OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Applied Science

General Certificate of Secondary Education

Unit **A192/01:** Science of Materials and Production (Foundation 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.

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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.

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

Annotation	Meaning
NBOD	no benefit of doubt
R	reject
	correct response
	draw attention to particular part of candidate's response
^	information omitted

Subject-specific Marking Instructions

a. If a candidate alters his/her response, examiners should accept the alteration.

b. 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.

This would be worth

Put ticks (✓) in the two correct boxes.

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

This would be worth 0 marks. 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 <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

Question			Answer	Marks	Guidance
1	(a)	(i)	hard	1	
		(ii)	low density	1	
	(b)		EITHER flexible; to change shape with her foot; OR tough / durable; so that it doesn't wear out; OR waterproof; so that her feet keep dry; OR breathable; so that sweat can escape; OR bright coloured; so that can be easily seen / looks nice; OR soft; so that it is comfortable OR stiff / hard; to protect the foot (when you hit the ball)	2	**Look for** a reasonable property (1) and a valid reason which describes that property (1) **Accept** a valid reason without mention of the property for (1) **Ignore** irrelevant properties e.g. density, strength
	(c)		any **two** of the following, 1 mark each: • (samples of) the boots have been tested; • for safety / quality / consistency / reliability; • by a (standards) laboratory / organisation; • for the European Committee for Standardisation	2	**Accept** checked / examined / approved **Accept** safe (to use) / good quality / meets standard **Reject** by the manufacture / shop
			Total	**6**	

Question			Answer	Marks	Guidance
2	(a)		2; 5; 6;	3	
	(b)		any **three** of the following, for 1 mark each • select a bull / cow (for its characteristics) • (collect sperm) with artificial cow / stimulation • test/check sperm • cool/freeze the sperm (to store it) • inject the cow with hormones (to prepare it) • insert the sperm into (the uterus / cervix of) the cow • when the cow is ready **OWTTE**	3	**Accept** male (cow) for bull**,** **Accept** any method which is practical **Accept** inject sperm into uterus **Reject** incorrect orifice
			Total	**6**	

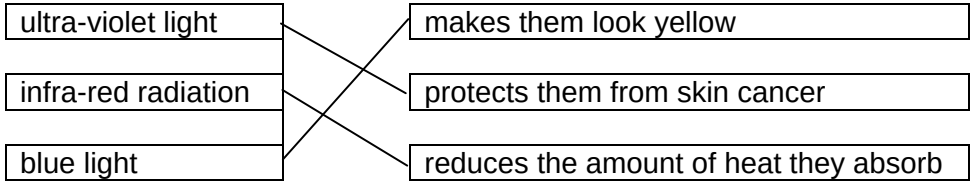
Question			Answer	Marks	Guidance
3	(a)		**Level 3 (5–6 marks)** Includes at least three of the safety features with valid reasons. Quality of written communication does not impede communication of Science at this level. **Level 2 (3–4 marks)** Includes a pair of safety features, both with valid reasons. Quality of written communication partly impedes communication of Science at this level. **Level 1 (1–2 marks)** Includes a safety feature with a valid reason, or a few safety features without valid reasons, or just a few reasons for safety features. Answer may be simplistic. Quality of written communication impedes communication of Science at this level. **Level 0 (0 marks)** Insufficient or irrelevant Science. Answer not worthy of credit.	6	**relevant health and safety features and reasons include:** safety curtain for stage to slow down spread of fire emergency lighting in case of power failure seats fixed to floor to avoid tripping up people no seats in the aisles to get in the way (verbal or written) evacuation instructions so that people know what to do sprinklers/fire hoses / extinguishers for putting out fires (emergency exit signs) show way to exits so that people can get out of building quickly **Reject** no smoking signs
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)		1; 2; oxygen	3	**Not** oxide
	(b)		magnesium oxide + nitric acid → magnesium nitrate + water	3	reactants correct for (1) **Accept** magnesium oxide and nitric acid in any order magnesium nitrate on RHS (1) water on RHS (1) **Accept** correct formulae (e.g. H_2O) instead of words
	(c)		$80 \times 0.5 \times 6 = 240$ g	1	
			Total	**7**	

Question			Answer	Marks	Guidance
5	(a)		(scientist is incorrect because) herbicides decreased (both) yields; variety change only increased yield in manured field;	2	**Ignore** references to yield increase after liming **Accept** in 1960 as herbicides **Accept** in 1970 as change of variety
	(b)		1970 - 100%; 2000 - 1.5 $\pm$ 0.1 and 4.8 $\pm$ 0.1; gives 250 % to 190 %, (so claim is correct);	3	calculation for 1970 (1) correct data points (1) correct calculation depending on their values (1) 1.5 and 4.8 gives 220% **Ignore** final written comment
	(c)		fertiliser – adds nutrients to the soil fungicide – inhibits growth of microorganisms herbicide – kills unwanted plants insecticide – reduces population of insects	2	all four correct (2) any one or two correct (1)
			Total	**7**	

Question			Answer	Marks	Guidance
6			**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. **Level 2 (3–4 marks)** Some relevant points for emulsion **and** suspension. Quality of written communication partly impedes communication of Science at this level. **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. **Level 0 (0 marks)** Insufficient or irrelevant Science. Answer not worthy of credit.	6	**Relevant points include:** **Making an emulsion** • add liquids together (in a container) • add the emulsifier • mix / shake (thoroughly) **Making a suspension** • (grind up solid to make) a powder • add a liquid • shake / mix (thoroughly) **Comparison** • 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
7			**Level 3 (5–6 marks)** Correctly names a new material and an old material for (part of) the racquet, with an improvement / comparison and a scientific reason for it. Quality of written communication does not impede communication of Science at this level. **Level 2 (3–4 marks)** Compares a new material and an old material for (part of) the racquet without naming them correctly. States an improvement / comparison and scientific reason for it. Quality of written communication partly impedes communication of Science at this level. **Level 1 (1–2 marks)** Either names a new material and its improvement, or names an old material and its drawback. May just name an old material and a new material with no comparison. No valid scientific reason. Answer may be simplistic. Quality of written communication impedes communication of Science at this level. **Level 0 (0 marks)** Insufficient or irrelevant Science. Answer not worthy of credit.	6	**Relevant points include:** **old materials** • wood frame • gut strings • leather handle **new materials** • GRP / carbon fibre / aluminium / titanium frame • nylon strings • (named) polymer handle e.g. rubber **improvement** • less likely to break • lighter • more colourful • better shapes possible • faster game **scientific reasons** • lower density / lighter • higher strength / stronger • tougher / more durable • higher elasticity **Ignore** references to tennis balls or size / shape of racquets **Accept** metal / plastic as new materials at L1 and L2
			Total	**6**	

Question			Answer	Marks	Guidance
8	(a)		any **two** of the following, for 1 mark each • how to wire up lamps to the supply • safe routing of cables • safe working at height • safe handling of hot lights • effect of colour on mood • how to mix colours to make others • different types of light source • health and safety regulations • programming a lighting sequence • how lenses work • safe use of lasers • how to use strobe lighting • use of mirrors	2	**Accept** anything specifically to do with lighting that a layman would not be able to do **Ignore** answer about filters
	(b)			2	correct pattern (2) one correct line (1)
	(c)		people = 500×0.1 = 50 kW; total = 10 + 20 + 50 = 80 kW;	1 1	 **ECF** only one of 10, 20 or 50 incorrect for (1)
			Total	**6**	

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