



---

# **GCSE MARKING SCHEME**

---

**SUMMER 2018**

**DESIGN & TECHNOLOGY  
RESISTANT MATERIALS TECHNOLOGY  
4111-01**

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

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

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

**GCSE DESIGN & TECHNOLOGY - RESISTANT MATERIALS TECHNOLOGY**

**SUMMER 2018 MARK SCHEME**

Question			On paper	Question Totals	Overall TOTAL	
1	(a)	No answer or an incorrect answer.	0	3x[1]	3	
	(i)	Scale of Manufacture.	1			
	(ii)	Target market.	1			
	(iii)	Safety considerations.	1			
	(b)	<p>No answer or an inappropriate answer.                      One word answers – Strong, hard, cheap.                      Appropriate reason but lacking detail award 1 mark,                      e.g. Stainless steel is a durable and hardwearing material.</p> <p>Appropriate reason well detailed award 2 marks,                      e.g. Stainless steel is a tough and durable material which will support the weight of all users without breaking/failing.</p> <p><b>Stainless steel - answers related to:</b></p> <ul style="list-style-type: none"> <li>• Resistant to corrosion</li> <li>• Resistant to wear</li> <li>• Good strength/weight ratio of tube</li> <li>• Can be extruded into round section</li> </ul> <p>Appropriate statement but lacking detail award 1 mark,                      e.g. ABS is a durable and hardwearing material.</p> <p>Appropriate statement well detailed award 2 marks,                      e.g. ABS is a durable material which is also lightweight and stain-resistant.</p> <p><b>ABS - answers related to:</b></p> <ul style="list-style-type: none"> <li>• Is able to be injection moulded into shape.</li> <li>• High-impact strength.</li> <li>• Excellent appearance and finish.</li> <li>• Inexpensive to replace.</li> <li>• Available in a range of colours.</li> <li>• Stain/Chemical resistant</li> </ul>	<p>0</p> <p>1 or 2</p> <p>1 or 2</p>	4	4	7

Question			On paper	Question Totals	Overall TOTAL	
(c)		<p>Appropriate advantage but lacking detail award 1 mark, e.g. The desk can be stored when not in use.</p> <p>Appropriate statement well detailed award 2 marks, e.g. The desk can be folded compact and stored efficiently when not in use.</p> <p><b>Also answers related to:</b></p> <ul style="list-style-type: none"> <li>Easily carried/transported.</li> <li>Space saving - desks take up much less space when folded.</li> <li>Can be taken away so that space can be utilised for other purpose.</li> <li>Ease of stacking/storage.</li> </ul>	1 or 2	2	10	9
(d)	(i)	<p>No answer or incorrect answer Only correct answer Total = <b>180</b></p>	0	1	11	10
	(ii)	<p>No answer or answer that does not match the mark scheme. Price =58, Total = 180 % of total no. that chose Price = <math>58/180 \times 100 = 32.2\%</math></p> <p>*Answer that is 32.2 without workings - can be awarded 1 mark.</p>	0 1 or 2	2	12	12
(e)		<p>No description or an inappropriate description.</p> <p>Appropriate description but lacking detail award 1 mark, e.g. So that none are left over.</p> <p>Appropriate description, includes some detail award 2 marks The manufacturer would make enough to satisfy early demand but not too many in case the product did not sell.</p> <p>Appropriate description well detailed award 3 marks, e.g. the manufacturer would make enough to satisfy early demand and to place the product in the public eye but not too many in case the product did not sell.</p> <p><b>Also answers related to:</b></p> <ul style="list-style-type: none"> <li>Just In Time (JIT)</li> <li>Attempt to predict the potential market.</li> <li>Further batches can be made according to initial response.</li> </ul>	0  1 or 2 or 3	3	15	15
					<b>15</b>	<b>15</b>

