

Design & Technology (Resistant Materials)

General Certificate of Secondary Education **GCSE J306**

General Certificate of Secondary Education (Short Course) **GCSE J046**

Mark Schemes for the Units

January 2010

J046/J306/MS/R/10J

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A562 Sustainable design

Section A

Question		Expected Answers	Marks	Rationale
1	(a)	Gas	[1]	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate's response is not clear. Accept any other method of indicating response eg tick
2		Leaving a product to biodegrade	[1]	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate's response is not clear. Accept any other method of indicating response eg tick
3		Risk Assessment	[1]	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate's response is not clear. Accept any other method of indicating response eg tick
4		Managed Forest	[1]	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate's response is not clear. Accept any other method of indicating response eg tick
5		Oil	[1]	Do not credit any other answer. No mark awarded if more than one answer ringed or the candidate's response is not clear. Accept any other method of indicating response eg tick
6		Naturally rots or breaks down in the environment	[1]	Credit any similar form of words with a similar meaning. Do not accept harm the environment
7		Recycling/recycled/primary recycling/secondary recycling	[1]	Accept recycled, primary/secondary recycling

Question	Expected Answers	Marks	Rationale
8	Looking at/describe/review features of a product/materials/sizes/manufacture/how it works.	[1]	Do not accept analysing the product. Do not accept answers related to evaluation of products or testing.
9	Conformiteie European Meets an agreed/European standard .	[1]	Do not accept 'made in Europe'. Do not accept safe/safety. Do not accept 'meets British standard'
10	Oil or Gas Accept all fuels made from oil/gas. E.g petrol/natural gas.	[1]	Do not accept wood or coke.
11	True	[1]	Do not award a mark if both true and false box is ticked or if the candidate's answer is not clear. Accept any other method of indicating correct response eg circled/cross
12	True	[1]	Do not award a mark if both true and false box is ticked or if the candidates answer is not clear. Accept any other method of indicating correct response eg circled/cross
13	False	[1]	Do not award a mark if both true and false box is ticked or if the candidates answer is not clear. Accept any other method of indicating correct response eg circled/cross
14	False	[1]	Do not award a mark if both true and false box is ticked or if the candidates answer is not clear. Accept any other method of indicating correct response eg circled/cross

Question			Expected Answers	Marks	Rationale
15			True	[1]	Do not award a mark if both true and false box is ticked or if the candidates answer is not clear. Accept any other method of indicating correct response eg circled/cross
16	(a)		Transporting/delivery/send to shops [1] Disposal/recycling/incineration/put in landfill[1]	[2]	Accept correct answers in any order. Accept answers in box if not on given lines
16	(b)		This is a measure of the impact of activities on the environment in terms of the greenhouse gasses produced through the outlet of carbon dioxide 1 mark for measure of impact/effect/how much 1 mark for mention of environment/atmosphere/planet/world 1 mark for mention of CO2 or greenhouse gas	[3]	Do not accept references to carbon without dioxide Do not accept references to ozone layer/global warming. Do not accept references to 'pollution' without mention of CO2/greenhouse gasses.
16	(c)		Effect of global warming on weather patterns Effect of global warming on sea levels Effect of global warming on ecology systems 1 mark for each or other any other effect of global warming Accept: ice cap melting, areas flooding, deserts expanding, increase in frequency of tropical storms, warmer summers/colder winters, wetter summers/windy winters. Accept three effects related to one of the given headings.	[3]	Do not accept references to temperature rise or heating up.
16	(d)	(i)	Repair [1] Reduce [1] Reuse [1]	[3]	Do not accept repaired, reduced, reused, reusable, etc. Do not accept repeats of correct answers and those given in the question.

