

Please write clearly in	n block capitals.
Centre number	Candidate number
Surname	
Forename(s)	
Candidate signature	I declare this is my own work.

GCSE DESIGN AND TECHNOLOGY

Unit 1 Written Paper

Monday 19 June 2023

Morning

Time allowed: 2 hours

For this paper you must have:

- normal writing and drawing instruments
- a calculator
- a protractor.

Instructions

- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- There are 20 marks for Section A, 30 marks for Section B and 50 marks for Section C.

For Exam	iner's Use
Section	Mark
А	
В	
С	
TOTAL	



	Section A – Core technical principles	
	Answer all questions in this section	
Each o	of Questions 01 to 10 is followed by four responses, A , B , C and D .	
For ea	ch question completely fill in the circle alongside the appropriate answer.	
CORRECT		
lf you v	want to change your answer you must cross out your original answer as shown.	\mathbf{X}
If you v as sho	wish to return to an answer previously crossed out, ring the answer you now wis wn.	sh to select
0 1	Which one of the following is a composite material?	
	A Carbonfibre reinforced plastic (CRP)	
	B Graphene	
	C High impact polystyrene (HIPS)	
	D Titanium	
		[1 mark]
0 2	Which one of the following statements is true?	
	A Coal is used to generate hydro-electric power.	
	B Fossil fuels produce argon when they burn.	
	C Gas is a renewable resource extracted from the ground.	
	D Oil is extracted from the ground to produce petroleum.	

0 3	Which one of the following statements is true?	Do not write outside the box
	A Batteries can be safely thrown away with household rubbish.	
	B Rechargeable batteries can only be used ten times.	
	C Toys that use batteries do not have any safety features.	
	D Zinc carbon batteries leak and corrode.	
	[1 mark]	
0 4	Which one of the following is a thermoforming polymer?	
	A Epoxy resin (ER)	
	B High density polythene (HDPE)	
	C Melamine formaldehyde (MF)	
	D Polyester resin (PR)	
	[1 mark]	
0 5	Which one of the following is a working property of a material?	
	A Absorbency	
	B Density	
	C Fusibility	
	D Malleability <a>O	
	[1 mark]	
06	When manufacturers focus on the reduction of waste during production, it is called	
	A batch manufacture.	
	B flexible manufacture.	
	C lean manufacture.	
	D mass manufacture.	
	[1 mark]	

Turn over ►

07	What type of motion best describes the action of the sewing machine needle in Figure 1 when in operation?	Do not write outside the box
	Figure 1	
	A Linear	
	B Oscillating	
	C Reciprocating	
	D Rotary	
	[1 mark]	
08	Which one of the following is a feature of design in society?	
	A Focus on machines	
	B Focus on materials	
	C Focus on people	
	D Focus on resources	
	[1 mark]	





1 1.1	Name one manufactured board. [1 mark]	Do not wr outside th box
1 1.2	Explain one advantage of using manufactured boards. [2 marks]	
1 2	Explain the term 'planned obsolescence'	
	Give an example of a product designed for 'planned obsolescence' in your answer. [3 marks]	
	Turn over for the next question	

7

20

Section B – Specialist technical principles
Answer all questions in this section.
A clothing manufacturer is producing 1500 coats for retail. Each coat will need four buttons and one extra for a spare. Each button costs 14 pence.
What is the total cost of the buttons required to complete the order?
Show your working.
Give your answer in £s. [3 marks]
Answer £
Answer £
Answer £ Give two aesthetic considerations when selecting materials and/or components to make prototypes.
Answer £ Give two aesthetic considerations when selecting materials and/or components to make prototypes. [4 marks] Consideration 1
Answer £ Give two aesthetic considerations when selecting materials and/or components to make prototypes. [4 marks] Consideration 1
Answer £ Give two aesthetic considerations when selecting materials and/or components to make prototypes. [4 marks] Consideration 1 Consideration 2
Answer £ Give two aesthetic considerations when selecting materials and/or components to make prototypes. [4 marks] Consideration 1 Consideration 2
Answer £ Give two aesthetic considerations when selecting materials and/or components to make prototypes. [4 marks] Consideration 1 Consideration 2
Answer £ Give two aesthetic considerations when selecting materials and/or components to make prototypes. [4 marks] Consideration 1 Consideration 2

UK in 2021 by the type of fuel/power they use. Percentage of vehicles sold in 2021 by fuel/power type Petrol 54% Diesel 10% Hybrid 17.5% Plug-in hybrid 7.5% Electric 11% Use the information in the table above to complete the pie chart. Show your working. [4 marks] Key Petrol Diesel Hybrid Plug-in hybrid Electric

The data in the table below shows the approximate percentage of vehicles sold in the

1 7

Do not write outside the

1 8	Cho	oose one comm	ercial process fro	m the table belo	w.	
Paper and board die cutting	d e	Wood turning	Metal casting	Polymer extrusion	Textile weaving	Electronic pick and place assembly
	Му	chosen process	is			
	N				_	
	inar	me a specific m	ain material used	with this proces	S.	[1 mark]
1 8 . 2	Nar	me a stock form	of the material us	ed in your chose	en process.	[1 mark]
1 1						
1 8.3	Giv	e two reasons t	hat make your ch	osen process sı	uitable for commo	ercial
	ma	nufacture.				[4 marks]
1 1	Rea	ason 1				
	Rea	ason 2				