Question			On paper	Question Totals	Overall TOTAL	
2	(a)	No answer or incorrect answer Only acceptable answers.	0		2	16
	(i)	The material can be <b>recycled</b> .		1		
	(ii)	The material is <b>polystyrene</b> .		1		
	(iii)	No explanation or incorrect explanation. Appropriate explanation but lacking detail award 1 mark, e.g. so that the material can be identified.  Appropriate explanation well detailed award 2 marks e.g. so that the material can be easily identified and separated from other materials at the recycling centre .  <b>Also answers related to:</b> <ul style="list-style-type: none"> <li>• Overuse of resources. Fossil fuels. Prevent global warming.</li> <li>• Ease of recycling - separate the materials easily at recycling centre.</li> <li>• Identification of the material at recycling centre.</li> <li>• So that the packaging can be recycled into another product.</li> <li>• To encourage the consumer to think about recycling.</li> <li>• So that the consumer knows that the product can be recycled and they can put it in the recycling bin.</li> <li>• So that it is not put in landfill.</li> <li>• To help prevent pollution.</li> <li>• Government legislation.</li> </ul> (Duplicated answers from (i) & (ii) will not be accepted).	0	2	4	18
	(b)	No answer or incorrect answer Only acceptable answer:  Evaluate / Reduce the Risks / control measures.	0	1	5	20

Question			On paper	Question Totals	Overall TOTAL	
	(c)	<p>No explanation or incorrect explanation Appropriate explanation but lacking detail award 1 mark, e.g. the BSI sets standards for products.</p> <p>Appropriate reason, well detailed award 2 marks, e.g. the BSI sets out standards for manufacturers to follow in the designing and manufacturing of their products.</p> <p><b>Also answers related to:</b></p> <ul style="list-style-type: none"> <li>• BSI standardises products - interchangeability of parts.</li> <li>• Certification mark such as the 'Kite' mark ensure buyers that the product is of a reasonable quality.</li> <li>• Safety considerations.</li> </ul>	0 1 or 2	2	7	22
	(d)	<p>No explanation or incorrect explanation Appropriate explanation but lacking detail award 1 mark, e.g. to protect the environment.</p> <p>Appropriate explanation, includes some detail award 2 marks, e.g. to protect the environment by designing and making products which do not cause harm.</p> <p>Appropriate explanation, well detailed award 3 marks, e.g. to protect the environment by designing products which do not cause harm as a result of their manufacture, use or disposal.</p> <p><b>Also answers related to:</b></p> <ul style="list-style-type: none"> <li>• The social, economic and environmental implications of designing.</li> <li>• Consideration of environmental issues when designing new products.</li> <li>• Sourcing of materials, Energy, Manufacturing processes, Transportation, Ethical issues,</li> <li>• Designing of products that are built to last and disposal issues.</li> <li>• Environmental regulations.</li> </ul>	0	3	10	25
					10	25

Question				On paper	Question Totals	Overall TOTAL
3	(a)	(i)	True	2	2	27
		(ii)	False			
	(b)		<p>Candidates could refer to the following in their answers.</p> <p><b>Phillip Starck - products:</b></p> <ul style="list-style-type: none"> <li>• <b>Any relevant products</b> - Ghost chair/range, To'taime coat stand, Juicy Salif, Dr. Skud fly swat, etc.</li> <li>• There are few areas of design he hasn't explored: from furniture to mail-order homes, motorbikes to mega-yachts, and even space-travel projects.</li> <li>• Responsible for the creation of a wide variety of objects in the O.W.O. Series, noodles for Panzani, boats for Beneteau, mineral-water bottles for Glacier, kitchen appliances for Alessi, toothbrushes for Fluocaril, luggage for Vuitton, "Urban Fittings" for Decaux, office furniture for Vitra, as well as vehicles, computers, doorknobs, spectacle frames, etc.</li> </ul> <p><b>Phillip Starck - characteristics:</b></p> <ul style="list-style-type: none"> <li>• Much of his work produced in the 1980's and 1990's were influenced by fashion and <b>novelty</b>. It has even been referred to by some as being 'overdesigned'.</li> <li>• Philippe Starck believed in the <b>green</b> long before ecology became fashionable, out of respect for the planet's future.</li> <li>• Concept of "<b>democratic design</b>" – increase the quality of objects at lower prices so that more people can enjoy the best – he was a lone voice at a time when design was turned exclusively towards an elite.</li> </ul> <p><b>Bethan Gray - products:</b></p> <ul style="list-style-type: none"> <li>• <b>Any relevant products</b> - Parker and Hana ranges, Shamsian Masirah collection, Ruby Tree collection, Lapidica, Workhouse, Crate &amp; Barrel, Wallpaper Handmade.</li> <li>• Pimlico kitchen range won an Elle Decoration award.</li> <li>• Welsh National Eisteddfod chair.</li> <li>• Bespoke furniture designer for companies such as John Lewis, Harrods and Liberty.</li> </ul> <p><b>Bethan Gray - characteristics:</b></p> <ul style="list-style-type: none"> <li>• Inspiration often comes from natural materials such as wood, marble, leather and slate.</li> <li>• Believes in using the best quality materials and working closely with craftspeople.</li> <li>• Combines natural techniques with cutting edge manufacturing Technology.</li> <li>• Inspired by the everyday items that surround us all, to objects and buildings discovered whilst travelling the globe.</li> <li>• Work reflects traditional Welsh culture and craft as well as geometric patterns and form.</li> </ul>	8	10	35

