



**ADVANCED SUBSIDIARY (AS)**  
**General Certificate of Education**  
**2015**

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**Biology**  
**Assessment Unit AS 1**  
*assessing*  
**Molecules and Cells**  
**[AB111]**

**MONDAY 8 JUNE, AFTERNOON**

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**MARK  
SCHEME**

## General Marking Instructions

### Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

### The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

/ denotes alternative points  
; denotes separate points  
**comments on mark values are given in bold**  
*comments on marking points are given in italics*

AVAILABLE MARKS

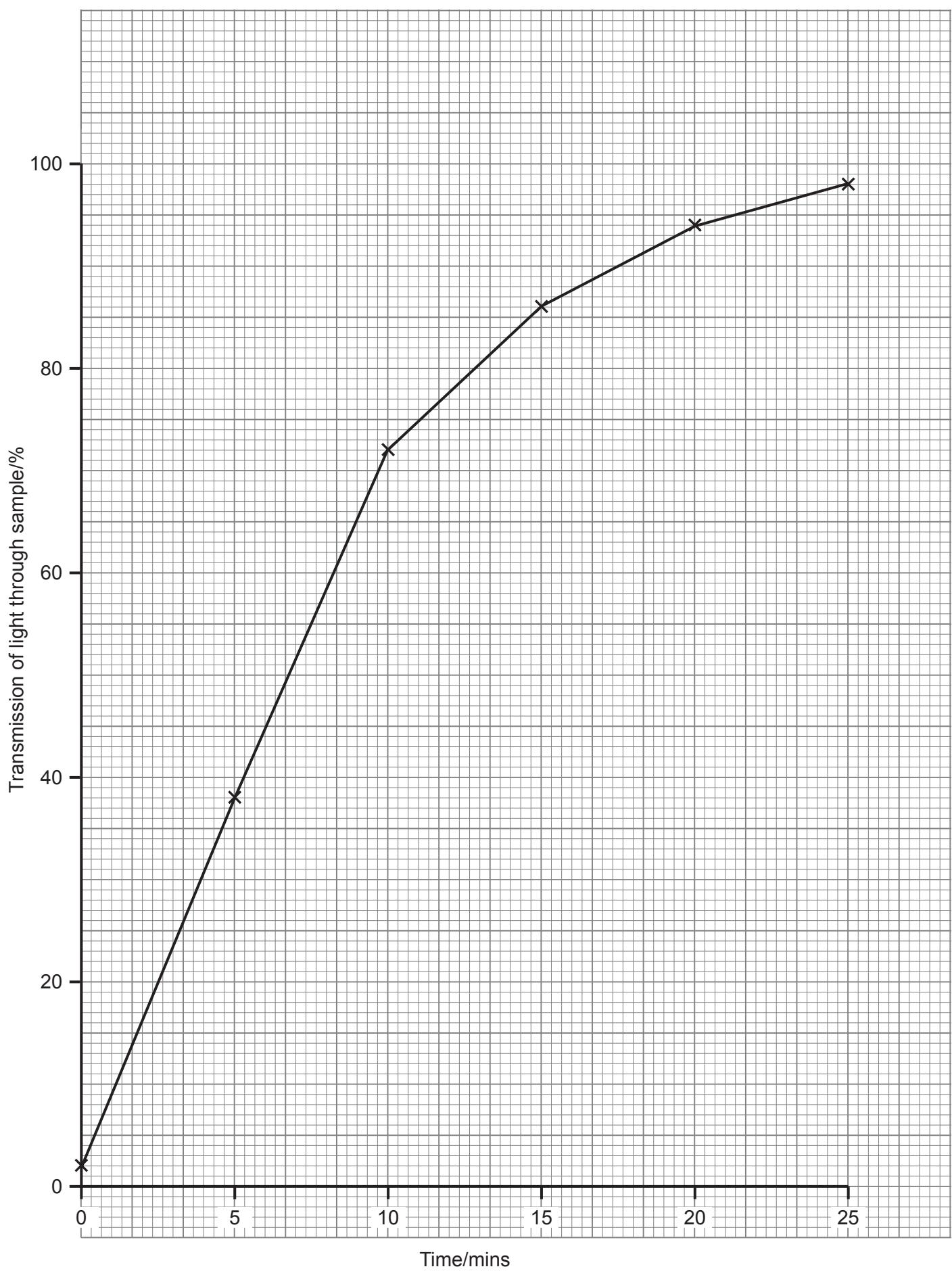
### Section A

1	<table border="1"> <thead> <tr> <th>Description</th><th>Mechanism of transport</th></tr> </thead> <tbody> <tr> <td></td><td>active transport;</td></tr> <tr> <td></td><td>endocytosis/phagocytosis/pinocytosis;</td></tr> <tr> <td></td><td>exocytosis;</td></tr> <tr> <td></td><td>facilitated diffusion;</td></tr> <tr> <td></td><td>(simple) diffusion;</td></tr> </tbody> </table>	Description	Mechanism of transport		active transport;		endocytosis/phagocytosis/pinocytosis;		exocytosis;		facilitated diffusion;		(simple) diffusion;	[5]	5
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	active transport;														
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2	<p>(a) Two layers;  with circles on outside and tails on inside;</p> <p>(b) The phospholipids can move from side to side;  proteins are irregularly arranged throughout the membrane;</p> <p>(c) Cholesterol provides support to the membrane/affects fluidity;</p>	[2] [2] [1]	5												
3	<p>(a) (i) A: contains chromosomes/genetic code/DNA/production of mRNA;  B: produces ribosomes/rRNA;</p> <p>(ii) C: nuclear pore;  D: nuclear envelope/double membrane of nucleus (<i>insist on double membrane/envelope, not simply membrane</i>);  E: ribosomes;</p> <p>(b) (i) Mitochondria;  synthesis of ATP/aerobic respiration;</p> <p>(ii) One is a longitudinal section and the other is a transverse (cross)  section/different plane/one newly divided (smaller)/other appropriate  response;</p> <p>(c) Length of scale bar = 49/50 mm;  = 49 000/50 000 µm;  49 000/50 000 ÷ 8 = 6125/6250;</p>	[2] [3] [2] [1] [3]	11												

