

# **Additional Applied Science A**

General Certificate of Secondary Education **A325/02**

Unit 3: Scientific Detection (Higher Tier)

## **Mark Scheme for June 2010**

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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.

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Question		Expected Answer	Mark	Rationale/Additional Guidance												
1	a	<table border="1"> <tr> <td>make a list of samples</td> <td></td> </tr> <tr> <td>copy samples for multiple use</td> <td>✓</td> </tr> <tr> <td>prevent change or deterioration to samples</td> <td></td> </tr> <tr> <td>avoid contamination of samples</td> <td></td> </tr> <tr> <td>avoid interfering with samples</td> <td></td> </tr> <tr> <td>disposing of the sample within three months</td> <td>✓</td> </tr> </table>	make a list of samples		copy samples for multiple use	✓	prevent change or deterioration to samples		avoid contamination of samples		avoid interfering with samples		disposing of the sample within three months	✓	[2]	if more than two boxes are ticked then minus 1 mark for each incorrect response; candidates cannot score less than zero;  <b>allow</b> any indication of correct response;
make a list of samples																
copy samples for multiple use	✓															
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	b	i	idea of reliability/confidence/laboratory meets (required) standard	[1]	<b>ignore</b> safety/fair test/same test each time/accuracy/legality/quality;  <b>allow</b> lab up to standard/people know (that lab is up to standard)/ <b>results</b> same each time/correct procedures/standard procedures;											
		ii	<table border="1"> <tr> <td>to make sure that they always get the same result</td> <td></td> </tr> <tr> <td>to check the quality of their work</td> <td>✓</td> </tr> <tr> <td>to ensure scientist know what to do</td> <td></td> </tr> <tr> <td>to make sure the test is the same every time</td> <td></td> </tr> </table>	to make sure that they always get the same result		to check the quality of their work	✓	to ensure scientist know what to do		to make sure the test is the same every time		[1]	if more than one box is ticked then candidate scores zero;  <b>allow</b> any indication of correct response;			
to make sure that they always get the same result																
to check the quality of their work	✓															
to ensure scientist know what to do																
to make sure the test is the same every time																
	c	2 from: idea of ensuring H&S; idea of regular maintenance / checking equipment; idea of training of staff/qualified staff; idea of following standard procedures/good organisation/cleanliness of equipment/correct equipment;	[2]	<b>allow</b> examples of safe working/make sure lab is safe;  <b>allow</b> make sure staff know what to do; <b>allow</b> method of avoiding cross contamination;												
<b>Total</b>			<b>[6]</b>													

Question		Expected Answer	Mark	Rationale/Additional Guidance
2	a	<p>The diagram shows a microscope with six labels in boxes connected to parts of the microscope by lines. The labels are: eyepiece (top left), objective (middle left), stage (bottom left), clip (top right), focus (middle right), and lamp (bottom right).</p>	[3]	<p>6 correct responses for 3 marks;                      5 or 4 correct response for 2 marks;                      3 or 2 correct responses for 1 mark;                      1 or 0 correct responses is 0;</p> <p><b>allow</b> eye lens for eye piece;  <b>not</b> lens alone for either eyepiece or objective;  <b>not</b> magnifying lens;  <b>allow</b> idea of clip e.g. grip/clamp/clasp/slide holder;  <b>allow</b> idea of <b>focus</b>(control) e.g. focussing knob;  <b>allow</b> light or mirror for lamp;</p>
	b	<p>The diagram shows two boxes on the left: 'magnification' and 'resolution'. On the right, there are five boxes: 'resolves errors with the image', 'separates out detail', 'makes the image larger', 'shows more colours', and 'increases contrast'. Lines connect 'magnification' to 'separates out detail' and 'makes the image larger'. Lines connect 'resolution' to 'resolves errors with the image' and 'increases contrast'.</p>	[2]	<p>1 mark for each connection;</p> <p>multiple lines going to more than one box does not score for that connection;</p>
	c	i	B;	[1]
		ii	D;	[1]
		<b>Total</b>		<b>[7]</b>

Question		Expected Answer	Mark	Rationale/Additional Guidance
3	a	round/spherical; spiky bits (on surface/round the edge);	[2]	<b>allow</b> circular; <b>ignore</b> spots/reference to colours or shading; <b>allow</b> alternatives to spikes e.g. hairs;
	b	i	[1]	<b>allow</b> answers between 29 and 31 inclusive;
		ii	[2]	<b>allow</b> ecf from answer to bi. If no response given to bi but a measurement is used in bii then treat as ecf;  correct answer alone = 2 marks; <b>allow</b> answers between 0.29 and 0.31 for 2 marks; whatever the working or answer in bi;
		<b>Total</b>	<b>[5]</b>	