Question				On paper	Question Totals	Overall TOTAL
		No answer or no relevant issues described or discussed.	0			
		Note: if both designers are described. Mark the first answer only.				
		Simple description of the range of work of one designer. Little, if any, understanding of influence on product design. Quality of Written Communication is limited, presenting material with limited coherence, many errors of grammar, punctuation and spelling.	1 or 2			
		Some description of the range of work of one designer. Little understanding of influence on product design. Quality of Written Communication is basic, presenting occasionally appropriate material with some coherence, some errors of grammar, punctuation and spelling.	3 or 4			
		Description of the range of work of one designer. Some understanding of influence on product design. Quality of Written Communication is good, presenting mainly appropriate material in a coherent manner, few errors of grammar, punctuation and spelling.	5 or 6			
		Clear description of the range of work of one designer. Clear understanding of influence on product design. Quality of Written Communication is excellent, presenting wholly appropriate material in a coherent and logical manner, hardly any errors of grammar, punctuation and spelling.	7 or 8			
					<b>10</b>	<b>35</b>



Question				On paper	Question Totals	Overall TOTAL	
4	(a)	(i)	No answer or incorrect answer  Suitable strategies such as: <ul style="list-style-type: none"> <li>• Product Analysis.</li> <li>• Competitor's products.</li> <li>• Expert advice.</li> <li>• Brainstorming.</li> <li>• Analysis of design Brief.</li> <li>• Market research.</li> <li>• User group.</li> </ul>	0	2x1	2	37
		(ii)	No answer or incorrect answer.  Suitable methods such as: <ul style="list-style-type: none"> <li>• CAD.</li> <li>• Isometric.</li> <li>• Oblique.</li> <li>• Modelling.</li> <li>• Paper/Card modelling.</li> <li>• Foam modelling.</li> <li>• Rapid prototyping.</li> </ul>	0	2x1	2	39
	(b)		No answer or incorrect answer  Appropriate explanation but lacking detail award 1 mark, e.g. is a checklist to test the final product against.  Appropriate explanation some detail award 2 marks, e.g. gives the designer a checklist of measurable criteria that makes testing the final product more effective.  Appropriate explanation, well detailed, award 3 marks, e.g. gives the designer a checklist of measurable criteria to measure ideas and evaluate the final product more effectively.  <b>Also consider:</b> <ul style="list-style-type: none"> <li>• The design specification is a list of statements that aids the designer.</li> <li>• Design ideas and development can be measured against the specification.</li> <li>• Is a checklist of things that the completed design needs to satisfy.</li> <li>• Can aid the process of evaluation at the end of the project.</li> <li>• The Specification gives detailed information to guide a designer when evaluating.</li> <li>• The Specification are used to help generate, test and evaluate the finished product.</li> </ul>	0	3	7	42