Question			Expected Answers	Marks	Rationale
16	(d)	(ii)	<p><u>Refuse</u> to use materials, energy source, materials processing which are not environmentally friendly. Or refuse to design a product which will not be environmentally friendly in use or when disposed of after use 1 mark for each point made (max 2)</p> <p><u>Rethink</u> the product to use less materials, reduce energy consumption, reduce transport requirements (eg flat pack or stack ability) reduces impact on environment in use 1 mark for each point made (max 2)</p>	[4]	<p>Accept a valid response that would have been better written under the other heading.</p> <p>Do not accept repeats of correct answer</p> <p>Do not accept answers which are a re-wording of the question.</p>
			Total	[15]	

Question	Expected Answers	Marks	Rationale
17 (a)	<p>Look first at the whole answer and decide which level it best fits.</p> <p>Level 1 (0-2 marks) Basic analysis, showing some understanding of manufacturing processes, sources of materials, processing of raw materials, finish requirements, and disposal. There will be little or no use of specialist terms. Answers may be ambiguous and disorganised. Errors of grammar, punctuation and spelling may be intrusive. One specific point is well made or two more general points (2) Just one general point made (1).</p> <p>Level 2 (3-4 marks) Adequate analysis, showing some understanding of manufacturing processes, sources of materials, processing of raw materials, finish requirements, and disposal. There will be some use of specialist terms. Answer may have some structure in format. Occasional errors of grammar, punctuation and spelling. Two specific points are well made(4) Two specific points adequately made(3)</p> <p>Level 3 (5-6 marks) Good analysis, showing clear understanding of manufacturing processes, sources of materials, processing of raw materials, finish requirements, and disposal. Specialist terms will be used correctly. Answers will be in structure in format. Accurate use of grammar, punctuation and spelling. Three specific points are well made (6) Three specific points adequately made.(5)</p>		<p>Specific points that may appear in the answer:</p> <ul style="list-style-type: none"> • Plastic is material made from oil which is a non-renewable • Wood comes from trees which can be grown again • Wood requires a finish many of which are made from oil • The processing of oil to plastic releases pollution into the atmosphere • The plastic easel may not last as long as may crack easier • The plastic easel will not biodegrade at the end of its useful life • The plastic easel requires no applied finish • The plastic easel may be able to be recycled • Both easels require considerable energy to manufacture the product from raw materials. <p>General points</p> <ul style="list-style-type: none"> • Consider if material can be recycled after use • Consider if material comes from a sustainable source • Does manufacturing cause pollution.

Question			Expected Answers	Marks	Rationale
17	(b)		Wax, Acrylic, water based finish, or vegetable dye Any 2	[2]	Do not accept paint or varnish. Do not accept stain.
17	(c)		<ul style="list-style-type: none"> Less pollution due to transportation [1] Less fuel used [1] 	[2]	
17	(d)	(i)	Adding design features to make a product unserviceable after a certain length of time. Designing a product to only last a certain length of time.	[1]	Do not accept references to style, fashion, or form. Accept answers that refer to specific examples such as light bulbs
17	(d)	(ii)	Manufacture will sell more products [1] as consumer will need to buy a new product, therefore increasing trade and profit [1]. Manufacturer can make products cheaper [1] if they are only designed to last a certain length of time[1]	[2]	First mark for a correct advantage. Second mark for a justification/explanation/qualification/exemplification.
17	(d)	(iii)	User will need to replace product [1] when it fails which will be at a cost [1]. Obsolete product will need to be disposed of [1] which could be costly or inconvenient [1].	[2]	First mark for a correct disadvantage. Second mark for a justification/explanation/qualification/exemplification.
			Total	[15]	

Question			Expected Answers	Marks	Rationale
18	(c)	(i)	Recyclable/can be recycled/recycle	[1]	Do not accept recycled/made from recycled materials/recycling.
18	(c)	(ii)	<ul style="list-style-type: none"> • Many purchasers are very aware of environmental issues [1] and prefer to purchase recyclable products [1]. • So the purchaser knows [1] how the product can be disposed of at the end of its life [1]. 	[2]	First mark for a correct importance to the purchaser. Second mark for a justification/explanation/qualification.
18	(d)		<ul style="list-style-type: none"> • Maximum working hours • Entitlement to breaks/meal breaks • Guarding on machines • Max/min temperature • Max noise level • Obligation to provide safety equipment. 	[2]	1 mark for a correct example of H&S regulations. Second mark for a justification/explanation/example/qualification. Example: must wear goggles(1) to protect the eyes(1)
			Total	[15]	

