

GCSE

Additional Applied Science

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

General Certificate of Secondary Education

Mark Scheme for June 2014

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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.

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These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

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

	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	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
	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.

E.g.

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, e.g. 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, e.g. 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.

E.g. 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	Mark	Guidance
2	<p>[Level 3] Describes and explains some relevant actions. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Describes some relevant actions, one of which is explained. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Describes some relevant actions. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C.</p> <p>Indicative science points may include:</p> <p>action – explanation</p> <p>access to grass / hay / pellets - so that they have food to eat; shelter - to keep them warm; supply drinking water – to avoid dehydration; regular checks - to monitor their welfare use the vet / antibiotics - to keep them healthy; space for exercise - to develop muscle; restrict space – so that they don't waste energy; access to mother's milk - for extra nutrition; give them hormones - to promote (enhanced) growth;</p> <p>ignore irrelevant details when allocating a level ignore references to "grow big" or "add weight" as an explanation</p>

Question		Answer	Mark	Guidance
3	a	$\text{Fe} + \text{H}_2\text{SO}_4 \rightarrow \text{FeSO}_4 + \text{H}_2$	2	left hand side correct (either order) [1] hydrogen correct in all respects [1]
	b	2 from: add iron to acid until no more reacts/excess iron; filter / decant (to remove surplus iron); heat/evaporate water;	2	
	c	EITHER each tablet is 0.5 g so number of tablets = 200 / 0.5 = 400 iron sulfate = 200 x 0.1 = 20 g; OR each tablet is 20% iron sulfate; 20% of 100 g = 20g;	1 1	correct method [1], correct evaluation [1] ecf: accept incorrect number of tablets for second calculation.

Question	Answer	Mark	Guidance
4	<p>[Level 3] Identifies several benefits of artificial light with relevant explanations. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Identifies a benefit of artificial light with relevant explanation or identifies several benefits with no explanations. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Identifies a benefit of artificial light or that natural light alone is not sufficient with an explanation. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to B</p> <p>Indicative science points may include:</p> <p>Benefits of artificial light sources: steady light from electrical lamps can be focussed with lenses colour balance can be corrected with filters IR and UV filters can protect actors can control (light) Benefits of artificial light may be implied in shortcomings of natural light</p> <p>Shortcomings of natural light sun position in sky changes clouds obscure the sun colour balance varies with time / weather can produce shadows which are sharp / in the wrong place too much sunlight can make actors hot / give them cancer</p>

Question		Answer	Mark	Guidance
5	a	any two of the following, [1] each <ul style="list-style-type: none"> • (low frequency) vibrations/shakes the ground; • travels through ground/foundations; • cause (specified) building damage; • difficult / expensive to absorb; 	2	ignore references to loudness of sound
	b	reduced to one quarter / by three quarters	1	accept 25%, 0.25 ...
	c	2.0×10^3 Hz;	1	
	d	any two of the following, [1] each <ul style="list-style-type: none"> • microphones in front of speaker/picks up sound • shield microphones from loudspeaker/put microphones behind speakers/point speakers away from microphone/ • keep amplifier / loudspeaker volume down • howling is uncontrolled amplification of sound 	2	

Question		Answer	Mark	Guidance
6	a	stiffness is $24/6 = 4$ N/mm; (less than 5 N/mm) so not stiff enough;	1 1	
	b	any two from: add (named) stiffening material to wood; use different type of wood/use composite; increase the thickness of each plank;	1 1	ignore make it thinner / longer allow different cross section shape allow extra layers do not allow use different material
	c	any three of the following, [1] each <ul style="list-style-type: none"> • test (representative samples of planks); • for consistency / quality / safety / fit for purpose; • against standard tests / with standard apparatus/meets the standard; • checked against national / other standards labs; 	3	

Question		Answer	Mark	Guidance
7	a	switches on heater (because temperature is too low); turns heater off (when sensor shows temperature back to normal / 33.5 °C);	2	
	b	$C_6H_{12}O_6 + 6O_2 \rightarrow 6H_2O + 6CO_2$	2	O ₂ correct for [1] balancing correct for [1]
	c	(new/different) gene/DNA transferred into fungus; allows it to make a new/different protein;	1 1	

Question	Answer	Mark	Guidance
8	<p>[Level 3] Provides a thorough description of research, testing and development of the process incorporating reference to costs. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Provides a description of any two from research, testing and development categories with some reference to cost for at least one. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Provides a description of several points. May only provide detailed description of one category. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A*.</p> <p>Indicative science points may include:</p> <p>research find out about organism which causes colds try out ways of killing it in the lab by exposing it to different substances select the ones which work cost of specialist equipment / staff</p> <p>testing get volunteers – cost implications then try effect of possible drugs watching out for side effects followed by large scale test on the public – cost implication</p> <p>development work out how to manufacture drug on a large scale cost of promoting / advertising successful product obtain a licence costs with long time for whole process cost related to risk of failure</p>

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