Do not write outside the box

19	Five tools are show	n below.			Do I out:
1 9 . <u>1</u>	Name one of the to	ols shown.			[1 mark]
1 9.2	Explain what the to	ol you have name	ed in Question 1 9	9.1 is used for.	[2 marks]

19.3	Give two safety points that need to be considered when using the tool you have named in Question 19.1 . [2 marks] Safety point 1 Safety point 2	Do not write outside the box
	Turn over for the next question	
13	Turn over ►	

Continuous	itch	Bato	/pe/one-off	rototy
turing in quantity compared	and disadvant	e advantages a a one-off item.	Discuss the producing a	
and give examples in your	production met	refer to the pro	You should answer.	
[8 ma				

	Section C – Designing and making principles	Do not outsia bo
	Answer all questions in this section.	
2 1	Describe how prototypes help designers to ensure a product is fit for its intended purpose.	_
	Give examples in your answer. [6 marks]	
	Turn over for the next question	



		outs
2.2	Ergonomics and anthropometrics. [6 marks]	
	Turn over for the next question	

2 3	The component below is to be manufactured with seven circular holes.	Do not write outside the box
	Each hole is:	
	 7 mm in diameter equally spaced from each other and from each end of the component equally spaced from the top and bottom of the component. 	
2 3	120 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	
1	What distance will the centre line need to be from either long side? [1 mark]	
	Answer mm	
2 3.2	What is the required distance from the centre of one hole to the centre of the next hole to ensure the holes are equally spaced?	
	Show your working. [2 marks]	
	Answer mm	

2 3.3	Work out the shortest distance between the circumferences of any two holes.	Do not write outside the box
	Show your working. [2 marks]	
	Answermm	
2 3.4	The holes are to be drilled 7 mm with a tolerance of ± 0.5 mm. State the maximum and minimum acceptable diameters of the holes. [1 mark]	
	Max mm Min mm	
	Turn over for the next question	

2 4	Explain why designers look at the work of others before creating new designs. [3 marks]	Do not write outside the box
		-
2 5	Explain how a user-centred design approach can ensure that products are fit for purpose.	
	Give examples in your answer. [6 marks	1
		-
		-
		-
		-
		-
		-
		-







2 7 Explain two advantages of using audio and/or visual recordings when developing design ideas. [4 marks] Advantage 1 Advantage 2 2 8 Explain how each of the following issues may be considered before designing and manufacturing new products. [4 marks] Fair trade Global warming _____ END OF QUESTIONS

50

Do not write outside the



Question number	Additional page, if required. Write the question numbers in the left-hand margin.		

Do not write outside the box

1

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

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GCSE DESIGN AND TECHNOLOGY 8552/W

Unit 1 Written Paper

Mark scheme

June 2023

Version: 1.0 Final

236G8552/w/MS

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

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Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

Glossary for maths

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

- [a, b] Accept values between a and b inclusive.
- For π Accept values in the range [3.14, 3.142]
- TheirAccept an answer from the candidate if it has been inaccurately calculated
but is subsequently used in a further stage of the question.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Qu	Part	Marking Guidance	Total marks	AO
01		A Carbon fibre reinforced plastic (CRP)	1 mark	AO4 1a

Qu	Part	Marking Guidance	Total marks	AO
02		D Oil is extracted from the ground to produce petroleum.	1 mark	AO4 1a

Qu	Part	Marking Guidance	Total marks	AO
03		D Zinc carbon batteries leak and corrode.	1 mark	AO4 1a

Qu	Part	Marking Guidance	Total marks	AO
04		B High density polythene (HDPE)	1 mark	AO4 1a

Qu	Part	Marking Guidance	Total marks	AO
05		D Malleability	1 mark	AO4 1a
0	Part	Marking Guidance	Total	40

Qu	Part	Marking Guidance	marks	AO
06		C lean manufacture.	1 mark	AO4 1a

Qu	Part	Marking Guidance	Total marks	AO
07		C Reciprocating	1 mark	AO4 1a

Qu	Part	Marking Guidance		AO
08		C Focus on people		AO4 1a
Qu	Part	Marking Guidance	Total	AO

Qu	Part	Marking Guidance	Total marks	AO	
10		D Thermochromic pigment	1 mark	AO4 1a	
Qu	Part	Marking Guidance	Total marks	AO	
11	1	One mark for a correct named manufactured board.	1 mark	AO4 1a	
Indi	Indicative content				

- Medium density fibreboard (MDF)
- High density fibreboard
- Plywood
- Aero ply
- Chipboard
- Laminboard
- Blockboard
- Strawboard
- Glulam
- Hardboard
- Pinboard
- Stirling board

ACCEPT GRAPHICS BASED BOARDS e.g., cardboard, corrugated board, duplex, foamboard, solid white board, inject.

Qu	Part		Marking Guidance		
11	2	2 marks	One point explained in detail, possibly using specific examples.	2 marks	AO4 1b
		1 mark	One correct simple point of explanation.		
		0 marks	No response or nothing worthy of credit.		