A564 Technical aspects of design and making

Section A

Expected Answer		Mark	Rationale										
1 (a) (i)	<table border="1"> <thead> <tr> <th>Stage</th> <th>Tools/items of equipment</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><i>Pencil, rule, try square, sliding bevel, template.</i></td> </tr> <tr> <td>2</td> <td><i>Tenon saw, coping saw, Hegner, vibro or equivalent.</i></td> </tr> <tr> <td>3</td> <td><i>Sanding disc, plane.</i></td> </tr> <tr> <td>4</td> <td><i>Glasspaper, sandpaper, abrasive paper, sander.</i></td> </tr> </tbody> </table>	Stage	Tools/items of equipment	1	<i>Pencil, rule, try square, sliding bevel, template.</i>	2	<i>Tenon saw, coping saw, Hegner, vibro or equivalent.</i>	3	<i>Sanding disc, plane.</i>	4	<i>Glasspaper, sandpaper, abrasive paper, sander.</i>	[4]	Stage 2 Accept 'saw' in stage 2. Accept any answer including 'saw' even if the named saw is incorrect; eg 'rip saw'. Stage 3 Do not accept file, sander. Stage 4 Do not accept emery cloth or wet and dry paper.
	Stage	Tools/items of equipment											
	1	<i>Pencil, rule, try square, sliding bevel, template.</i>											
	2	<i>Tenon saw, coping saw, Hegner, vibro or equivalent.</i>											
	3	<i>Sanding disc, plane.</i>											
4	<i>Glasspaper, sandpaper, abrasive paper, sander.</i>												
(a) (ii)	Clamp work down securely, keep fingers out of the way of the blade, eye protection.	[1]	If method in Stage 2 is inappropriate but safety precaution is sensible and <u>corresponds to method</u> award 1 mark.										
(b)	Technical accuracy of joint: [0-2] Butt, dowel, finger [comb], dovetail, half-lap or equivalent [1]	[3]	Sketch can be correct and name incorrect or sketch incorrect and name correct. Do not accept mitre joint.										
(c)	Method of support: dowel, wooden rail. Must be shown connected to the ends for maximum marks [0-2] Kept apart: some form of 'spacer' or 'block' with no movement allowed [0-2]	[4]	2 key points: 'support' and 'kept apart'. 'support' Sketch 1 mark, notes and/or labels 1 mark. 'kept apart' Sketch 1 mark, notes and/or labels 1 mark.										
Total		[12]											

Expected Answer		Mark	Rationale								
2 (a) (i)	Mitre	[1]									
(a) (ii)	<table border="1"> <thead> <tr> <th>Stage</th> <th>Tools</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><i>Scriber</i></td> </tr> <tr> <td>2</td> <td><i>Hacksaw, mechanical hacksaw</i></td> </tr> <tr> <td>3</td> <td><i>File</i></td> </tr> </tbody> </table>	Stage	Tools	1	<i>Scriber</i>	2	<i>Hacksaw, mechanical hacksaw</i>	3	<i>File</i>	[3]	<p>Stage 1 Do not accept pencil, marker</p> <p>Stage 2 Do not accept 'saw'. Must be specific.</p> <p>Stage 3 If a specific name of file is given, it must be appropriate otherwise it is incorrect; eg 'Flat file' is correct but 'Round file' is incorrect.</p>
Stage	Tools										
1	<i>Scriber</i>										
2	<i>Hacksaw, mechanical hacksaw</i>										
3	<i>File</i>										
(b) (i)	emery cloth: to clean the metal.	[1]									
(b) (ii)	flux: to keep the joint clean when heated or to enable the spelter to run.	[1]									
(b) (iii)	brazing rod: to apply to make the joint, to join the two pieces together.	[1]									
(c)	<p>Basic idea with limited function [0-1]</p> <p>Functions adequately [2]</p> <p>Fully functioning device [3]</p> <p>Materials and methods of construction used [0-2]</p>	[5]	The device can be designed to be part of the gate or a separate unit that fits the gate.								
Total		[12]									

