

Design and Technology: Resistant Materials

General Certificate of Secondary Education

Unit **A562**: Sustainable Design

Mark Scheme for January 2011

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2011

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Section A

Question	Expected Answers	Marks	Rationale
1	C Solar	[1]	
2	A Disposal of the product	[1]	
3	D People	[1]	
4	A Pine	[1]	
5	B Mild steel	[1]	
6	Recyclable aluminium Recycle aluminium and recycling aluminium	[1]	Do not accept 'recyclable' or 'aluminium' on their own. Do not accept 'recycled', 'made of aluminium' or 'reusable'.
7	The restocking/replanting of existing forests and woodlands. The answer should convey the idea of replacing a tree that has been cut down.	[1]	Do not accept 'planting trees' on its own.
8	Control of Substances Hazardous to Health	[1]	All four key words needed.
9	The measurement of human actions on the environment.	[1]	Reference must be made to 'quantitative', eg – 'amount', 'how much'.
10	'Smart' or 'Modern' materials	[1]	Do not accept named materials for example – thermo chromic.
11	False	[1]	
12	True	[1]	
13	False	[1]	
14	True	[1]	

Question			Expected Answers	Marks	Rationale
15			True	[1]	
			Total	[15]	

Section B

Question		Expected Answers	Marks	Rationale
16	(a)	<p>To examine a product in detail to understand how and how well the product works.</p> <p>Reference to examining/looking at/taking apart/check the product - 1 mark</p> <p>Then reference to materials, features, shape, form, function (see how it works), aesthetics, sizes, texture, components, ergonomics, purpose, manufacturing methods, safety, ease of use, good/bad points, possible improvements.</p> <p>1 mark for each additional point (max 2).</p>	[3]	<p>Do not accept 'analyse' or 'analysing' the product.</p> <p>Do not accept 'evaluate', 'research' or 'test' the product.</p>
	(b)	<ul style="list-style-type: none"> • How the mechanism works • Materials components are made from • Method of construction/manufacture used for each component • The components used • Fixings used • Finish used • Ease of disassembly • Quality of manufacture <p>1 mark for each (max 4)</p>	[4]	<p>Be aware of repetition.</p> <p>Do not accept references to: weight, sizes, assembly, aesthetics or improvements.</p>
	(c)	<ul style="list-style-type: none"> • Product encourages people to recycle cans. • Product crushes cans so they take up less space when stored or transported for recycling. • Product does not require an energy source/no emissions. <p>1 mark for each point made (max 3)</p>	[3]	<p>Be aware of repetition</p> <p>Reference to landfill not acceptable</p> <p>Must refer to environmental benefits</p>

Question		Expected Answers	Marks	Rationale
16	(d)	<p>Look for three pieces of information, both notes and sketches:</p> <ul style="list-style-type: none"> • Base is extended (1 mark). • An attachment to base or back plate (1 mark). • Fixed to a wall/work surface (1 mark). • Addition of a second supporting handle that improves stability (1 mark). <p>3 x 1 mark</p>	[3]	<p>Sketch only – max 2 marks. Annotation only – max 2 marks</p> <p>For 3 marks the annotation should be relevant to the modification and should add to the understanding.</p> <p>Simply labelling parts gains no marks.</p> <p>Do not accept references to the illustrated handle.</p>
	(e)	<ul style="list-style-type: none"> • Could be made from recyclable/sustainable materials • Easy to disassemble for recycling or disposal (includes biodegrading) • Use of materials/packaging kept to a minimum • Easy to repair • No energy required for operation • Use of environmentally friendly finishes • Sourcing of materials • Choice of materials • Keeping the energy needed for manufacture to a minimum • Information on the packaging stating that the product can be recycled <p>2 x 1 mark</p>	[2]	<p>Do not accept references to cost, transport.</p>
Total			[15]	

Question		Expected Answers	Marks	Rationale
17	(a)	<p>Any reasonable user group that is qualified with an appropriate reason and outcome. Eg</p> <ul style="list-style-type: none"> • Elderly and/or physically disabled people (1). • Reason: They would find it difficult to step over the seat (1) because their joints are less supple (1). • Young children (1). • Reason: they may fall backwards (1) because there is no support behind them (1). <p>User group 1 mark each (max 2) Reasons/outcomes (2 x 2)</p>	[6]	<p>Do not accept reasons related to the strength of the plastic.</p> <p>Two outcomes are acceptable if the reason is inferred.</p>
	(b)	Aluminium, Brass, Stainless steel, Nylon. 1 mark	[1]	Metal, plastic, iron or copper not acceptable.
	(c)	<ul style="list-style-type: none"> • Shows that the product can be recycled (only 1 mark). • Enables the type of material the product is made from to be identified for recycling (this would gain 2 marks). <p>2 x 1 mark</p>	[2]	Two points made on one line are acceptable for two marks.