- To ensure that the whole of the tree is used and there is no waste e.g., knots, surface defects etc that have to be avoided.
- Produce large flat boards.
- Produce boards of a consistent thickness which are better for making accurate engineered products e.g., flat-pack furniture.
- Produce flat boards that are less likely to warp.
- Some manufactured boards have a smooth surface finish which can be painted to produce a highquality finish or have a laminate bonded to it to create a durable hard-wearing surface e.g., kitchen worktops.
- Better for the environment as the whole tree can be used e.g., chipboard.
- Use of recycled
- Create a timber with enhanced properties that is stronger and more suited to modern engineered buildings and structures e.g., glulam where long, consistent beams can be manufactured.

Accept all other valid responses including graphic responses.

Qu	Part		Marking Guidance	Total marks	AO
12		3 marks	Two simple/one detailed point of explanation clarifying understanding AND an example.	3 marks	AO4 1b
		2 marks	One detailed point of explanation with no example OR Two simple points of explanation with no example OR One simple point and example.		
		1 mark	One simple point of explanation OR a correct example.		
		0 marks	No response or nothing worthy of credit.		

The guidance provided is illustrative and not exhaustive. Credit any worthy points made in support of the band descriptors above.

- Because a product may only be **designed to have a short useful life** e.g., disposable products like a milk carton, contact lenses, disposable razors.
- A company may take the view of **designing a limited lifespan** into a product to ensure continuous demand e.g., mobile phone before a new, improved replacement comes along.
- Product may be **designed and made so that after a time cannot be repaired or upgraded**. A company may not want to invest time and resources (spare parts and technical support) supporting old tech e.g., a flat-screen TV.
- Some manufacturers design products with planned obsolescence in mind to ensure there is always a **market for new and improved products/sales to keep the company profitable**, e.g., computer game companies. Upgrades/speeds/better graphics are all part of a more realistic experience for gamers. Computers become obsolete unless upgraded.
- Planned obsolescence can lead to waste.
- Some products are made of inferior quality/ fragile, so they break and need to be replaced.

CONSUMABLE PRODUCTS ARE INCORRECT.

Qu	Part	Marking Guidance		Total marks	AO
13		One mark for	2 marks	AO4 1b	
		1 mark Any correct advantage given.			
		0 marks	No response or nothing worthy of credit.		

- Highly visible way of reaching interested parties/investors.
- Raise awareness of cause.
- Linked to social media to maximise exposure.
- Uses the internet for exposure so is a global way of raising funds.
- No need for 'cold calling'.
- Does not require big investors, but does require many.
- Little financial risk associated with big start-up costs.
- Good way for entrepreneurs to raise funds without having to go and find backers directly.
- A fast way to raise money with no up-front fees.

Accept all other valid responses.

Qu	Part		Marking Guidance		AO
14		2 marks	Any two correct points relating to motion direction and magnitude of gear C	2 marks	AO4 1c
		1 mark	One correct point about motion or magnitude. Can include indicated use of arrow.		
		0 marks	No response or nothing worthy of credit.		

Indicative content

WE ARE ONLY MARKING DESCRIPTIVE POINTS FOR GEAR C

Direction:	Magnitude:			
	Gear C turns the slowest of all (as it has the most teeth)			
Gear C turns clockwise	C goes slower that A			
	Takes longer time to rotate.			
	• 19:26 ratio			
Accept all other valid responses.				

Qu	Part	Marking Guidance	Total marks	AO
15		Costing of buttons to make 1500 coats:	3 marks	AO4 1c
		AWARD FULL MARKS FOR CORRECT ANSWER, EVEN WITH NO WORKING SHOWN		

1 mark	Step 1: 4 × 14 = 56 + (1 × 14) = 70 OR 5 × 14 = 70 total	$4 \times 0.14 = 0.56 + 0.14 = 0.70$ OR $5 \times 0.14 = 0.70$	1500 × 5 = 7500
1 mark	Step 2: 1500 × 70 (their 70) = 105 000 (their 105 000) pence	1500 × (their 0.70) = 1050 (their 1050)	7500 × 0.14 = 1050
1 mark	Step 3: £1050	£1050	£1050

Qu	Part		Total marks	AO	
16		Two marks ma	aximum for each consideration.	4 marks	AO4 1c
		2 marks	One consideration explained in detail, possibly using an example to clarify response.		
		1 mark	One simple correct point given for each consideration.		
		0 marks	No response or nothing worthy of credit.		

- Surface finish does the surface need to be shiny or matt?
- Texture does the surface a visual appearance?
- Colour does the material or component need to be coloured in some way?
- Pattern some materials have a pattern e.g., wood grain, fabric design to enhance appearance.
- Matching does the material being used match or sit well with other materials used in the prototype?

Responses may also look at:

- will the base material absorb or take a good finish? A material that won't stain or is too flexible to be painted may be rejected.
- will the aesthetics (looking good) be maintained for a long time? E.g., how long before an object needs re-plating or painting or waxing? etc.