			AVAILABLE MARKS									
4	(a) Any four from:											
	<ul style="list-style-type: none"> <li>• DNA is unzipped by breaking of hydrogen bonds</li> <li>• this is catalysed by DNA helicase</li> <li>• each strand acts as a template/semi-conservative mechanism</li> <li>• free nucleotides are attracted to their complementary bases/base pairing occurs, A with T and C with G</li> <li>• (phosphodiester) bonds form between the deoxyribose and the phosphate of adjacent nucleotides</li> <li>• catalysed by DNA polymerase</li> </ul>	[4]										
	(b) Any two from:											
	<ul style="list-style-type: none"> <li>• heat is used to break the hydrogen bonds/separate strands instead of an enzyme (helicase)</li> <li>• only a small section of the DNA is replicated</li> <li>• primers are used (to identify the section of DNA to be amplified)</li> <li>• a thermostable enzyme (e.g. Taq polymerase) is used</li> </ul>	[2]										
	(c) (i) Drug A: prevents the DNA being unzipped (due to cross linkage); Drug B: prevents addition of further nucleotides to the spine (due to three phosphates instead of one);	[2]										
	(ii) S/synthesis phase;	[1]	9									
5	(a) (i) Glycosidic;	[1]										
	(ii)	<table border="1"> <thead> <tr> <th>Carbohydrate</th> <th>Function</th> <th>Location in cell</th> </tr> </thead> <tbody> <tr> <td>Starch</td> <td><b>energy store/storage of glucose</b></td> <td><b>chloroplasts/cytoplasm</b></td> </tr> <tr> <td>Cellulose</td> <td><b>provide support/strength/rigidity</b></td> <td><b>cell walls</b></td> </tr> </tbody> </table>	Carbohydrate	Function	Location in cell	Starch	<b>energy store/storage of glucose</b>	<b>chloroplasts/cytoplasm</b>	Cellulose	<b>provide support/strength/rigidity</b>	<b>cell walls</b>	
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		[4]										
	(b) (i) Disaccharides;	[1]										
	(ii) Hydrolysis;	[1]										
	(iii) Glucose and fructose;	[1]										
	(c)	<ul style="list-style-type: none"> <li>• Erlose has one more monomer than sucrose/consists of three monosaccharides (rings)/is a trisaccharide;</li> <li>• erlose consists of two glucose plus a fructose/a glucose molecule has been added to the sucrose;</li> </ul>	[2]									
			10									

