The images below show a miniature smartphone tripod stick.	AO3	AO4	Mark
(b)	State the name of the material that bears this symbol and describe the properties that make this material suitable for the three legs of the tripod stick.		✓	4
	Answers naming the correct material should awarded 1 mark. Up to 3 marks should be awarded for describing the properties of the material. If the name of the material is incorrect, but the properties contain some truth, award up to 2 marks maximum. No answer or no relevant information presented or discussed.			0
	Correct name for material Polystyrene			1
	No answer or no relevant information presented or discussed.			0
	Simplistic or basic response This material (Polystyrene) can be injection moulded to produce the 3 identical legs. Or Polystyrene is a rigid material able to support the tripod stick.			1
	More detailed explanation or response Polystyrene can be used to make 3 identical rigid legs which can fold out to support the weight of the tripod stick.			2
	A detailed explanation or response Polystyrene is a common material for injection moulding. It can be used to produce 3 identical legs quickly and efficiently with little waste. The legs can be intricate and fold in and out as required to act as the handle and base for the tripod stick.			3
	A fully detailed explanation Polystyrene is a common material suitable for injection moulding. It can be used to produce 3 identical legs quickly and efficiently with little waste. The legs can be intricate and fold in and out as required to act as the handle and base for the tripod stick. Polystyrene is rigid and durable and can be easily cleaned if used outdoors.			4

	The smartphone is held securely using a spring-loaded catch as shown below.	AO3	AO4	Mark
(c)	(i) Explain how the spring-loaded catch functions.		✓	3
	Answers relating to explaining how the spring-loaded catch functions should be awarded up to 3 marks. Guidance: Acceptable answers may include how the catch can be opened or closed to grasp different smartphones of varying sizes. No answer or no relevant information presented or discussed.			0
	Simplistic or basic response The spring pulls the catch closed to grip the phone			1
	More detailed explanation or response The spring provides compression which pulls the catch together, gripping the smartphone.			2
	A fully detailed explanation The user needs to open / slide the catch open using tension force. The smartphone needs to be inserted and then the catch released. The spring provides tension which pulls the catch closed tightly gripping the smartphone.			3
(d)	The tripod stick is supplied with standardised fittings as shown below. Explain the benefits that using standardised fittings brings to both the manufacturer and end user of the tripod stick.		✓	4
	Answers relating to the benefits of the standardised fittings should be awarded up to 4 marks. Responses must cover both manufacturer and end user to access the full 4 marks.			
	No answer or no relevant information presented or discussed.			0
	Simplistic or basic response To fit other accessories on Or So other cameras can be used with the tripod stick			1 1
	More detailed explanation or response The manufacturer of the tripod stick will sell more products because they are compatible with a wider range of cameras, smartphones and 'Go Pro's'. Or The end user can use the tripod stick with a variety of products because the standardised fittings will be universal. (and allow the user to carry less items outdoors)			2 2

		AO3	AO4	Mark
(e)	The manufacturer uses a fully automated continuous production system to produce the tripod stick. Explain how this may create winners and losers.		✓	5
	Answers explaining winners and losers of fully automated continuous production should be awarded up to 5 marks. Guidance: For responses gaining 5 marks, both winners and losers must be explained. • End user is a winner because the product will be cheaper to purchase due to the high volume and machinery involved. • End user will win because the product should be high quality /contain no defects / mistakes. • End user will be a winner because the product lead in time is reduced due to faster production system. • Manufacturer is a winner because products are sold worldwide increasing profits. • Manufacturer is a loser because much capital is required to install production lines. • Manufacturer is a loser because there is low flexibility in changing products. (end user could be a winner because all products / parts are compatible) • Manufacturer /and / or / end user could be a loser because high receptiveness to malfunctions since a single fault can stop the entire course of production. • Workers / employees are winners because continuous is 24 /7, so it would be likely to have 3 shift patterns. • Manual workers could be losers because the line is automated so fewer labour / workers needed.			
	No answer or no relevant information presented or discussed.			0
	Simplistic or basic response The end user is a winner because the product will be at its cheapest price because so many are made. Or The manufacturer is a winner because they will made large amounts of products to sell worldwide so lots of profit.			1-2
	More detailed explanation or response The manufacturer will be a winner because the automated production line can produce large numbers quickly to supply demand and make large profit margins. Losers will be manual workers because there will be less staff on production due to high levels of machinery / robotics.			3-4
	A clear and fully detailed response The manufacturer will be a winner because the automated production line can produce large numbers quickly to supply demand and make large profit margins. This will make the end user a winner because they will get a high quality product quickly and economically. Losers will be manual workers because there will be less staff on production due to high levels of machinery / robotics.			5

