

Additional Applied Science

General Certificate of Secondary Education

Unit **A192/02**: Science of Materials and Production (Higher Tier)

Mark Scheme for January 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, 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 2013

Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

Annotation	Meaning
	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt

Annotation	Meaning
	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

Subject-specific Marking Instructions

- If a candidate alters his/her response, examiners should accept the alteration.
- Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

Eg

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

- c. The list principle:
 If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, eg one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

- d. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

Eg If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

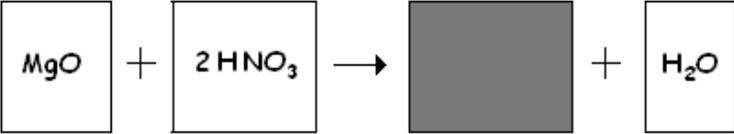
Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Answer	Marks	Guidance
1	(a)	(scientist is incorrect because) <ul style="list-style-type: none"> herbicides decreased the yield (in both fields); variety only increased yield in manured field; 	2	Ignore references to yield increase after liming Accept in 1960 as herbicides Accept in 1970 as change in variety
	(b)	1970 - 100%; 2000 - 1.5 ± 1 and 4.8 ± 1 ; gives 250 % to 190 %, (so claim is correct);	3	calculation for 1970 (1) correct data points (1) correct calculation - conclusion depending on values (1)
Total			5	

Question		Answer	Marks	Guidance
2	(a)	CBDEA	2	DCBEA (2) D before E before A (1)
	(b)	stage 1 kills bacteria; stage 2 introduces small amount of one type of bacteria; stage 3 allows bacteria to multiply (and ferment the milk);	3	
	(c)	to stop public being poisoned OWTTE	1	Allow any reference to safety
		Total	6	

Question	Answer	Marks	Guidance
3	<p>Level 3 (5–6 marks) Includes majority of relevant points for making both emulsion and suspension. Includes at least one comparison. Quality of written communication does not impede communication of Science at this level.</p> <p>Level 2 (3–4 marks) Some relevant points for emulsion and suspension. Quality of written communication partly impedes communication of Science at this level.</p> <p>Level 1 (1–2 marks) Some relevant points for either emulsion or suspension. Answer may be simplistic. Quality of written communication impedes communication of Science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant Science. Answer not worthy of credit.</p>	6	<p>Relevant points include:</p> <p>Making an emulsion</p> <ul style="list-style-type: none"> • add liquids together (in a container) • add the emulsifier • mix / shake (thoroughly) <p>Making a suspension</p> <ul style="list-style-type: none"> • (grind up solid to make) a powder • mix with liquid • mix / shake (thoroughly) <p>Comparison</p> <ul style="list-style-type: none"> • Emulsion is two liquids, suspension is solid and liquid • Emulsion is as tiny droplets, suspension is tiny lumps • Emulsion shouldn't separate but suspension will.
	Total	6	

Question	Answer	Marks	Guidance
4	<p>Level 3 (5–6 marks) Includes most of the relevant points. Quality of written communication does not impede communication of Science at this level.</p> <p>Level 2 (3–4 marks) Includes most of the description points and some of the performance or material properties points. Quality of written communication partly impedes communication of Science at this level.</p> <p>Level 1 (1–2 marks) Includes some of the description points and a performance or material properties point. Answer may be simplistic. Quality of written communication impedes communication of Science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant Science. Answer not worthy of credit.</p>	6	<p>Relevant points include:</p> <p>description</p> <ul style="list-style-type: none"> • name of sport • name of item of equipment • name of old material • name of new material <p>performance</p> <ul style="list-style-type: none"> • description of performance indicator • reason for improvement of performance indicator <p>material properties</p> <ul style="list-style-type: none"> • statement of key material properties • explanation of why they are required <p>Explanation of why new material performs better</p> <p>If reference to tennis maximum L1 for description old / new material plus at least 1 performance or material property</p>
	Total	6	

Question		Answer	Marks	Guidance
5	(a)	one particle of magnesium, 11% (for) two particles of nitrogen, 22% (for) six particles of oxygen, 66%	2	names all three particles (1) states correct relative quantity of all three (1) Accept nine particles in total Accept atom / ion for particle
	(b)		2	H ₂ O on RHS (1) same number of each type of particle on both sides (1)
	(c)	RFM of potash = 74.5/RFM of potassium hydroxide = 56; yield is $(280/56) \times 74.5 = 372.5$ kg	2	Either 74.5 or 56 for 1 mark correct answer alone scores both marks Allow ECF for incorrect RFM's
Total			6	

Question		Answer	Marks	Guidance
6	(a)	electric circuits light sources using computers	1	Need all three for the mark
	(b) (i)	yellow	1	Not red and green
	(ii)	to stop (the actors) getting too hot	1	
	(c)	reflective; translucent / transparent / absorbing; transparent / refracting;	3	
		Total	6	

Question		Answer	Marks	Guidance
7	(a)	metals are hard / tough / durable ; so that they won't wear out in use / don't scratch easily / will dig into the ground / won't break in use;	2	Allow stiff / rigid / malleable Allow reverse argument Reject strong
	(b)	ceramics are brittle; so they will break in use / need replacing often;	2	
	(c) (i)	GRP / fibreglass / concrete / Kevlar / carbon fibre; Names of the 2 materials;	2	Accept any recognisable composite
	(ii)	A named sports item that could be made from a composite; Either 2 properties required by a composite in the situation quoted;; or 1 property required by a composite in the situation quoted; with explanation;	3	Ignore name of material
Total			9	

Question	Answer	Marks	Guidance
8	<p>Level 3 (5–6 marks) Includes most pairs of relevant points. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Quality of written communication does not impede communication of Science at this level.</p> <p>Level 2 (3–4 marks) Includes some pairs of relevant points. For the most part the information is relevant and presented in a structured and coherent format. Quality of written communication partly impedes communication of Science at this level.</p> <p>Level 1 (1–2 marks) Includes some relevant points. Answer may be simplistic. Quality of written communication impedes communication of Science at this level.</p> <p>Level 0 (0 marks) May list things to check but provides no reasons. Insufficient or irrelevant Science. Answer not worthy of credit.</p>	6	<p>Relevant pairs of points include:</p> <ul style="list-style-type: none"> • check that seating is secured to floor • doesn't get in people's way • check that all exit doors open when pushed • so that people can escape / clear of obstructions • check the alarms • to warn everybody • check that the emergency lights work • so people can see if mains power fails • lower the fire safety curtain • to seal off a fire backstage • inspect fire hoses / extinguishers • to put out fires • practise an emergency drill • so that staff know what to do
	Total	6	

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

OCR Customer Contact Centre

Education and Learning

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

© OCR 2013