Qu	Part		Marking Guidance	Total marks	AO
17		This questic equals 1%, cars and the IF PIE CHA WITHIN A 2	on requires candidates to recognise that 3.6 degrees calculate the correct sector angles for diesel and hybrid en indicate on the pie chart. RT IS CORRECTLY SHADED AND LINE DRAWN 2 DEGREES TOLERANCE IT IS FULL MARKS.	4 marks	AO4 10
		1 mark	Correct calculation of 1% to be 3.6 degrees.		
		1 mark	Correct calculation/ representation of either 36- degree segment for diesel cars OR 63-degree segment for hybrid cars.		
		1 mark	Correct position of a single line. Line must be within 2-degree tolerance i.e. 36 +/- 2 degrees or 63+/- 2 %.		
		1 mark	Correct application of key.		
			Key	etrol	
			Key Pe	etrol esel /brid	

Qu	Part		Marking Guidance	Total marks	AO		
18	1	Indica	tive content	1 mark	AO4 1c		
Specif	ic main	materia	l:		L		
Proc	ess		Specific main material for 1 mark.				
Pape die ci	Paper and board die cutting		Any specific named paper e.g., cartridge paper, layout paper Any specific paper-based board e.g., cardboard, corrugated ca white board	irdboard, so	lid		
Wood	d turning	3	Any specific named wood e.g., beech, ash				
Meta	l casting)	Any specific named metal e.g., aluminium, pewter				
Polyn	ner extr	usion	Any specific named polymer e.g., acrylic, nylon				
Textile weaving		ing	Any specific named textile fibre e.g., cotton, polyester				
Electronic pick and place assembly		ck and bly	Any specific named material e.g., PCB board, solder				

NB If a candidate has **NOT** selected or indicated which process they have chosen, **BUT** the material given is appropriate for one of the question processes, then mark can be awarded.

Qu	Part	Marking Guidance			AO
18	2	Indicative content			AO4 1c
Stock	form:				I
Proc	ess		Only accept these stock forms		
Pape	r and b	oard die cutting	Sheet, roll		
Wood	d turning	g	Plank, board, log, (bowl) blank		
Meta	l casting	3	Ingot, bar		
Polymer extrusion			Powder, granules, pellets		
Textile weaving			Yarn, thread, hank		
Electronic pick and place assembly			Board, PCB board, reel of solder		

NB Stock form **must** be correct for the process not the material **BUT** if a process has not been selected a mark can be awarded if the stock form matches the main material given in 18.1.

Qu	Part		Total marks	AO	
18	3	The question all four availa	requires the candidate to detail two reasons to access ble marks.	4 marks	AO4 1c
		2 marks	One correct reason clarified in detail.		
		1 mark	One correct reason identified in brief.		
		0 marks	No response or nothing worthy of credit.		
		NB If a procest is the focus of	ss has not been selected or it is unclear which process f the response award no marks.		

Indicative content

Die cutting.

- Multiple copies of nets can be cut in one go e.g., leaflets.
- Cutting and/or creasing and/or perforations can be added at the same time e.g., tissue boxes.
- Speeds up the production of cardboard packaging for mass manufacture of product packaging e.g., mobile phone packaging.
- Once set up process allows for highly accurate, repetitive production of die-cut items.
- A net can be cut out as a flat shape and assembled into a 3D construction at a later point e.g., pizza box.

Turning

- Suited to CAD/CAM production for high volume wood products e.g., staircase spindles.
- Work piece is spun/rotates meaning material is removed rapidly.
- Turn consistent circular shapes e.g., bowls, cylinders without having to care for them by hand.
- Quick finishing of the turned surface as you do not have to move abrasive paper by hand. You just touch the surface of the work piece, and it rubs against the abrasive paper with no effort from the worker e.g., using glass paper.
- Several processes can be performed with the work piece set up once e.g., scraping, sanding, and applying a finish.

Casting

- A molten metal can be poured into a mould, so the metal takes on a complex shape and requires less processing e.g., casting for a mechanical pump.
- Leftover metal can be re-melted and reused again, reducing waste. Reduces material cost and can increase profit margins.
- Die casting is used to create highly accurate (fine detail) metal components where the material is gravity fed or pressure fed into a mould e.g., die casting metal figures/warcraft.
- A quality finish can be achieved, reducing finishing costs of mass manufactured products e.g., no need to paint etc.

Extrusion

- If long lengths/large quantities of a constant profile are required, a material can be 'pushed' through a die of a given shape/profile e.g. polymer tubes.
- Dimensional accuracy along a material length can be maintained by the profile.
- Complex cross-sectional profiles can be created in one process without the need for additional wastage processes.
- Extruded material can be cut and/or rolled in some cases for transportation and storage.

Weaving

- Weaving looms can be automated and linked to CAD to allow for changes in pattern design of a very large scale.
- Designs can undergo a 'test weave' to assess the suitability of a design for commercial manufacture before committing too much time and resources on production.
- Once set up, weaving looms can produce very large quantities of fabric at low cost due to reduced human involvement.
- Woven fabric can be constructed in different ways to give a wide variety of different qualities such as strength, durability, aesthetic appeal, drape and comfort.

Pick and place assembly.

- Allows the manufacturers of electronic products to employ surface-mount technology to populate PCBs.
- Highly suited to automated circuit construction meaning components can be placed very accurately.
- Accurate placement using CAD/Robots means that components can be placed closer together than by hand.
- Pick and place machines monitor reserves of components as they are held in cartridges or reels and stop production when they are depleted, meaning materials and time are not wasted making incomplete PCBs.