Question 4

Many homeowners are now being encouraged to install electric car charging points as shown below.		AO3	AO4	Mark
(a)	Explain two major problems that occur as a result of the high numbers of petrol and diesel powered vehicles on UK roads.		✓	2 x [2]
Answers relating to two different major problems should be awarded up to 2 marks each. Guidance DO NOT credit repeat responses. There are many problems and responses may include: • Congestion / overcrowding in towns and cities, with increased pollution. • Higher demand for fuel • Finite fuel resources will run out quicker due to increased demand • Poorer air quality in congested zones due to emissions • Increased wear and tear on motorways, roads and transport systems / networks. • Noise pollution from busy road networks • Increased carbon footprint for the UK • Failure to meet government set targets / agreements				
No answer or no relevant information presented or discussed.				0
Simplistic or basic response The more cars there are, the more pollution is produced.				1
A more detailed explanation or response The increased number of petrol and diesel cars increase the pollution generated, which contributes to a larger CO₂ / carbon footprint for the UK. Credit any appropriate response.				2

		AO3	AO4	Mark
(b)	Most electric cars are able to travel at least 100 miles, with some of the more modern electric cars accessing a range of 250 miles per charge. Describe the effect this might have on consumers considering purchasing a 'greener' car.		✓	4
	Answers relating to describing the issues that the range presents for consumers considering purchasing a 'greener' electric car should be awarded up to 4 marks. DO NOT reward for repeating the statement regarding ranges that can be achieved in isolation. Guidance: • The range of daily commute for the user • Charging facilities at home, including installation cost and charging costs. • Life of batteries in Ecars / performance of batteries / Ecars • What about longer journeys? Holidays? Regular stops to charge the car will be required. • Inconvenient to have to 'stop and plug in' during journey. • 250 miles is nowhere near the range a typical full tank of fuel on a regular family car can achieve (500+ miles) • Cost of electricity could rise if more people purchase Ecars • Speed of charging			
	No answer or no relevant information presented or discussed.			0
	Simplistic or basic response The range might be too limited and the consumer might need to travel further.			1
	More detailed explanation or response The mile range might be too restrictive and consumers would not want to stop on longer journeys to charge the car up.			2
	A detailed response The mile range might be too restrictive and consumers would not want to stop on longer journeys to charge the car up. The cost of the charging is important when compared to petrol / diesel cars, also the installation of charging equipment at home.			3
	A clear and fully detailed response The cost of a full charge against a full tank of fuel will be important, and the cost of installing charging equipment to the car owner's home (and possible place of work). The consumer will need to consider the likely mileage required and whether regular 'stops' in journeys would be required to 'top up' the Ecar.			4