		AVAILABLE MARKS
6	(a) A: Rough endoplasmic reticulum; B: (ER) vesicles; C: Golgi body (apparatus)/dictysome;	[3]
	(b) Cytoplasm: amino acids; Nucleus: organic (nitrogenous) bases/named example of a base/nucleotides;	[2]
	(c) In <b>A</b> (RER and ribosomes) are used to make the protein/polypeptide chains; polypeptides/proteins are transported in <b>B</b> (ER vesicles) to <b>C</b> (Golgi body); and modified into the final protein/glycoprotein in <b>C</b> (Golgi); proteins are transported to the cell membrane in <b>D</b> which fuses with the cell membrane;	[4] 9
7	(a) Change in % transmission of light with time for a starch-amylase (and iodine) mixture; independent variable (time) on X-axis; axes correctly plotted with units and scale; accurate plotting and points joined with short, straight lines;	[4]
	(b) Lighter colour of blue allows light to be transmitted/dark blue-black would not allow any light to be transmitted; so that small changes in colour are picked up, even in the early part of the reaction;	[2]
	(c) Results in increased sensitivity to small changes in blue colouration/only wavelengths absorbed by starch-iodine mixture are being measured/solution absorbs red light;	[1]
	(d) Use clean cuvette for each solution/only handle cuvette on sides not used for transmission/reset colorimeter (using dilute iodine solution) before test reading/other appropriate response;	[1]
	(e) Any three from: • start with a standard solution/solution with a known concentration of starch • make serial dilutions of this standard solution (and add iodine)/use a range of concentrations of starch • measure % transmission of each solution in the colorimeter • plot a graph of % transmission against starch concentration	[3] 11
Section A		60

## Change in % transmission of light with time for a starch-amylase (and iodine) mixture



Section B		AVAILABLE MARKS
8	<p><b>Three</b> essential points and any <b>ten</b> other points from:</p> <ul style="list-style-type: none"> <li>at prophase 1 homologous chromosomes pair up/form bivalents</li> <li>chromosomes shorten and thicken/become visible/condense</li> <li>chiasma/chiasmata/crossing over occurs</li> <li>between non-sister chromatids/homologous chromosomes</li> <li>leads to recombinants/new allelic combinations/non-parental allelic combinations</li> <li><b>which is one cause of variation (essential point)</b></li> <li>spindle fibres develop</li> <li>at metaphase 1 the bivalents (homologous pairs) attach to the spindle fibres by their centromeres</li> <li>orientation of the bivalents (homologous pairs) is random/independent assortment occurs</li> <li><b>which is another cause of variation (essential point)</b></li> <li>at anaphase 1 the spindle fibres contract</li> <li>pulling whole chromosomes to opposite poles of the cell/separating homologous chromosomes</li> <li><b>this is the point at which the haploid number of chromosomes is formed (essential point)</b></li> <li>nuclear membranes form/two cells produced</li> <li>in prophase 2 two sets of spindle fibres form at right angles to the original</li> <li>in metaphase 2 individual chromosomes (within each group) attach to the spindle fibres by their centromeres (<b>allow once</b>)</li> <li>in anaphase 2 the spindle fibres contract (<b>allow once</b>)</li> <li>pulling the chromatids (<i>do not accept chromosomes</i>) to opposite poles resulting in four groups of (new) chromosomes</li> <li>nuclear membranes form/four cells produced (<b>allow once</b>)</li> <li>chromosomes decondense/become thinner/less visible</li> </ul>	[13]
Quality of written communication:		
2 marks:	The candidate expresses ideas clearly and fluently through well-linked sentences, which present relationships and not merely list features. Points are generally relevant and well-structured. There are few errors of grammar, punctuation and spelling.	
1 mark:	The candidate expresses ideas clearly, if not always fluently. The account may stray from the point or may not indicate relationships. There are some errors of grammar, punctuation and spelling.	[2]
0 marks:	The candidate produces an account that is of doubtful relevance or obscurely presented with little evidence of linking ideas. Errors in grammar, punctuation and spelling are sufficiently intrusive to disrupt the understanding of the account.	15
Section B		
Total		15
Total		75