Question			On paper	Question Totals	Overall TOTAL
	(c)	(i)	<b>Details to satisfy specification</b>		
			<b>0 marks</b> No work or does not meet specification in anyway.	0	3
			<b>1 mark</b> Basic solution that addresses only 1 of the specification points.	1	10
			<b>2 marks</b> Feasible solution that addresses two of the specification points (3 specification points).	2	45
			<b>3 marks</b> Feasible solution that addresses all of the specification points.	3	
		(ii)	<b>Technical details</b>		6
			<b>0 mark</b> no details of construction shown.	0	16
			<b>1-2 marks</b> basic solution but could work with few technical features and processes shown.	1 or 2	51
			<b>3-4 marks</b> feasible solution that shows some important technical features and processes.	3 or 4	
			<b>5-6 marks</b> feasible solution, sufficient technical details are listed to manufacture the support frame. Clearly communicated with detailed range of sketches and good annotation.	5 or 6	
		(iii)	<b>Labelling suitable materials, components &amp; processes</b>		3
			Up to 3 marks for naming SPECIFIC and relevant material(s), component/s & process(es). Do not accept wood, plastic, etc.	1 or 2 or 3	19
					54
		(iv)	<b>Stating 2 important dimensions</b>		2
			Up to 2 marks specifying appropriate dimensions. 1 mark per important/appropriate dimension.	1 or 2	21
					56
		(v)	<b>Quality of communication</b>		4
			4 Excellent	1	25
			3 Good	2	60
			2 Average	3	
			1 Below average	4	
					<b>25</b>
					<b>60</b>

Question			On paper	Question Totals	Overall TOTAL	
5	(a)	<p>One-off production ——— Large numbers of products are made.</p> <p>Mass production ——— A single product is made.</p> <p>Batch production ——— A specific number of products are made.</p>	2x1	2	62	
	(b)	<p>No answer or incorrect answer.</p> <p>Suitable answers such as:</p> <p><b>Heater:</b></p> <ul style="list-style-type: none"> <li>To soften the plastic.</li> <li>To make the plastic flexible.</li> <li>To heat the material so that it can be moulded.</li> </ul> <p>*Do not accept "To heat/melt the plastic"</p> <p><b>Platen:</b></p> <ul style="list-style-type: none"> <li>The mould is placed on the platen.</li> <li>A vacuum is created by sucking the air down through the Platen.</li> </ul> <p><b>Lever:</b></p> <ul style="list-style-type: none"> <li>To raise and lower the platen.</li> <li>To allow the mould to be lowered away from the plastic until the plastic is softened.</li> </ul>	0	1  1  1	5	65
	(c)	<p>No answer or incorrect answer.</p> <p>Candidates need to state two appropriate advantages such as:</p> <ul style="list-style-type: none"> <li>Solid wood effect can be created without having to use solid timber.</li> <li>Saves on the expense of using solid natural wood.</li> <li>Preserves resources of natural wood.</li> <li>Recycled material can be used to produce the chipboard/MDF.</li> <li>Sheet material is more stable than natural wood.</li> <li>Large sheets of material can be manufactured, saves on jointing widths of natural timber.</li> </ul>	0	2x1	7	67

Question			On paper	Question Totals	Overall TOTAL
(d)	No explanation or incorrect explanation,	0	3	10	70
	Appropriate explanation but lacking detail award 1 mark, e.g. so that products are made to standard.	1			
	Appropriate explanation, some detail, e.g. QC checks are carried out during the production process to ensure the final product is made to standard, award 2marks.	2			
	e.g. QC checks are carried out at stages during the production process to ensure the final product is made to a high standard and is safe to use, award 3 marks.	3			
Answers related to:					
<ul style="list-style-type: none"> <li>• Inspections on the production line to identify quality and note any imperfections.</li> <li>• Checking against the Manufacturing Specification</li> <li>• The Quality Control Manager is responsible for ensuring accuracy and consistency throughout the manufacturing process.</li> <li>• ISO 9000 is awarded to manufacturing companies that produce high quality products.</li> </ul>					
				<b>10</b>	<b>70</b>