		AO3	AO4	Mark
(c)	The UK Government will stop the production and sale of all petrol and diesel vehicles in the UK by 2035. Explain the pressures this places on most production car manufacturers.		✓	4
	Answers relating to explaining the impact on the manufacturer of government legislation should be awarded up to 4 marks.			
	No answer or no relevant information presented or discussed.			0
	Simplistic or basic response The manufacturer will need to replace existing cars with e-cars. Or The manufacturer will need to put large investment into electric cars.			1
	More detailed explanation or response The manufacturer will need to replace existing petrol and diesel cars with e-cars that represent the same reliability and brand standard. Or The manufacturer will need to invest in R&D well before 2035 so that the new e-cars succeed traditional fuel cars smoothly			2
	A detailed explanation or response The manufacturer will need to replace existing petrol and diesel cars with e-cars that represent the same reliability and brand standard. The manufacturer will not want to lose profits, or be bettered by competitor products Or The manufacturer will need to invest in R&D to ensure charging and batteries for cars are efficient and reliable well before 2035 so that the new e-cars succeed traditional fuel cars smoothly and the user is provided with a good alternative.			3
	A clear and fully detailed response The manufacturer will need to replace existing petrol and diesel cars with e-cars that represent the same reliability and brand standard. The manufacturer will not want to lose profits or be bettered by competitor products. The manufacturer will need to invest in R&D to ensure charging and batteries for cars are efficient and reliable well before 2035 so that the new e-cars succeed traditional fuel cars smoothly and the user is provided with a good alternative. Accept responses related to new production techniques and methods.			4

		AO3	AO4	Mark
(d)	Describe how the charging of electric cars needs to be designed to ensure the National Grid can cope with the energy demand.		✓	3
	Answers relating to the charging of electric cars in relation to demand on the national grid should be awarded up to 3 marks. Guidance: Accept responses identifying potential issues with owners charging electric cars. Times of the day, access, tariffs, energy supplies, removal of nuclear and fossil fuel power stations, national grid robustness, Government led incentives for homeowners to install e systems, workplace and shopping centre charging points etc. No answer or no relevant information presented or discussed.			0
	Simplistic or basic response Providing the ability for owners to charge cars as and when required Or Providing a flexible system where owners of electric cars can charge cars as / when required			1
	More detailed explanation or response If all working electric car owners require charging overnight, the grid needs to provide suitable resources for charging 'off peak' Or The national grid will need to be prepared for charging on a 'need to' basis but also may need to consider specific times when e-car owners will expect / need to recharge.			2
	A detailed explanation or response E car owners will need to charge cars whenever required which places demands on the national grid. Working daytime hours will place more expectation on the grid after 5pm and before 7am so there could be an 'on' and 'off' peak system which ensures supply is adequate, and pricing could feature.			3
		Total		10

Question 5

Study the images of modern sports products shown below.		AO3	AO4	Mark
(a)	Analyse how the performance of modern sports equipment has improved as a result of the use of composite materials.	✓		5
Answers relating to analysing how the performance of modern sports equipment has improved as a result of modern composite materials should be awarded up to 5 marks. No marks should be awarded for naming PPE without qualification. Guidance: • Lightweight – most sports equipment requires human movement – so the lighter the better including golf clubs, skis, cycles, rackets, fishing rods etc. • Mechanical performance – fibre reinforced composites provide excellent mechanical properties. Good shock absorption, • Design freedom – many difficult shapes can be achieved with composites which would otherwise be very difficult under another material – so the benefits of the composite are shape achievement. • Environmental issues / cost – many composites outlast traditional materials, and composites provide good value for money. • Typical product may include glass fibre, carbon fibre, silicon carbide fibres, high strength and high modulus synthetic fibre, hybrid fibre, fabric structure reinforcement. • Examples of products may include skis, surfboards, windsurfing, table tennis boards, tennis, badminton, squash, hockey sticks, fishing rods, golf clubs, helmets, climbing ropes, lines etc.				
No answer or no relevant information presented or discussed				0
Brief description, very little analysis, simplistic or basic response. They are very lightweight but strong shapes which perform very well, much better than previous traditional materials. They are the best products in their class.				1-2
More detailed analysis showing more understanding of features that make modern sports equipment so improved as a result of composite material use. Equipment like kayaks, snowboards, skis benefit from the lightweight but strong introduction of fibre composites replacing wooden materials. These are now much lighter, more flexible and resistant to moisture which provides enhanced performance.				3-4
A clear and detailed analysis of the features that make modern sports equipment so improved as a result of composite materials. Equipment like kayaks, snowboards, skis benefit from the lightweight but strong introduction of fibre composites replacing wooden materials. These are now much lighter, more flexible and resistant to moisture which provides enhanced performance. Rackets like squash and tennis require very high impact resistance and extremely good tension, compression and torsion resistance. Some at 110g provide remarkable performance for their overall weight.				5