Question	Expected Answers	Marks	Rationale
(d)	<p>This question is about the benefits of using recycled plastic.</p> <p>Level 1 (0-2 marks) Basic discussion showing some understanding of how the product may improve quality of life and advantages of this product over a similar one made from timber. There will be little or no use of specialist terms. Answers will be ambiguous and disorganised and there will be errors of grammar and punctuation. Spelling will be intrusive.</p> <p>Level 2 (3-4 marks) Adequate discussion showing an understanding of how the product may improve quality of life and advantages of this product over a similar one made from timber. There will be some use of specialist terms. Answers will be reasonably clear and presented in a mainly structured format. There will be occasional errors of grammar, punctuation and spelling.</p> <p>Level 3 (5-6 marks) Thorough discussion showing clear understanding of how the product may improve quality of life and advantages of this product over a similar one made from timber. Specialist terms will be used appropriately and correctly. Answers will be clear and presented in a structured format. The candidate will demonstrate the accurate use of grammar, punctuation and spelling.</p>		<p>Look firstly at which level – 1, 2, 3 (basic, adequate, good) is the best fit for the candidates' response, then use the information on general/specific points to fine tune the mark.</p> <ul style="list-style-type: none"> • The table will require no maintenance. • The table will be easy to clean and be more hygienic to eat from. • The table will be more comfortable due to rounded edges and no splinters etc. • Table is made from recycled plastic so no new resources used. • Can be recycled again at the end of its useful life. • Could be lighter so easier to move than solid wood • Self coloured. <p>If listed as bullet points - no more than level 1. Look for evidence to back up any points made for level 3.</p>
	Total	[6]	[15]

Question		Expected Answers	Marks	Rationale
18	(a)	<p>Look for issues associated with manufacture, not the solutions.</p> <ul style="list-style-type: none"> • Pollution, i.e. in the form of carbon dioxide (1 mark), are forming a thicker layer over the earth and preventing infrared radiation escaping leading to global warming (1 mark). • Factories use large amount of energy (1 mark) production of energy uses unsustainable resources or causes pollution (1 mark). • Other airborne pollution (1 mark) leading to acid rain etc. (1 mark). • Sourcing materials (1 mark) from other parts of the world/using recycled or sustainable materials (1 mark). • Transportation of finished products to markets (1 mark) will use fossil fuels (1 mark). • Disposal/discharge of waste materials/product at the end of its life (1 mark) may lead to pollution of the local environment (1 mark). <p>2 x 2 marks</p>	[4]	Look for a clear example (1 mark) and a relevant explanation of the issue (1 mark) not the solution.
	(b)	<ul style="list-style-type: none"> • They cause damage to the ozone layer (1 mark). • The designer may think it is immoral to use them because of damage to the environment (1 mark). • Mention of specific health issues such as sunburn (1 mark). • Allows more UV light through which impacts on marine life (1 mark). • Customers may not want CFC products (1 mark). • Problems with recycling CFC products (1 mark). <p>2 x 1 mark</p>	[2]	Do not accept references to toxicity, global warming or carbon footprint.

Question	Expected Answers	Marks	Rationale
(c)	<ul style="list-style-type: none"> • Making products stackable (1 mark) so more can be transported in a given space (1 mark). • Making products self assembly (flat pack) (1 mark) so more can be transported in a given space (1 mark). • Manufacturing closer to where the product is retailed (1 mark) so less distance is travelled/less energy used (1 mark). • Reduce the size/weight of the packaging used (1 mark) so that more products can be moved at the same time (1 mark). <p>2 X 2 marks</p>	[4]	Do not accept 'bigger/smaller vehicles', 'smaller products', 'different forms of energy' or 'different forms of transport'.
(d)	<p>Look for offsetting not reduction of carbon emissions.</p> <ul style="list-style-type: none"> • Compensating for/offsetting (1 mark) the negative effects on the environment of their activities (1 mark) by promoting and/or investing in energy sources which emit less carbon dioxide (1 mark). • Offsetting the negative effects (1 mark) on the environment of their activities (1 mark) by promoting and/or investing in resources which soak up carbon dioxide (1 mark). 	[3]	Do not accept references to carbon reduction.
(e)	<ul style="list-style-type: none"> • Contributing to the development of renewable energy sources (1 mark) so less energy from non renewable resources are used in the long term (1 mark). • Investing in reforestation (1 mark) so trees soak up carbon dioxide (1 mark). <p>1 x 2</p>	[2]	Accept 'donating to carbon offsetting schemes/charities'.
Total		[15]	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity



OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553