Question			On paper	Question Totals	Section TOTAL	
6	(a)	No answer or incorrect answer. Only acceptable answers:  (i) Strip            (ii) Tube            (iii) Channel	0	3x1	3	73
	(b)	No explanation or incorrect explanation. Appropriate description but lacking detail award 1 mark, e.g. Thermoplastics can be heated to make them soft.  Appropriate description well detailed award 2 marks, e.g. Thermoplastics can be heated to make them soft and this can be repeated many times.  <b>Answers related to:</b> <ul style="list-style-type: none"> <li>• Can be recycled.</li> <li>• Plastic memory.</li> <li>• Returns to a rigid state on cooling.</li> <li>• Weaker covalent bonds than Thermosetting plastics.</li> </ul>	0 1 or 2	2	5	75
	(c)	No answer or an inappropriate answer. Any acceptable answer such as: <ul style="list-style-type: none"> <li>• Screw</li> <li>• Nut and Bolt</li> <li>• KDF</li> <li>• Velcro</li> </ul>	0	2	7	77
	(d)	Only acceptable answers:  (i)        MDF/Hardboard (ii)       Balsa/Jelutong		2x1	9	79
	(e)	No answer or incorrect answer. Appropriate discussion point but lacking detail award 1 mark e.g. GRP is a waterproof material.  Appropriate discussion, includes some detail award 2 marks e.g. GRP is a waterproof material with a good strength to weight ratio.  Appropriate discussion, well detailed award 3 marks e.g. GRP is a waterproof material with a good strength to weight ratio. It can also be moulded into complex shapes.  <b>Answers related to:</b> <ul style="list-style-type: none"> <li>• Rigid structure.</li> <li>• Seamless no need to join board materials.</li> <li>• Can be repaired.</li> <li>• Range of colours.</li> </ul>	0 1 or 2 or 3	3	12	82

Question			On paper	Question Totals	Section TOTAL	
	(f)	<p>No answer or incorrect answer.</p> <p>Appropriate discussion point but lacking detail award 1 mark e.g. adding carbon makes the steel harder.</p> <p>Appropriate discussion, includes some detail award 2 marks e.g. adding carbon makes the steel harder but too much will make it brittle.</p> <p>Appropriate discussion, well detailed award 3 marks e.g. high carbon steel is very hard but also less ductile, tough and malleable.</p> <p><b>Answers related to:</b></p> <ul style="list-style-type: none"> <li>• Mild, Medium-carbon and High-carbon steels.</li> <li>• % of carbon added to steel.</li> <li>• Usage of steel in products – drills, chisels, knives, etc.</li> <li>• Case hardening.</li> </ul>	<p>0</p> <p>1 or 2</p> <p>or 3</p>	<p>3</p> <p>3</p>	<p>15</p>	<p>85</p>
				15	85	

Question			On paper	Question Totals	Overall TOTAL	
7	(a)	No answer or an incorrect answer. Scriber                      Marking gauge Sliding bevel              Try square	0	4x1	4	94
	(b)	(i)		2x1	6	96
		(ii)				
	(c)	No answer or an unacceptable answer.  <ul style="list-style-type: none"> <li>Producing the mould – manually (coping saw/file), laser cutter or CAM router to ‘mill out’ the mould. Suitable materials are referenced for mould.</li> <li>Runner to ensure pressure/flow of molten metal.</li> <li>Mould could be 2/3 parts that are clamped/secured together after cavity is formed.</li> <li>Pewter is heated until molten then poured into Runner.</li> <li>After leaving to cool and harden the casting is carefully removed from mould and the sprue cut off.</li> </ul> <p><b>1 mark</b> Very basic understanding (reference to one of the points above).</p> <p><b>2 marks</b> More detail (reference to 2 of the points above).</p> <p><b>3 marks</b> Fairly detailed response (reference to 3 of the points above).</p> <p><b>4 marks</b> Detailed response (reference to 4 of the points above).</p> <p><b>5 marks</b> Highly detailed response (all of the above referenced).</p>	0	5	11	101