		AO3	AO4	Mark
(b)	Analyse the importance of Health and Safety practices when producing prototypes in a school workshop.	✓		5
	Answers relating to the analysis of the importance of H&S regulations in a school workshop should be awarded up to 4 marks. Guidance: • Analysis of use of PPE, including goggles and protective equipment. • Analysis of requirements for extraction / dust management • Safe working practices, training on specific machines / equipment • Safe work with substances, chemical, biological, physical, ergonomic. • Adequate lighting in workshop environments to improve visibility • Ventilation is good • Workspace is effective and not cramped, with safe passageways etc. • Working safely with consideration to others. • Trained use of tools, equipment and machinery to avoid injury. No answer or no relevant information presented or discussed.			0
	Simple or basic analysis of the importance of H&S regulations when producing prototypes in a school workshop. Wear goggles when using drill press / bandsaw machines, use dust masks when operating disc sander / linisher machines. Use dust extraction / LEV when cutting, shaping, forming materials. Safe practices help prevent injuries.			1-2
	Some analysis of the importance of H&S regulations when producing prototypes in a school workshop. Operators should wear goggles when using drill press / bandsaw machines, use dust masks when operating disc sander / linisher machines. There should be dust extraction / LEV when cutting, shaping, forming materials. Other safety equipment such as guards on machines, emergency stop buttons etc should be fitted to comply with H&S regulations. Safe practices help prevent incidents and injuries when followed correctly.			3-4
	A clear and detailed analysis of the importance of H&S regulations when producing prototypes in a school workshop. Operators should wear goggles when using drill press / bandsaw machines, use dust masks when operating disc sander / linisher machines. There should be dust extraction / LEV when cutting, shaping, forming materials. Other safety equipment such as guards on machines, emergency stop buttons etc should be fitted to comply with H&S regulations. Full training should be provided to ensure users are familiar with operating machinery and equipment. Supervision may be required. Risk assessments and regular maintenance and safety inspections should be in place to ensure all tools, equipment and machinery is safe, and fit for purpose. Effective safe practices help ensure that users undertake tasks safely and prevent incidents or injuries from occurring.			5

		AO3	AO4	Mark
(c)	Evaluate why user feedback is so critical when producing innovative and creative products such as the modern sports products shown. Marks will be awarded for the content of the answer and the quality of written communication.	✓		10
	Answers relating to the evaluation of the user feedback is so critical when producing innovative and creative products should be awarded up to 10 marks. QWC is also assessed here. Guidance: • The user is very important throughout the iterative design process. • Establishing user's needs and wants is vital to the success of the product. • Users need to provide clear information for designers to produce clear and detailed specifications. • The user should be contacted regularly during designing to check whether ideas are progressing or not. • Users feedback supports the modification / refinement of ideas as they develop. • Users are integral to the testing of design ideas to ensure the product remains 'on track'. • The end user is the likely purchaser of the product, so their opinions on products is paramount • The target market should be used as a 'design tool' to identify areas / features that need including / evolving. • User feedback should not be used just at the start as research and at the end for final testing – this is a gamble! No answer or no relevant information presented or discussed.			0
	Brief description, very little detail of evaluating how user feedback is so critical when producing innovative and creative products. Quality of Written Communication is basic, presenting occasionally appropriate material with some coherence, some errors of grammar, punctuation and spelling.			1-2
	Some detail with some evaluation of how user feedback is so critical when producing innovative and creative products. Quality of Written Communication is good, presenting mainly appropriate material in a coherent manner, few errors of grammar, punctuation and spelling.			3-4
	A clear and detailed evaluation of how user feedback is so critical when producing innovative and creative products. Quality of Written Communication is good, presenting mainly appropriate material in a coherent manner, few errors of grammar, punctuation and spelling.			5-6
	A fully clear and very detailed evaluation of how user feedback is so critical when producing innovative and creative products. Quality of Written Communication is very important presenting wholly appropriate material in a coherent and logical manner, hardly any errors of grammar, punctuation and spelling.			7-8
	A highly clear and fully detailed evaluation of how user feedback is so critical when producing innovative and creative products. Quality of Written Communication is excellent, presenting wholly appropriate material in a coherent and logical manner, no errors of grammar, punctuation and spelling.			9-10
		Total		20