Qu	Part		Marking Guidance			
19	1	1 mark	Correct name.	1 mark	AO4 1c	
		0 marks	No response or nothing worthy of credit.			
		NB The Mark specific tool na safety.	Scheme for Question 19 is looking for linking between ame AND appropriate AND THEN correct use and the			
Indica	tive co	ntent				
Name	e of too					
A = C	Chisel					
B = S	Soldering	g iron				
C = F	lacksav	/junior hacksav	V			
D = F	D = Pinking shears/ Pinking scissors. DO NOT ACCEPT SCISSORS ALONE					
E = F	E = Rotary cutter/paper guillotine/guillotine/ paper trimmer					

Qu	Part			Total marks	AO	
19	2	2 mark	S	Two simple points of use or one clarified in detail.	2 marks	AO4 1c
		1 mark	<u> </u>	One simple correct descriptive point.		
		0 mark	S	No response or nothing worthy of credit.		
Indica	ative co	ntent				
NB Cr	edit if ex	kplanation	n is apj	propriate for named tool. Do not double penalise.		
Nam	e of too		Use	of tool		
A = 0	Chisel		• Us joii • Pa	ed to remove wood shavings from natural timbers when nts e.g., frame and box, finger joints, mortice and tenon ring by hand or chopping with a mallet.	n cutting woo joints.	odwork
B = S	Soldering	g iron	 Co He bo He sid 	onnecting electronic components and wire to a PCB/circ eating and/or melting solder to join and connect compor ard. eating heat shrink to encapsulate a wire to a component le of soldering iron not tip).	uit board. ients to a PC terminal (us	B ing
C = H junio	Hacksaw r hacksa	ı/ aw	 Us Use Rer Co 	ed with a metalwork vice to cut bar/rod/strip and angle. ed to cut both metals and polymers (not wood). move a part or component from a material length of stor nvert metal or polymers down into smaller more manag	ck form mate leable pieces	erial. S.
D = Pinking shears/scissors Us us		 Cu To Nea Sto Us use 	t fabric with a zigzag edge to neaten and stop fraying. give a decorative edge. aten edge. p fraying of edge. ed on shop-bought fabric to make the fabric look better e.	on purchase	e before	
E = Rotary cutter/ paper guillotine/paper trimmer• Use siz siz • Siz • Cu			• Use siz • Sizi • Cut	ed to cut paper and thin card down into smaller and mo ed pieces. ing laminated pieces of paper and card. is a straight line with accuracy.	re manageat	ble

Qu	Part		Total marks	AO	
19	3	2 marks	Two simple correct safety points (hazard or precaution) or one point described in detail.	2 marks	AO4 1c
		1 mark	One brief correct safety point (hazard or precaution) stated.		
		0 marks	No response or nothing worthy of credit.		
		NB Credit if sa	afety points are appropriate for the tool named.		
Nam	e of too	Safety cor	siderations		
A = 0	Chisel	 Keep yo Do not ru When ca Safety g The chis 	ur fingers behind the cutting edge at all times. un with a chisel in your hand in case you fall. arrying a chisel always carry point down. lasses/safety goggles/wearing goggles. el is sharp.		
B = S iron	Solderin	 The iron Put the s Check th Never to Solder in Safety g 	gets hot. soldering iron in its stand when not in use. he soldering iron for PAT testing sticker before use. buch the hot metal tip – hold by the coloured polymer bo n in a ventilated space lasses/safety goggles/wearing goggles.	dy (yellow/bl	ue/red).
C = H junio	Hacksav r hacksa	 Never cu Use the Slow down Make su without t Safety g 	ut near your fingers. saw with both hands to keep the blade straight and stop wn when cutting through material as it is about to finish are the saw blade is replaced when blunt to ensure safe the blade breaking. lasses/safety goggles/wearing goggles.	o it from twist cut. and effective	ting. e cutting
D = Pinking shears • Keep • When • Carry • Sharp		 Keep yo When ca Carry the Sharp point 	ur fingers away from the shearing action of the blades. arrying always carry point down so you don't injure your e scissors in your hand by grasping the blade. pints on the blade.	self if you fal	I.
 Sharp provide the second second			hat all guide strips are in place so fingers cannot be pla wheel/blade. vay securely so that the cutter cannot fall on you and ha overload the paper cutter with too much material so that bes not jam/stop suddenly.	rm you. the paper cu	of the utting

MARK SCHEME – GCSE DESIGN AND TECHNOLOGY – 8552/W – JUNE 2023

Qu	Part		Marking Guidance	Total marks	AO
20		7–8 marks	A detailed consideration of advantages and disadvantages manufacturing in quantity can have over producing a one-off item. Different scales of production evident, and where and why they would be used. Relevant example(s) of products/manufacturing processes/situations of use to clarify response for this band award.	8 marks	AO3 2a AO3 2b
		5–6 marks	A good consideration of advantages and disadvantages manufacturing in quantity can have over producing a one-off item. Good evidence of different scales of production considered. Some examples of products/manufacturing processes/situations of use to clarify response for this band award.		
		3–4 marks	A basic consideration of some advantages and disadvantages manufacturing in quantity can have over producing a one-off item. Limited evidence of different scales of production considered. No attempt to evaluate or offer a personal judgement. Very limited or no examples to support response given.		
		1–2 marks	One or two limited advantage or disadvantage points given. No examples given.		
		0 marks	No response or nothing worthy of credit.		