	Expected Answer	Mark	Rationale
3 (a) (i)	Aluminium: lightweight, dust not corrode, needs no finish. OR Mild steel: relatively cheap, very hardwearing, less likely to bend.	[1]	Do not reward 'strong', cheap' type answers. These need qualifying.
(a) (ii)	Sketch shows some form of insert/bush/sleeve/plate. [1] Notes give information about material: metal or plastic [1]	[2]	
(b)	Polymorph.	[1]	
(c) (i)	Use of screw, grub screw, pin, roll pin, rivet. [1] Accuracy of sketch. [1]	[2]	Candidates may not draw on Fig.5 but could give accurate details. Award 1 mark for 'glue'.
(c) (ii)	Initial cost of setting up/machines/die/moulds. [1] Cost of setting up machines. [1]	[2]	Answers only relate to 'large quantities' issue. Not 'accurate' or similar answers.
(d)	System: use of rods/sliding counters: clear sketches. [0-2] Materials and fittings used. [0-2]	[4]	2 key points: 'system' and 'materials/fittings'.
	Total	[12]	

Section B

Expected Answer	Mark	Rationale
4 (a) MDF uses recycled materials, does not use trees.	[1]	
(b) Plain butt joint [0] Plain butt joint + glue [1] Reinforced butt joint + glue [0-2] Comb[finger] joint [0-2]	[2]	6mm thickness is the key to this question.
(c) Sketch showing modification to desk tidy: eg some sort of 'tray'/drawer/magnet to hold paper clips. [0-2] Notes to provide additional information. [1]	[3]	
* (d) Discussion of factors include: <ul style="list-style-type: none"> • scale of production, • manufacturing techniques/construction, • cost of materials, • durability of materials, • labour costs, • aesthetics, • fashion/trends/consumer preferences, • environmental issues- timber renewable, oil limited resource, • tooling available. <p>Level 1 (0-2 marks) Shows limited understanding of the factors to consider when making a decision. There will be little or no use of specialist terms. Answers may be ambiguous or disorganized. Errors of grammar, punctuation and spelling may be intrusive.</p>		Different routes possible: detailed discussion of one or two points or brief mention of numerous points both valid. Be aware of repeated points. Try to identify the band that the answer fits best then decide on which of the two marks in that band.

Expected Answer	Mark	Rationale
<p>5 * (a)</p> <p>Issues that may be included in an evaluation Table A:</p> <ul style="list-style-type: none"> • no fabricated joints • is moulded to shape, therefore once mould/former is made is relatively quick process with little waste, but mould could be costly. <p>Issues that may be included in an evaluation Table B:</p> <ul style="list-style-type: none"> • jointed/therefore more time is needed for processes to cut and join, • results in higher labour costs, • but once tooling is completed is relatively economical. <p>Level 1 (0-2 marks) Shows limited understanding of the issues involved when evaluating the methods of manufacture. There will be little or no use of specialist terms. Answers may be ambiguous or disorganized. Errors of grammar, punctuation and spelling may be intrusive.</p> <p>Level 2 (3-4 marks) Shows some understanding of the issues involved when evaluating the methods of manufacture with some analysis of the issues involved. There will be some use of specialist terms although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar.</p>		<p>Can argue for either method but some details about both methods must be given for maximum marks</p> <p>Try to identify the band that the answer fits best then decide on which of the two marks in that band.</p> <p>Minimum of 2 issues.</p>

Expected Answer	Mark	Rationale
<p>Level 3 (5-6 marks) Shows detailed understanding of the issues involved when evaluating the methods of manufacture and analyses most of the issues involved. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.</p>	[6]	Minimum of 3 issues.
<p>(b) Processes: drill hole, insert Hegner saw/vibro saw jig saw blade, pad saw or equivalent] clean sawn edge with file/glasspaper use of router/cnc router [2x1] Tools named: may be included in description of processes. [2x1] Supporting the glass: use of a recess, use of applied bead or routered bead clearly shown. [0-2]</p>	[6]	
Total	[12]	

Grade Thresholds

GCSE Design & Technology (Resistant Materials) (Specification Code J306/J046)
January 2010 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	u
A561	Raw	60	54	48	42	36	30	24	18	12	0
	UMS	120	108	96	84	72	60	48	36	24	0
A562	Raw	60	50	44	38	33	27	21	16	11	0
	UMS	80	72	64	56	48	40	32	24	16	0
A563	Raw	No Candidates									
	UMS	120	108	96	84	72	60	48	36	24	0
A564	Raw	60	54	48	42	36	30	24	18	12	0
	UMS	80	72	64	56	48	40	32	24	16	0

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