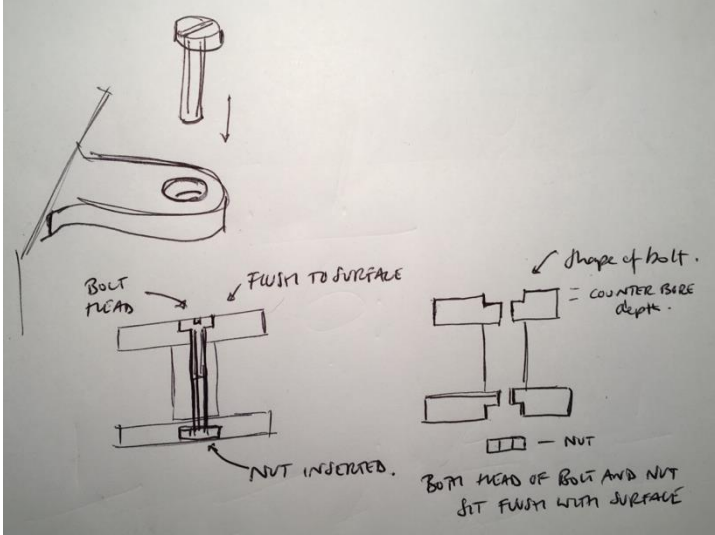
Question 6

The headlamp below has been produced to allow users to wear a light source for a range of activities.		AO3	AO4	Mark
(a)	(i) The headlamp is sold as a blister pack. Describe the meaning of the term 'blister pack'.		✓	2
Answers relating to a description of the term blister pack should be awarded up to 2 marks. Guidance: • Blister pack refers to the package of a product that contains a cavity or pocket, normally using a thermoformed polymer, to hold a product or item. • The cavity is often transparent to allow the product to be visible • Blister packs are often sealed with a sheet of cardboard.				
No answer or no relevant information presented or discussed.				0
Simplistic or basic response A package to display a product Or Allows you to see the product. Or A space to hold a product safely				1
				1
				1
More detailed explanation or response. A blister pack is a package that holds the product safely and securely in a (transparent) 'bubble' so that it can be clearly seen by potential purchasers.				2
	(ii) Explain the role of the two card layers in the blister pack.		✓	3
Answers relating to explaining the role of the two card layers should be awarded up to 3 marks. Guidance: DO NOT credit repeat responses from (i) here. This relates to the two card layers in isolation.				
No answer or no relevant information presented or discussed.				0
Simplistic or basic response These form the centre of the blister pack Or They hold the transparent window in place.				1
More detailed explanation or response. The card layers provide user information while holding the two transparent mouldings securely to display the headlamp in a sealed package.				2
A detailed explanation or response. The card layers allow the product to be hung and displayed attracting potential consumers whilst providing user information and holding the two transparent mouldings securely to display the headlamp in a sealed package				3