Question			On paper	Question Totals	Section TOTAL	
(d)	(i)	No answer or an unacceptable answer.	0	4	15	105
		<b>Injection</b> moulding.		1		
	(ii)	<p>Appropriate advantage but lacking detail award 1 mark, e.g. ...is a very rapid process, many blocks can be made in a short time.</p> <p>Appropriate advantage/s some detail award 2 marks, e.g. ...is a very rapid and efficient process, many identical blocks can be made in a short time.</p> <p>Appropriate advantage/s, well detailed award 3 marks, e.g. is a very rapid and efficient process, many identical blocks which are complex in shape can be made in a short time.</p> <p><b>Also consider:</b></p> <ul style="list-style-type: none"> <li>• A variety of coloured plastics can be used.</li> <li>• High production rate with good quality.</li> <li>• Intricate moulds can make complex shapes.</li> <li>• Economy of scale reduces costs.</li> <li>• Very little material is wasted.</li> </ul>		3		
(e)		No answer or an unacceptable answer.	0	5	20	105
		<p>The following points need to be referenced to gain marks:</p> <ul style="list-style-type: none"> <li>• Clean surface of steel.</li> <li>• Offer up pieces.</li> <li>• Apply flux.</li> <li>• Apply heat to dull red/red hot.</li> <li>• Apply solder/brazing rod.</li> </ul> <p><b>1 mark</b> Very basic understanding.</p> <p><b>2-3 marks</b> Some detail and understanding related to tools, processes.</p> <p><b>4-5 marks</b> Detailed understanding (most of above points referenced), clearly communicated.</p>	1 or 2 or 3 or 4 or 5			
					<b>20</b>	<b>105</b>



Question			On paper	Question Totals	Overall TOTAL		
8	(a)	No answer or an incorrect answer. Only acceptable answers:	0	2	2	107	
		(i) Communication	1				
		(ii) Manufacture	1				
	(b)	No answer or an incorrect answer. Only acceptable answers:  Dowel                  Dovetail                  Comb / Finger	0	1x3	5	110	
	(c)	No explanation or incorrect explanation,  The following points need to be referenced to gain marks: <ul style="list-style-type: none"> <li>• Draw filing edges/use of scraper/steel rule.</li> <li>• Emery cloth.</li> <li>• Work down through grades of wet &amp; dry paper.</li> <li>• Apply an appropriate polishing compound such as Vonax, T-cut.</li> <li>• Use of polishing mop/rag.</li> </ul> <p><b>1 mark</b> Basic understanding (reference to 1 or 2 of the points above).</p> <p><b>2 marks</b> More detail (reference to 3 or 4 of the points above).</p> <p><b>3 marks</b> Detailed response (reference to 5 of the points above).</p>	0	3	8	113	
	(d)	(i)	No answer or an incorrect answer.	0	2	10	115
			<b>Black:</b> shows lines to be cut out.	1			
			<b>Red:</b> shows lines to be engraved.	1			
		(ii)	Appropriate description but lacking detail award 1 mark, e.g. Allow for thickness of laser beam.  Appropriate description well detailed award 2 marks, e.g. Allow for thickness of laser beam by reducing the size of the slot slightly.  <b>Answers related to:</b> <ul style="list-style-type: none"> <li>• Thickness of laser beam (approximately 0.6mm).</li> <li>• Use of contour tool.</li> <li>• Speed and power optimised for precision cutting.</li> </ul>	1  or 2	2	12	117

Question			On paper	Question Totals	Overall TOTAL
	(e)	<p>No explanation or incorrect explanation,</p> <p>Appropriate discussion point but lacking detail award 1 mark, e.g. to soften the copper.</p> <p>Appropriate discussion, includes some detail award 2 marks, e.g. the copper will become harder as it is being worked with so it will need to be softened.</p> <p>Appropriate discussion, well detailed award 3 marks, e.g. the copper will become harder as it is being worked with so it will need to be softened as it can become brittle and break when bent or hammered.</p> <p><b>Answers related to:</b></p> <ul style="list-style-type: none"> <li>• Relieve internal stresses in the copper.</li> <li>• To make it easier to work with/easier to shape/form.</li> <li>• To prevent cracks forming.</li> <li>• Work hardening.</li> </ul>	0 1 or 2 or 3	3 15	120
				15	120