Indicative content

Expect candidates to talk about different scales of production, particularly batch, mass, and continuous production for manufacturing in quantity.

Prototype/one off

- Used to make an early version of a product/system to test a concept and see how well a component/part/feature works e.g., toile for a dress, concept vehicle.
- Used for a unique/personalised piece of work/product e.g., jewellery, handmade suit, where only one example will be required.
- 3D printing can be used to rapidly create a one-off prototype product of concept e.g., artificial implants used in surgery.
- This production technique is used where the manufacturer usually can work directly with the customer/end user /client and meet their very specific and personalised requirements e.g., wedding dress.
- Very labour intensive using highly skilled persons.

Batch

- Used where a specific number of a product are required.
- Using jigs and templates in batch production allows more of a component to be made later.
- Small changes between batches e.g., colour of phone cases is possible.
- Products/systems are produced in a higher volume than one-off /prototype production but less than mass and continuous production.

- Products created are identical and usually referred to as a batch e.g., rolls of wallpaper, components, perishable foods.
- Batches can be very small or quite large depending on complexity.
- Technique makes use of highly skilled persons to make products, but repetitive nature of batch production may require production lines and the use of jigs, former, templates and stencils to ensure consistency.

Mass

- Items tend to be consistently used where there is little change in the design eg white goods and electrical goods.
- Mass production involves high initial start-up costs in equipment and machinery that is recouped due to larger production runs e.g., car manufacture where product costs can be reduced and passed on to customers.
- Increasing levels of automation and use of robots to speed up production, minimise waste and increase efficiency.
- Mass production makes use of highly skilled technicians to keep the production line running smoothly.
- Minimal downtime in production to keep production rates high.

Continuous

- Where simple products or components are continually in demand and never change e.g., screws, zips, switches, resistors.
- Like mass production, but production lines run 24/7.
- Trying to keep production costs as low as possible so products can be produced for as little as possible.
 Staff usually low skilled
- Staff usually low skilled.
- Very high levels of automation e.g., pick and place machines for PCB assembly.
- Factories using commercial production techniques make a very limited number of products (limited range) with few or no changes to the product.

Qu	Part		Marking Guidance			
21		5–6 marks	A thorough understanding of how prototyping helps test that a prototype or part of it is fit for purpose and will work. Response makes use of clear examples to clarify point(s) made in more detail.	6 marks	AO4 2b	
		3–4 marks	Good understanding of how prototyping helps test that a prototype or part of it is fit for purpose and will work. Response may use generic examples to clarify a point made in more detail.			
		1–2 marks	A basic understanding with one brief point made which links to prototypes and their use to test.			
		0 marks	No response or nothing worthy of credit.			

Response should focus on testing of the product to ensure it meets the original product brief, client needs and wants, functionality and marketability. Is it fit for purpose and does what it should? We are not looking for generic reference to development, i.e., modelling.

- Build and test a prototype to see if it does what the design brief wants.
- A prototype allows a design or iteration to become 'real' and allows both designers and potential clients to test parts and review and see how it matches the requirements of the brief.
- · Will the prototype do what the customer wants?
- Allows for rapid realisation and visualisation for testing e.g., electrical system, a part or combined components.
- Allows for parts or elements to be prototype for testing against the design brief.
- They can help refine and inform changes that need to be made to create an effective product and make safe for sale.
- Test safety for the customer and meet safety requirements e.g., BSI, CE, PAT tested.
- Will the product be marketable (sell) in terms of aesthetics/looks?
- · Does the product work/function as intended for sale?
- · How does it compare to similar products sold on the market?
- Prototypes allow for material and manufacturing experimentation to check marketability in terms of cost, usability before scaling up to mass production etc.
- Allow for a prototype to be physically evaluated by focus groups and potential customers.

Qu	Part		Marking Guidance			
22	1	5–6 marks	Thorough analysis and evaluation of both bags considering their suitability for children to use.	6 marks	AO3 1a AO3 1b	
		3–4 marks	Good analysis and simple evaluative points of one or more bags considering their suitability for children to use.			
		1–2 marks	Basic analysis of one or two simple suitability points for either rucksack or drawstring bag.			
		0 marks	No response or nothing worthy of credit.			

Expect responses to consider needs (essential things) and wants (desirable things) of a child or teenager.

The guidance provided is illustrative and not exhaustive. Credit any worthy points made in support of the band descriptors above.

Rucksack

- Somewhere to carry a drinks bottle for break time. Prevents the bottle from getting lost.
- Lots of pockets for things like phone, pencil case, calculator.
- Zips and clips for security so items do not fall out and get lost.
- Adjustable straps for comfort. The padding will also make it easier to carry the bag a long time.
- Made from a hard-wearing material so holes do not appear from placing/dragging on rough surfaces e.g., playground.
- It keeps the contents dry.
- Protects fragile things from being crushed or damaged.
- Different things can have their own place to help keep them safe and organised.
- Colourful graphics to appeal to the user.
- Plastic feet at base to protect the bag.
- Options for how to carry the bag handle and straps.
- Reflector triangles for safety.
- Add a negative point for evaluation such as the rucksack may be expensive.