		AO3	AO4	Mark
	(iii) Describe two properties of PET (Polyethylene Terephthalate) that make it suitable for the two plastic components in the blister pack.		✓	2 x [2]
	Answers relating to describing two different properties of PET that make it suitable for the plastic components should be awarded up to 2 x 2 marks. Guidance: DO NOT credit repeat responses, the two properties must be different. These could include: • PET is highly flexible for moulding / shaping the pockets. • PET will retain a rigid shape once deformed. • PET has dimensional stability • PET is resistant to moisture, and other chemicals / solvents • PET is a thermoplastic suitable for vacuum forming the shapes required • PET can provide impact resistance to protect content • PET can be purely transparent to allow contents to be seen clearly. • PET is a recyclable material No answer or no relevant information presented or discussed.			0
	Simplistic or basic response PET is able to be shaped into the components shown Or PET will stay in the shape to protect the headlamp			1
	More detailed explanation or response. PET is a thermopolymer which is able to be heated to form the desired transparent shape and remain rigid to hold and protect the headlamp. Or PET will remain in the desired shape when deformed and protect the headlamp. PET is lightweight and transparent.			2

(b)	The blister pack has been designed to include a ' Try Me ' feature as shown. Explain how the Try Me feature benefits both the manufacturer and the consumer of the headlamp		✓	4
	Answers relating to explaining how the 'try me' feature benefits both the manufacturer and the consumer should be awarded up to 4 marks. Guidance: DO NOT credit repeat responses. To gain 4 marks, the response must explain benefits to the manufacturer AND consumer and not one or the other in isolation. No answer or no relevant information presented or discussed.			0
	Simplistic or basic response The 'Try Me' feature will benefit the consumer so they can see how it works Or The manufacturer will not get returned products / complaints			1
	Detailed explanation or response. Consumers can test the product in the shop / outlet and see it operating prior to purchase. This avoids after sales problems. Or The manufacturer is allowing consumers to purchase the product when they are happy with how it functions / feels / operates. This will consolidate sales.			2
	More detailed explanation or response. Consumers can test the product in the shop before purchasing, to see how it functions and avoid after sales disappointment. The manufacturer allows consumers to try the product to build product confidence in the function and features of the product building sales.			3
	Allowing the consumer to try the product before purchasing builds consumer confidence in the brand and the product. Consumers will become familiar the quality and features of the product and encourages consumers to buy the torch. This could lead to more sales of the torch and higher sales revenue. Having the consumer the opportunity to try the product will lead to fewer problems after sales.			4

	The headlamp body has been designed with an adjustable hinge using an M4 nut and 30 mm long M4 bolt as shown below.	AO3	AO4	Mark
(c)	(i) Explain what is meant by the term M4.		✓	2
	Answers relating to explaining the meaning of the term M4 should be awarded up to 2 marks.			
	No answer or no relevant information presented or discussed			0
	Simplistic or basic response M4 is the size of the bolt Or The bolt is 4mm diameter M relates to a metric thread			1
	More detailed explanation or response. M4 means the bolt is a standard 4mm diameter machine thread component, and this will be compatible with any M4 nut. Or M4 means the bolt has a standard 4mm diameter machine thread, and this will be compatible with any other M4 component.			2

(ii) The M4 nut and bolt are counterbored into the hinge. Using notes and sketches below, explain how this has been achieved.		✓	5
Answers relating to explaining how the M4 nut and bolt are counter bored into the headlamp's hinge should be awarded up to 5 marks. For full 5 marks, response must include notes AND sketches. Up to 3 marks for notes only, or sketches only. Guidance: Candidates need to demonstrate understanding of: • The bolt head needs to sink into the plastic lug and remain flush with top • The nut needs to fit into a similar 'cavity' and remain flush on opposite side • This is achieved by moulding the hinge to the correct depth. • The length of the bolt must not extend past the nut beyond the hinge. 			
No answer or no relevant information presented or discussed.			0
Simplistic or basic response with some notes / and / or sketches.			1-2
More detailed explanation or response with some notes and sketches.			3-4
A clear and fully detailed response with accurate notes and high quality sketching.			5
Total			20