Question		Expected Answer	Mark	Rationale/Additional Guidance										
4	a	<table border="1"> <tr> <td>electrons only</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>light only</td> <td><input type="checkbox"/></td> </tr> <tr> <td>both electrons and light</td> <td><input type="checkbox"/></td> </tr> <tr> <td>neither electrons or light</td> <td><input type="checkbox"/></td> </tr> </table>	electrons only	<input checked="" type="checkbox"/>	light only	<input type="checkbox"/>	both electrons and light	<input type="checkbox"/>	neither electrons or light	<input type="checkbox"/>	[1]	if more than one box is ticked then candidate scores zero;  <b>allow</b> any indication of correct response;		
electrons only	<input checked="" type="checkbox"/>													
light only	<input type="checkbox"/>													
both electrons and light	<input type="checkbox"/>													
neither electrons or light	<input type="checkbox"/>													
	b	<table border="1"> <tr> <td>negative nucleus surrounded by positive electrons</td> <td><input type="checkbox"/></td> </tr> <tr> <td>positive nucleus surrounded by positive electrons</td> <td><input type="checkbox"/></td> </tr> <tr> <td>negative nucleus surrounded by negative electrons</td> <td><input type="checkbox"/></td> </tr> <tr> <td>positive nucleus surrounded by negative electrons</td> <td><input checked="" type="checkbox"/></td> </tr> </table>	negative nucleus surrounded by positive electrons	<input type="checkbox"/>	positive nucleus surrounded by positive electrons	<input type="checkbox"/>	negative nucleus surrounded by negative electrons	<input type="checkbox"/>	positive nucleus surrounded by negative electrons	<input checked="" type="checkbox"/>	[1]	if more than one box is ticked then candidate scores zero.  <b>allow</b> any indication of correct response		
negative nucleus surrounded by positive electrons	<input type="checkbox"/>													
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	c	<table border="1"> <tr> <td>very thick specimens</td> <td><input type="checkbox"/></td> </tr> <tr> <td>living organisms</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>specimens that are opaque</td> <td><input type="checkbox"/></td> </tr> <tr> <td>moving objects</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>specimens that are very hard</td> <td><input type="checkbox"/></td> </tr> </table>	very thick specimens	<input type="checkbox"/>	living organisms	<input checked="" type="checkbox"/>	specimens that are opaque	<input type="checkbox"/>	moving objects	<input checked="" type="checkbox"/>	specimens that are very hard	<input type="checkbox"/>	[2]	if more than two boxes are ticked then minus 1 mark for each incorrect response; Candidates cannot score less than zero;  <b>allow</b> any indication of correct response;
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	d	cost / size / idea of hard to use or prepare;  magnification / larger image / resolution / detail / depth of field / 3D images;	[2]	<b>ignore</b> any of the five statements used in part (c);  <b>ignore</b> colour;  <b>allow</b> can examine <u>surface detail</u> of thick specimens; <b>allow</b> >X 1200; <b>ignore</b> more powerful / precise / zoom in more / clearer / accurate;										
		<b>Total</b>	<b>[6]</b>											

Question			Expected Answer	Mark	Rationale/Additional Guidance
5	a	i		[1]	
		ii	3;	[1]	<b>allow</b> DEF
		iii	6;	[1]	<b>allow</b> ABCDEF
		iv	A, (C and E);	[1]	<b>allow</b> A alone A & E A & C no other letters
	b			[2]	1 mark for each connection  multiple lines going to more than one box does not score for that connection
	c		to be able to identify an unknown dye;	[1]	<b>allow</b> idea of match up with dyes they don't know <b>ignore</b> used as reference / accurate/reliable
			<b>Total</b>	[7]	

Question		Expected Answer	Mark	Rationale/Additional Guidance												
6	a	<table border="1"> <tr> <td>It separates a greater range of colours than paper chromatography.</td> <td></td> </tr> <tr> <td>It is much faster than thin layer chromatography.</td> <td></td> </tr> <tr> <td>It can use two solvents at the same time.</td> <td></td> </tr> <tr> <td>It has greater separating power than paper or thin layer chromatography.</td> <td>✓</td> </tr> <tr> <td>It costs less to use than thin layer chromatography</td> <td></td> </tr> <tr> <td>It can separate liquids, gases and volatile solids.</td> <td>✓</td> </tr> </table>	It separates a greater range of colours than paper chromatography.		It is much faster than thin layer chromatography.		It can use two solvents at the same time.		It has greater separating power than paper or thin layer chromatography.	✓	It costs less to use than thin layer chromatography		It can separate liquids, gases and volatile solids.	✓	[2]	if more than two boxes are ticked then minus 1 mark for each incorrect response; candidates cannot score less than zero  <b>allow</b> any indication of correct response
		It separates a greater range of colours than paper chromatography.														
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		It can separate liquids, gases and volatile solids.	✓													
<b>b</b>	<b>i</b>	D;	[1]													
	<b>ii</b>	D and F;	[1]	<b>allow</b> F and D												
	<b>iii</b>	E;	[1]													
		<b>Total</b>	<b>[5]</b>													
		<b>Paper Total</b>	<b>[36]</b>													

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