Drawstring bag

- Easy to customise and personalise to own taste e.g., writing name on, adding badges, stickers, and keychains.
- Can get your fingers caught in clips like with the rucksack.
- Can fold away when not full/in use.
- The bag expands to fit more things in. You are not limited by compartment size.
- The string might fall out so the bag can't be closed.
- Thin material so a hole might wear in it easily.
- Difficult to find what you want if the bag is full of things.
- It keeps the contents dry.
- Strings may be uncomfortable when carrying the bag.

Qu	Part		Marking Guidance			
22	2	5–6 marks	Thorough analysis and evaluation of both bags considering ergonomics and anthropometrics.	6 marks	AO3 1a AO3 1b	
		3–4 marks	Good analysis and simple evaluative points of one or more bags considering ergonomics and/or anthropometrics.			
		1–2 marks	Basic analysis points of one or two ergonomic or anthropometric points for either the rucksack or drawstring bag.			
		0 marks	No response or nothing worthy of credit.			

Analysis – identification of different bag features.

Evaluation – judgement and personal consideration as to the value of each bag feature.

The guidance provided is illustrative and not exhaustive. Credit any worthy points made in support of the band descriptors above.

Ergonomics

- How the user interacts with the bag(s) e.g., organising.
- The rucksack has comfortable straps for carrying on the shoulders.
- Adjustable straps for comfort.
- Ergonomically designed and shaped one-piece handle for comfort on the rucksack unlike the string on the drawstring bag.
- The drawstring bag will dig into your shoulders or hands when carrying for a long time.
- Reflective panels for safety and night to keep the user visible. This will help reassure parents a child is safe and make them easier to spot by car drivers.
- Clips can be seen that make a firm 'click' sound, so you know you have locked it.
- The bag has edges that are made from softer material so that they don't cut your hands.
- Drawstring bag is made from softer material that is more comfortable to handle.

Anthropometrics

- The clips will be sized so the user's fingers can fit round them to open and close them.
- Straps long enough to fit on the back of a child.
- Carrying handle on the rucksack is designed to be the right size for a child's hand.
- The polymer lock mechanism on the drawstring bag can be too small to operate if your hand is wet e.g., after swimming.

Qu	Part Marking Guidance		Total marks	AO
23	1	1 mark 25 divided by 2 = 12.5 mm	1 mark	AO4 2c

Qu	Part		Marking Guidance	Total marks	AO	
23	2	Two me	wo methods:			AO4 2c
			Method 1	Method 2		
1 mark		k	120 divided by 8 (their 8)	120-49= 71		
1 mark		k	15 mm	15.875mm		

Qu	Part	Marking Guidance			AO
23	3	Two methods:			AO4 2c
		Method 1 Method 2			
1 ma	ırk	Distance between hole centres = 15 (their 15) - 7	Distance between hole centres = 15.875 (their 15.875) - 7		
1 mark		= 8 mm	= 8.875 mm		

Qu	Part	Marking Guidance	Total marks	AO
23	4	Minimum drill size = 6.5 mm & maximum drill size = 7.5 mm	1 mark	AO4 2c
		No mark if both correct measurements are not given.		
		Accept if correct values are given but written wrong way round.		

Qu	Part	Marking Guidance		Total marks	AO
24		3 marks	A very detailed explanation with clear linking to the work of others. Response may use one detailed point of explanation or several simpler creditworthy points of explanation.	3 marks	AO4 2b
		2 marks	A detailed explanation or two simple creditworthy points of explanation.		
		1 mark	One brief creditworthy point made.		
		0 marks	No response or nothing worthy of credit.		

- Get some design inspiration before starting own design work.
- To ensure own designs are original and new.
- Can provide new starting points to make a better or improved design.
- Identify features that work well and those that work less well.
- Get inspiration on how shapes and colours combine in existing designs e.g., textiles and soft furnishings.
- By looking at a range of designers you may get information and ideas of how to design a product in many ways.
- Provides an opportunity to look at materials and technologies used by other designers to create a design solution.
- Some designers find it too difficult to start with a blank piece of paper and try to come up with a design. The work of others gives a starting point.

Qu	Part		Marking Guidance		
25		Maximum of f	Maximum of four marks for detailed points but no examples given.		
		5–6 marks	A thorough and detailed explanation with clear, relevant discussion of a user-centred design approach. Excellent understanding of how it can be used to make sure products are fit for purpose. Clear example(s) given to support response.		
		3–4 marks	A good explanation with relevant supporting discussion on user-centred design. Some understanding of how user-centred design can be used to make sure products are fit for purpose. There may be example(s)s given to support response.		
		1–2 marks	Basic discussion with general points made around user-centred design and what it is. Little or no consideration of examples to support response		
		0 marks	No response or nothing worthy of credit.		

