

Applied Science: Double Award

General Certificate of Secondary Education

Unit **B482/02**: Science for the needs of Society

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

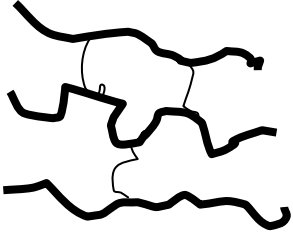
Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Question		Expected Answers	Marks	Additional Guidance															
1	a	<p>any two from: use less electricity/power / more energy efficient; less fossil fuels burnt; fossil fuels produce CO₂ when burnt</p>	2	IGNORE use less energy / energy wasted / less heat given out / less CO ₂ in the atmosphere															
	b	<p>i neutrons</p> <p>ii 80</p>	1																
	c	<table border="1"> <thead> <tr> <th></th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>three of the chemicals are compounds</td> <td></td> <td>✓</td> </tr> <tr> <td>mercury is a non-metal</td> <td></td> <td>✓</td> </tr> <tr> <td>sulphur atoms react with oxygen atoms</td> <td>✓</td> <td></td> </tr> <tr> <td>all the chemicals are inorganic</td> <td>✓</td> <td></td> </tr> </tbody> </table>		true	false	three of the chemicals are compounds		✓	mercury is a non-metal		✓	sulphur atoms react with oxygen atoms	✓		all the chemicals are inorganic	✓		2	all 4 correct = 2 marks 2/3 correct = 1 mark 1 correct = 0 marks
	true	false																	
three of the chemicals are compounds		✓																	
mercury is a non-metal		✓																	
sulphur atoms react with oxygen atoms	✓																		
all the chemicals are inorganic	✓																		
	d	<p>any two from: idea of remove mercury / remove toxic gases; treating/filtering/decontaminating/purifying/scrubbing gases or water; prevent mine water from entering rivers/water supplies/land; idea of decontaminating poisoned land; provide bottled water / alternative water supply;</p>	2	IGNORE stopping/reducing water or gases leaving the mine – this is insufficient															
	e	<table border="1"> <tbody> <tr> <td>hiring people to work in the mines</td> <td></td> </tr> <tr> <td>working out the best conditions for the heating process</td> <td>✓</td> </tr> <tr> <td>organising transport for raw materials</td> <td></td> </tr> <tr> <td>checking the quality of the mercury that is made</td> <td>✓</td> </tr> <tr> <td>managing the money for the company</td> <td></td> </tr> </tbody> </table>	hiring people to work in the mines		working out the best conditions for the heating process	✓	organising transport for raw materials		checking the quality of the mercury that is made	✓	managing the money for the company		2						
hiring people to work in the mines																			
working out the best conditions for the heating process	✓																		
organising transport for raw materials																			
checking the quality of the mercury that is made	✓																		
managing the money for the company																			
Total			[10]																

Question			Expected Answers	Marks	Additional Guidance
2	a	i	moving/changing genes/DNA; idea of from one organism to another organism;	2	ignore chromosomes /parts of genes accept cell/nucleus plant/animal / monkey to monkey
		ii	involves genes / alleles / chromosomes / DNA; genetic disease is inherited / passed on /passed down / through the family (from parents) OR infectious disease can be caught / caused by micro-organisms;	2	IGNORE born with / cannot get better
	b	i	<i>for</i> – idea enriches life eg improves quality of life, better choice of fashion / needed for a career or hobby / safety argument <i>against</i> – playing God / unnatural / reduces diversity / may cause new problems/side effects / only tested on monkeys / may not work in humans	1 1	IGNORE can see / see better / see colour / happier / nicer IGNORE It can go wrong / make you go blind
		ii	1 st row – cystic fibrosis 4 th row – Huntington’s chorea	2	
	c		A genes / alleles / DNA B sexual / sex	2	DO NOT ACCEPT genetic
Total				[10]	

Question			Expected answers	Marks	Additional guidance
3	a	i	1 st row 3 rd row	2	
		ii	any 3 from: increase in oxygen (in atmosphere); decrease in carbon dioxide in atmosphere; photosynthesis; plants use carbon dioxide / give off oxygen;	3	
	b		thermal plume; - pushes new rock up/ rising magma; convection current - drags/pushes plate along; gravity - pulls plate down;	3	one mark for name of force and one mark for explanation max 2 marks with no explanation give credit for correct explanation or diagram max 1 mark for explanation with no force identified
	c		2 nd row 5 th row	2	
			Total	[10]	

Question			Expected answers	Marks	Additional guidance
4	a	i	C ₆ H ₁₂ O ₆	1	
			O ₂ AND H ₂ O	1	
		ii	any two from: increased CO ₂ <u>in blood</u> ; detected by brain; <u>brain increases</u> breathing rate	2	
		iii	CO ₂ is toxic/poisonous / decreases blood pH	1	
	b		up/out down ; lower / less. enters/goes into;	2	accept diaphragm flattens
	c		any two from: insufficient oxygen; leads to anaerobic respiration; build up of lactic acid	2	
Total				[9]	

Question		Expected answers	Marks	Additional guidance
5	a	any two from: improved properties; specific examples eg lighter; stronger; more durable; more heat resistant	2	do not accept can be shaped, flexible.
	b	i cross links shown (at least 3) eg 	1	do not allow just tangled
		ii any two from: cross links prevent movement of chains; polymer A / no crosslink polymer melts; polymer B /crossed linked polymer more heat resistant / doesn't melt / chars;	2	
	c	i : 2(Mg) 2(MgO)	1	
		ii correct electrons 2,8; Mg ²⁺ / Mg ⁺⁺	2	
		iii T F F F	2	all correct = 2 marks 2 or 3 correct = 1 mark
Total			[10]	

Question		Expected answers	Marks	Additional guidance
6	a	will not run out idea eg is not finite/limited	1	do not allow 'can be remade' or 'can be reused'
	b	i	2	
		wave energy = 8250 (kJ) AND electrical energy = 750 (kJ) (1) wasted energy = 7500 (kJ) (1)		
		ii	2	correct numerical answer gains 2 marks. 0.09 gains 1 marks
		efficiency = useful energy output x100/energy input OR efficiency = $750 \times 100 \div 8250$; (1) 9 or 9.09.. or 9.1 (1)		
	c	speed = $f\lambda$ or 0.6×4 (1) 2.4 (1)	2	correct numerical answer gains 2 marks
	d	i	2	correct numerical answer gains 2 marks unit must match numerical answer eg 18 MWh / 18,000,000 Wh / OR 64,800,000 J/ 64.8 MJ / 64800 kJ
		P x t OR 750×24 OR $750 \times 24 \times 60 \times 60$ (1) 18,000 (kWh) (1)		
		ii	2	correct numerical answer gains 2 marks
		current = power \div voltage or $750 \div 11,000$ (1) 0.06(818..) or 0.07 (1)		
		Total	[11]	
		Paper Total	[60]	

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