

## **GCSE**

### **Additional Applied Science**

Unit **A191/02**: Science in Society (Higher Tier)

General Certificate of Secondary Education

### **Mark Scheme for June 2015**

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.

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**Annotations**







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

Used in the detailed Mark Scheme:

<b>Annotation</b>	<b>Meaning</b>
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
<b>not/reject</b>	answers which are not worthy of credit
<b>ignore</b>	statements which are irrelevant - applies to neutral answers
<b>allow/accept</b>	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 checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<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

<b>Edinburgh</b>	
<b>Manchester</b>	
<b>Paris</b>	
<b>Southampton</b>	

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).

<b>Edinburgh</b>			✓			✓	✓	✓	✓	
<b>Manchester</b>	✓	x	✓	✓	✓				✓	
<b>Paris</b>				✓	✓		✓	✓	✓	
<b>Southampton</b>	✓	x		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

Question			Expected Answers	Marks	Additional Guidance								
1	a	i	$80 \div 2^2 / 80 \div 4$ ; 20;	2	20 on its own scores 2 <b>Ignore</b> units								
		ii	<table border="1"> <tr> <td>healthy weight</td> <td>✓</td> </tr> <tr> <td>obese</td> <td></td> </tr> <tr> <td>underweight</td> <td></td> </tr> <tr> <td>overweight</td> <td></td> </tr> </table>	healthy weight	✓	obese		underweight		overweight		1	ecf  underweight < 18.5 normal 18.5 – 24.9 overweight 25 – 29.9 obese >30
healthy weight	✓												
obese													
underweight													
overweight													
	b		Any 4 from.... pulse; temperature; blood pressure; gender / age / DOB; full name / address; does he smoke; does he drink; medication; medical history / allergies / asthma; tests e.g blood / urine / MRSA / Xray / scans;	3	4 or 3 scores 3 marks 2 scores 2 1 scores 1  <b>Ignore</b> health								
			<b>Total</b>	<b>[6]</b>									

Question			Expected Answers	Marks	Additional Guidance
2	a		artery;  vein;  atrium;  valve;  ventricle;	3	5 correct = 3 marks 3 or 4 correct = 2 marks 2 correct = 1 mark

	<b>b</b>	<p>Artery – thick wall/muscle to withstand pressure;                  Valve – prevent backflow of blood;                  Vein – also contain valves to prevent backflow/                  bigger lumen to aid flow (at low pressure);</p>	<b>3</b>	<p>Must include structure AND job  <b>Ignore</b> strong/elastic  <b>Allow</b> small lumen to maintain pressure  <b>Accept</b> makes blood flow in 1 direction only  <b>accept</b> thin walled/muscled because of low pressure</p>																									
	<b>c</b>	<table border="1"> <thead> <tr> <th data-bbox="383 440 557 480"></th> <th data-bbox="557 440 658 480">rbc</th> <th data-bbox="658 440 761 480">wbc</th> <th data-bbox="761 440 909 480">plasma</th> <th data-bbox="909 440 1048 480">platelets</th> </tr> </thead> <tbody> <tr> <td data-bbox="383 480 557 547">oxygen</td> <td data-bbox="557 480 658 547">✓</td> <td data-bbox="658 480 761 547"></td> <td data-bbox="761 480 909 547"></td> <td data-bbox="909 480 1048 547"></td> </tr> <tr> <td data-bbox="383 547 557 614">glucose</td> <td data-bbox="557 547 658 614"></td> <td data-bbox="658 547 761 614"></td> <td data-bbox="761 547 909 614">✓</td> <td data-bbox="909 547 1048 614"></td> </tr> <tr> <td data-bbox="383 614 557 681">carbon dioxide</td> <td data-bbox="557 614 658 681"></td> <td data-bbox="658 614 761 681"></td> <td data-bbox="761 614 909 681">✓</td> <td data-bbox="909 614 1048 681"></td> </tr> <tr> <td data-bbox="383 681 557 756">lactic acid</td> <td data-bbox="557 681 658 756"></td> <td data-bbox="658 681 761 756"></td> <td data-bbox="761 681 909 756">✓</td> <td data-bbox="909 681 1048 756"></td> </tr> </tbody> </table>		rbc	wbc	plasma	platelets	oxygen	✓				glucose			✓		carbon dioxide			✓		lactic acid			✓		<b>4</b>	<p>1 mark for each correct row</p>
	rbc	wbc	plasma	platelets																									
oxygen	✓																												
glucose			✓																										
carbon dioxide			✓																										
lactic acid			✓																										
		<b>Total</b>	<b>[10]</b>																										



Question		Expected Answers	Marks	Additional Guidance
3	a	<p><i>Any two from.....</i>            Hospitals/A &amp; E – specialist care/ operations            GP / surgery / walk in centre / health centre – routine health problems;            Opticians – looks after eyes;            Dentists – looks after teeth;            Physiotherapists – rehabilitation;            Pharmacists/ chemists – supply medication/advice;</p>	2	<p><b>Allow</b> drug clinics /mental health clinics/ family planning clinics with appropriate role</p>
	b	<p><i>Any two from.....</i>            GP/doctor/surgeon – advice / prescriptions / referrals/operations;            Nurse – advice / tests/ monitors;            Midwife – ante and post natal advice;            Nutritionist – diet advice;            Optician - Prescribes glasses / referrals;            Dentist – repairs / removes / dentures or crowns;            Physiotherapist – massage;            Podiatrist – feet;            Pharmacist/ chemist – supply medication/advice;            Dermatologist – skin;</p>	2	<p>Any sensible suggestion of suitable practitioner and their role.</p>
	c	<p><i>Any two from.....</i>            Provides free healthcare;            Non local specialist care;            Monitors national trends;            Plans suitable healthcare;            Allocates resources;            Public awareness campaigns;            Holds patients data;            Research;</p>	2	<p><b>Ignore</b> examples of treatments if not in context of not local</p> <p><b>Allow</b> idea of funding specialist care e.g. IVF/cancer treatment  <b>Allow</b> examples e.g. advice on smoking etc.</p>

