

**GCE**

**Applied Science**

Unit **G623/02**: Cells and Molecules

Advanced Subsidiary GCE

**Mark Scheme for June 2018**

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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.

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Question		Level	Answer	Mark	Guidance												
1	(a)	2 E/U 1 C/D	<table border="1"> <thead> <tr> <th>Feature to be observed</th> <th>Light or electron microscope</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td><i>Quick check</i></td> <td>light</td> <td>ease of use /portable /high magnification not needed</td> </tr> <tr> <td><i>Golgi</i></td> <td>electron</td> <td>High(er), magnification/ resolution / size of organelle</td> </tr> <tr> <td><i>Moving cytoplasm</i></td> <td>light</td> <td>A live sample</td> </tr> </tbody> </table>	Feature to be observed	Light or electron microscope	Reason	<i>Quick check</i>	light	ease of use /portable /high magnification not needed	<i>Golgi</i>	electron	High(er), magnification/ resolution / size of organelle	<i>Moving cytoplasm</i>	light	A live sample	3	Type of microscope <b>and</b> reason both needed for mark  <b>Ignore</b> quick /cheap
			Feature to be observed	Light or electron microscope	Reason												
			<i>Quick check</i>	light	ease of use /portable /high magnification not needed												
			<i>Golgi</i>	electron	High(er), magnification/ resolution / size of organelle												
<i>Moving cytoplasm</i>	light	A live sample															
(b)	(i)	<p><i>Any three from:</i></p> <p>prepare sample, e.g section / slice ; add drop of water /alcohol: stain / named stain;</p> <p>position coverslip/second slide; exclude air bubbles/ use of mounting needle;</p>	3	<b>Ignore</b> put on slide  e.g. iodine (solution) / methylene blue; <b>Ignore</b> indicator													
	(ii)	<p><i>Any two from:</i></p> <p>Cell wall; Chloroplast(s); (Permanent) vacuole; Starch grain / amyloplast;</p>			2	<b>Ignore</b> chlorophyll											
		<b>Total</b>	<b>8</b>														

Question		Level	Expected Answers	Marks	Additional Guidance										
2	(a)	EU	Any one from: Nucleus; Nucleolus;	1	<b>Allow</b> mitochondrion / mitochondria										
	(b) (i)	CD	X = (inorganic) phosphate (group); Y = sugar/pentose/ribose/deoxyribose;	1 1	<b>Ignore</b> 5 carbon unqualified										
	(ii)	1EU 1CD 2AB	<table border="1"> <thead> <tr> <th>Name of nucleotide base</th> <th>% in sample analysed</th> </tr> </thead> <tbody> <tr> <td>(Adenine)</td> <td>(16)</td> </tr> <tr> <td>Guanine</td> <td>34</td> </tr> <tr> <td>Thymine</td> <td>16</td> </tr> <tr> <td>Cytosine</td> <td>34</td> </tr> </tbody> </table>	Name of nucleotide base	% in sample analysed	(Adenine)	(16)	Guanine	34	Thymine	16	Cytosine	34	4	<b>Allow</b> phonetic spelling <b>Allow</b> guanine thymine and cytosine in any order  <i>Names of bases:</i> <b>two</b> correctly named bases = 1 mark; <b>three</b> correctly named bases = 2 marks;  <i>percentages:</i> all percentages correct = 2 marks; correct match of <b>one or two</b> named bases/initials with its % = 1 mark; i.e. thymine/T = 16 guanine/G = 34 cytosine/C = 34
Name of nucleotide base	% in sample analysed														
(Adenine)	(16)														
Guanine	34														
Thymine	16														
Cytosine	34														
	(c) (i)	EU	<u>Translation</u> ;	1											
	(ii)	EU	Gene(s);	1											
	(iii)	EU 2CD	Any <b>three</b> from:  (Happens at) ribosome; mRNA joined (to ribosome); tRNA joined (to ribosome/mRNA); tRNA has amino acid attached; (adjacent) amino acids join; peptide bond forms / condensation reaction;	3											
			<b>Total</b>	<b>12</b>											

