OCR
Oxford Cambridge and RSA

GCSE

Additional Applied Science

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

General Certificate of Secondary Education

Mark Scheme for June 2017

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 RM Assessor to annotate scripts

	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

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.

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.

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

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	

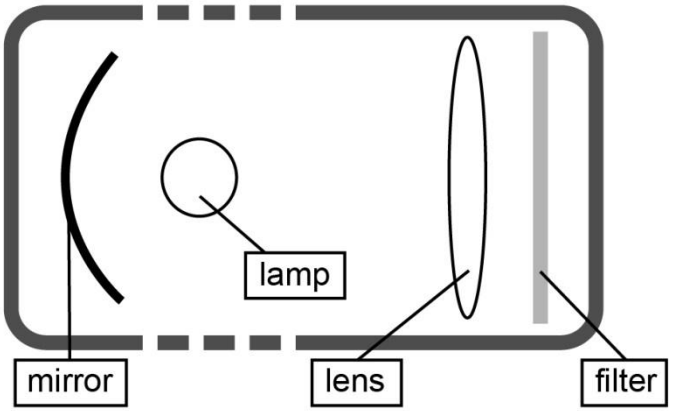
the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

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

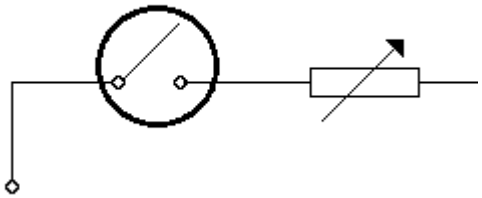
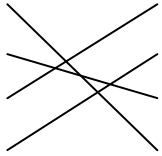
MARK SCHEME:

Question			Answer	Mark	Guidance
1	a		-15 °C	1	
	b		energy loss of LessCold is 250 W/m^2; energy loss of HotStuff is 160 W/m^2; should choose one with lowest energy loss;	1 1 1	must have calculations to earn third mark ecf incorrect calculations
	c		(area =) 1.12 m^2; total energy loss = 200 × 1.12 = 224 W	1 1	Allow "1.4 x 0.8" within a calculation ecf from incorrect area e.g. 2 × (1.4+0.8) × 200 = 880 W for [1] 224 on its own scores two marks [2]

Question			Answer	Mark	Guidance
2			**[Level 3]** Describes aspects of the work done by inspector, with one linked to the continued good health/confidence of consumers. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes aspects of the work done by inspectors OR Links an aspect to the continued good health/confidence of consumers. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Describes an aspect of the work done by inspectors. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targetted at grades up to C.** **Indicative science points may include:** **Some possible roles for inspectors:** • health and safety of employees • storage of meat • cleanliness of machinery • quality of non-meat ingredients • equipment / machinery / refrigeration • environment / building / vehicles • test for bacteria / micro-organisms • identify droppings / other dirt • measure storage temperatures • (DNA testing for) food substitution • test for use of illegal materials • study logs of storage times / use by dates • observe workers in action • check on sources of meat **importance to the public** • (Health & safety) keep food safe to eat • infection control • maintains a nutritional standard for food • public trust / confidence

Question			Answer	Mark	Guidance
3	a			3	each correct label for [1]
	b		idea that lamp gets hot in use; idea of ventilation e.g. holes allow (heat / hot) air to escape;	1 1	**Allow**: might overheat **Allow** cool air in
	c		brittle ☐ strong ✓ flexible ☐ opaque ✓ transparent ☐	2	each correct entry for [1]

Question	Answer	Mark	Guidance
4	**[Level 3]** Describes all three parts to the process in the correct order. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes any two parts of the process in the correct order. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Describes one of the three parts of the process. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targetted at grades up to C** **Indicative science points may include:** Mixing: • add the correct solid to the acid • stirring / heating to speed up the reaction • until no more will dissolve / bubbles stop / solid left Separation: • pass solution through filter paper / decant to separate (excess) solid from liquid Crystallisation: • heat solution gently to remove some water • leave to allow crystals to form • dry crystals with paper **accept** annotated diagrams If no preparation process described, allow description of evaporation / filtering (to remove crystals from solution) as level one (1 mark)

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>5</td><td>a</td><td></td><td>  </td><td>1</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><td>lamp</td><td rowspan="4">  </td><td>adjusts amount of current</td></tr><tr><td>switch</td><td>mains electricity input</td></tr><tr><td>dimmer</td><td>turns current on or off</td></tr><tr><td>power supply</td><td>source of light</td></tr></table></td><td>3</td><td>all correct for [3]
two or three correct for [2]
one correct for [1]</td></tr>
<tr><td></td><td>c</td><td></td><td>To update / learn / not forget;
about safety / new products / new regulations / skills;</td><td>1
1</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
6			**[Level 3]** Describes tests on two poles with measurement and assessment of which is stiffer. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Tests two (or more) poles – with measurement of stiffness / bending. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Describes a test which involves bending a pole (with an applied force). Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targetted at grades up to E.** **Indicative science points may include:** **Process:** • fix one end of the pole (so that pole is horizontal) • hang a weight (from the free end of the pole) • to apply a vertical force to it Measurement: • fix a ruler at the free end of the pole • note how far free end goes down Assessment: • pole which bends the most is least stiff ORA Allow use of a ruler rather than a pole

Question			Answer	Mark	Guidance
7	a		total allotment area = $8 \times 5 = 40$ $m^{2;}$ mass of fertiliser = $40 \times 120 = 4800$ g ; 4800 g is 4.8 kg, (less than 5 kg);	1 1 1	**allow** ecf from incorrect area i.e. $5 \times 120 = 600$ g **look** for correct conversion of g to kg **accept** reverse calculation e.g. 5000 / 120 = etc.
	b		She keeps chickens in her garden. ☐ To increase the yield of her vegetables. ✓ It supplies elements missing from the soil. ✓ To keep pests away from her growing plants. ☐ It stops the soil getting waterlogged when it rains. ☐	2	
	c		Bess	1	

Question			Answer	Mark	Guidance
8	a		copper sulfate + sodium carbonate → copper carbonate + sodium sulfate	2	lhs in either order lhs correct [1] rhs correct [1]
	b		F C D E A B	2	completely correct for [2] C immediately before D anywhere for [1]
	c		distilled water — solute copper sulfate — solvent copper carbonate — precipitate	1	
	d		mass of copper carbonate = 82 – 20 = 62 g yield = $\frac{62}{124} \times 100 = 50\%$	2	completely correct for [2] first row correct for [1] ecf for (1)

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