d	<p><b>[Level 3]</b> Comments on the need to be informed and the benefits and risks and <u>uses</u> data/graph. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Refers to the data/graph with basic comments on the need to be informed AND the benefits/risks. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Refers to the data/graph with basic comments on the need to be informed OR the benefits/risks. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades B to A*</b></p> <p><b>Uses data may include:</b></p> <ul style="list-style-type: none"> <li>• even Friday operations have a risk &lt;2% / 85% increase of 1% is still &lt;2%</li> <li>• uses numbers from the graph for comparisons / trends e.g. prostate cancer survival rates have improved from 20% to 70% since 1971/ from 30% to 70% since 1991/ prostate cancer survival rates now 70% whereas bladder and kidney are below 50%</li> </ul> <p><b>Reference to data</b></p> <ul style="list-style-type: none"> <li>• Quotes numbers from data e.g. prostate cancer survival rate was 70% in 2007/ risk of death from operation is only 1%</li> <li>• Prostate cancer survival rates continuing to improve (unlike bladder)</li> <li>• Dramatic improvement since 1991/1971</li> <li>• Better survival rates than the other cancers</li> </ul> <p><b>Risks for having/ not having the operation may include:</b></p> <ul style="list-style-type: none"> <li>• reaction to anaesthetic</li> <li>• mistakes</li> <li>• does not cure disease</li> <li>• will die if not treated</li> <li>• may die if has operation (be one of the 1%)</li> </ul> <p><b>Benefits of having/ not having the operation may include:</b></p> <ul style="list-style-type: none"> <li>• cures disease</li> <li>• reduces pain / symptoms</li> <li>• increases chance of survival</li> <li>• avoids risks of operation</li> </ul> <p><b>Needs to be informed may include:</b></p> <ul style="list-style-type: none"> <li>• information about the procedure/ so he knows what will happen</li> <li>• risks involved from procedure</li> <li>• to allow an informed decision</li> </ul>
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				<ul style="list-style-type: none"><li>• needs to consent to operation</li><li>• prevents litigation</li></ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
		<b>Total</b>	<b>[12]</b>	

Question	Expected Answers	Marks	Additional Guidance
4	<p><b>Level 3 (5–6 marks)</b> Answer includes some points from all three areas of relevant points. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Answer includes points from basic description AND points from extended description OR Points from basic description AND points from explanation. OR A point from all three areas of relevant points</p> <p>Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Answer includes points from basic description. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to A</b></p> <p><b>relevant scientific points concerning basic description may include:</b></p> <ul style="list-style-type: none"> <li>• Method of collection e.g. swab</li> <li>• place (blood) in container</li> <li>• label samples (of blood)</li> <li>• cold storage</li> <li>• idea of matching with suspect/records/National Database</li> <li>• preserve crime scene e.g. protective clothing/cordons etc</li> </ul> <p><b>relevant scientific points concerning extended description may include:</b></p> <ul style="list-style-type: none"> <li>• sterilised/sealed containers</li> <li>• identification of blood group</li> <li>• DNA analysis of blood</li> <li>• electrophoresis</li> </ul> <p><b>relevant scientific points concerning explanation may include:</b></p> <ul style="list-style-type: none"> <li>• prevent deterioration of blood</li> <li>• avoid contamination</li> <li>• avoid tampering.</li> <li>• To identify victim/suspect</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	<b>Total</b>	<b>[6]</b>	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	Jason – B Jane – A Mary – C	2	3 correct = 2 marks 2 or 1 correct = 1 mark
		ii	Scale/ more graduations on B more accurate (than A or C); No scale on C / sloping side make it harder to measure/Mary's results are less precise;	2	
	b		Random error – <b>person</b> measuring makes small mistakes; Systematic error – different <b>equipment</b> is slightly inaccurate;	2	If answers not linked to type of error, assume first answer is random (order in question)  <b>Allow</b> errors in <b>Ignore</b> machine/computer errors
			<b>Total</b>	<b>[6]</b>	

Question		Expected Answers	Marks	Additional Guidance
6	a	<p><b>[Level 3]</b> Refers in detail to both support and not support. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Refers to both support and not support. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Refers to only support OR not support. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Supports conclusion</b></p> <ul style="list-style-type: none"> <li>• look the same</li> <li>• uses scale to show both are same size/similar size</li> <li>• both round / spherical / same shape</li> <li>• both have spikes</li> </ul> <p><b>Does not support conclusion</b></p> <ul style="list-style-type: none"> <li>• unknown has fewer spikes / ORA</li> <li>• cannot compare colour</li> <li>• different flowers may produce similar pollen grains</li> <li>• em has hemispheres / round things</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	b	<p><i>Any 2 from:</i> Kills the sample; Complicated sample preparation; Very expensive; Not portable; Not colour/black and white;</p>	2	<p><b>Accept</b> hard to use</p>
	c		2	

			Electron micrographs do not magnify. Chromatograms do.		
			Electron micrographs do not last very long. Chromatograms do.		
			Chromatograms do not produce Rf values. Electron micrographs do.		
			Electron micrographs do not separate substances. Chromatograms do.	✓	
			Chromatograms do not depend upon colours. Electron micrographs do.		
			Chromatograms cannot have a depth of field. Electron micrographs can.	✓	
			Chromatograms are always 1-way. Electron micrographs can be 2-way.		
			<b>Total</b>		<b>[10]</b>
			<b>Paper total</b>		<b>50</b>

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