Question			Level	Answer	Mark	Guidance
3	(a)		E/U C/D	Biuret; Purple/lilac/mauve;	2	<b>Allow</b> phonetic spelling
3	(b)	(i)	C/D	1 or 2 fatty acids ; 1 (inorganic) phosphate (group);	2	<b>Accept</b> labelled diagram showing structure <b>Ignore</b> refs to glycerol <b>Accept</b> correct ref to hydrophobic/non-polar or hydrophilic/polar on diagram = 1 mark max
	(b)	(ii)	A/B A/B	<i>Any two from:</i>  Barrier / controls movement (into/out of cell); Prevents water soluble/polar molecules; Allows passage of water; Allows passage of non-polar molecules;  To make membrane selectively permeable ;;	2	<b>Accept</b> this = 2 marks <b>Ignore</b> semi-permeable
3	(c)		E/U C/D C/D E/U C/D	Carbon <b>and</b> hydrogen <b>and</b> oxygen; Water; Hydrolysis; Iodine (solution); Black / blue black;	1 1 1 1 1	
				<b>Total</b>	<b>11</b>	

Question		Level	Expected Answers	Marks	Additional Guidance
4	(a)	2EU 2CD 2AB	<p><b>0 marks</b> Candidate includes fewer than <b>two</b> correct valid points.</p> <p><b>1 – 2 marks</b> Candidate correctly names tests <b>and/or</b> equipment, <b>and/or</b> explains how to interpret results, including at least <b>two</b> valid points.</p> <p><b>3 - 4 marks</b> Candidate correctly names tests <b>and/or</b> linked equipment, <b>and</b> includes at least one interpretation, including at least <b>four</b> valid points expressed clearly and logically.</p> <p><b>5 – 6 marks</b> Candidate correctly names tests <b>and</b> linked equipment, <b>and</b> explains how to interpret results, including at least <b>six</b> valid points, expressed clearly and logically.</p>	6	<p>Valid points to include:</p> <p><b>Tests</b></p> <ul style="list-style-type: none"> <li>• Red blood cell count</li> <li>• White blood cell count</li> <li>• ELISA/Monoclonal antibodies</li> </ul> <p><b>Equipment</b></p> <ul style="list-style-type: none"> <li>• Coulter counter (for RBC and/or WBC count)</li> <li>• Haemocytometer (for RBC and/or WBC count)</li> <li>• (test) Wells/tubes (for MABs)</li> </ul> <p><b>Interpretation</b></p> <ul style="list-style-type: none"> <li>• Anaemia = low RBC count</li> <li>• Leukaemia = high WBC count</li> <li>• Herpes virus antibodies = colour change/fluorescence</li> </ul>
	(b)	2EU	<p><i>Any two from:</i></p> <p>Risk of miscarriage with pre-natal test; Tests, could give false positives/not 100% accurate; Human rights of the unborn/fetus; Whether to pursue abortion, qualified; Access to information with family members;</p>	2	e.g. child's/mother's quality of life, religious belief
			<b>Total</b>	<b>8</b>	

Question		Level	Answer	Mark	Guidance					
5	(a)	E/U C/D A/B	<table border="1" style="margin-left: 20px;"> <tr> <td style="width: 40px;">B</td> <td style="width: 40px;">A</td> <td style="width: 40px;">E</td> <td style="width: 40px;">D</td> <td style="width: 40px;">C</td> </tr> </table> <p>B immediately before A; A immediately before E; E immediately before D; D immediately before C;</p>	B	A	E	D	C	3	Marking points:  3-4 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark
B	A	E	D	C						
5	(b)	(i) A/B A/B	<p><b>FIRST CHECK THE ANSWER.</b>  <b>If the answer is 45 award 2 marks</b></p> <p><math>100 \text{ epu} = 18 \times 10 \mu\text{m} / 1 \text{epu} = \frac{180 \mu\text{m}}{100}</math>;</p> <p><math>25 \text{ epu} = \frac{180 \times 25}{100} \mu\text{m}</math>;</p>	2	Correct conversion = 1 mark  x25 = 1 mark					
	(b)	(ii) C/D	Daffodil;	1	<b>ECF</b> if calculation wrong but correct identification from their answer <b>Ignore</b> Narcissus					
<b>Total</b>				<b>6</b>						

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