NB Example(s) may be actual products or methods used in user centred design

- Constant contact, feedback and discussion with the end user or client group e.g., questionnaire's, survey.
- Designing thinking about how specific people will use products.
- Designing thinking about what clients and end users will do with the product.
- User-centred design focusing on:
 - a specific identified problem e.g., opening bottles and jars, mountain bike equipment storage.
 - client-based approach e.g., GCSE projects where candidates identify an end user
 - responding to customer feedback on existing products e.g., computer games and gaming hardware such as, virtual reality headsets, game graphics etc.
- Focused on the needs and wants of the client or end user to ensure the product meets their specific requirements e.g., a suit or wedding dress.
- User-centred design is focused on a specific target or end user group.
- User-centred design focuses on the needs and wants of the user at each specific phase of design and development.
- User-centred design will make use of primary and secondary research e.g., interviews, focus groups, user interactions.
- Focus group testing to ensure the product works safely and correctly with its intended user group. Testing may flag up issues and/or changes that need to be made to improve how a product works for a future iteration e.g., battery life, camera, screen size on a mobile phone.

Qu	Part	Marking Guidance		Total marks	AO
26	1	Indicative content		1 mark	AO4 2a
		Any correct re	esponse:		
		1 mark	3rd angle3rd angle projection3rd angle orthographic projectionOrthographicOrthographic drawingOrthographic projection		
		0 marks	No response or nothing worthy of credit.		

Qu	Part		Marking Guidance		
26	2	1 mark	Added solid bottom horizontal line to side view	4 marks	AO4 2c
		1 mark	Added hidden detail line for plane /part of plane on which buttons located		
		1 mark	Three sides of at least one button drawn in hidden detail		
		1 mark	Fully complete drawing including centre lines		
		0 marks	No attempt or nothing worthy of credit.		

The answer is looking for the correct use of centre lines and hidden detail lines to complete the drawing as shown below in red.

Indicative content



Qu	Part		Marking Guidance		
26	3	1 mark	Correct position of missing rear edge/back edge detail to drawing.	4 marks	AO4 2c
		1 mark	Correct indication of a third button.		
		1 mark	Correct indication of a lozenge-shaped button.		
		1 mark	Accurate and correctly proportioned addition of all buttons and lines.		
		0 marks	No attempt or nothing worthy of credit.		

Do not expect inclusion of lines drawn towards vanishing points.

Indicative content



Qu	Part	Marking Guidance			AO
27		Maximum of t	wo marks for each response.	4 marks	AO4 2b
		2 marks	A detailed explanation of an advantage of using audio/visual recordings to develop ideas.		
		1 mark	A simple point clarifying an advantage of using audio or visual recordings to develop ideas.		
		0 marks	No response or nothing worthy of credit.		

WE ARE NOT REWARDING SKETCHING OF IDEAS AS A VISUAL RECORDING.

Audio recordings

- Interviewing possible client's/end users to find out their needs and wants.
- Gain feedback on your design ideas and prototypes before moving forward.
- Keep a record of discussion/information for retrieval later.
- You might forget the details of a discussion after time.
- Evidence of ownership/intellectual rights etc.
- Very quick way of recording information e.g., using your smartphone to record.
- Teams/Zoom meeting

Visual recordings

- Make a recording of a client or user group working with a potential product e.g., nursery children at play with a prototype toy.
- Interaction of end users with a product.
- Evidence of ownership/intellectual rights etc.
- Recorded 3D simulation of a product in CAD software.
- A visual recording of a prototype being tested to see how it performs.
- Video recording to help show how to dismantle and put together products e.g., clips on social media and on websites to help customers really see how to do something rather than look in an instruction manual.
- A video recording can be slowed down to see gradually how a product performs incrementally e.g., design of new sports equipment like running shoes.
- Video recordings of destructive and non-destructive testing.
- Teams/Zoom meetings.

Qu	Part		Marking Guidance		
28		Maximum of	2 marks per each issue.	4 marks	AO2b
		2 marks	One point understanding in detail or two simple points of understanding given.		
		1 mark	One simple correct point made.		
		0 marks	No response or nothing worthy of credit.		
		NB Two mar warming.	ks maximum for each response for fair trade and global		

Fair trade

- Are people getting a fair price.
- Companies may want to improve their credentials as a fair-trade organisation when selling their new products.
- Promotes the company with more ethical credentials.
- Designers and manufacturers will want to know farmers can support their families.
- Workers' rights.
- Safe working conditions.
- Are farmers in the developing world getting a fair price for their produce?
- Designers and manufacturers will recognise that good PR can help sales if working conditions are good for farmers (and their families).
- Manufacturers now know that some customers actively buy based on whether a product is fair trade or not e.g., coffee or chocolate.
- Moral purpose to ensure farmers and their families are not being exploited.

Global warming

- Don't want to heat up the planet.
- Don't want products that damage the planet.
- Don't want to add to conditions that create extreme weather/drought.
- Designers/manufacturers may want to cut CO₂ emissions as they know it leads to global warming.
- Designers and manufacturers may employ strategies and techniques which don't contribute to global warming e.g. use fossil fuels to power factories.
- Designers/manufacturers may want to cut CO₂ emissions as they know it leads to global warming. They won't want to be responsible for damaging the planet more.
- Manufacturers may choose to promote a product as 'climate friendly' because it has lower CO₂ emissions and won't contribute to global warming e.g., car manufacturers, TV manufacturers.
- Designers and manufacturers may calculate the carbon footprint of their business or product and aim for a state of net-zero carbon dioxide emissions.