



GCE MARKING SCHEME

SUMMER 2016

**BIOLOGY - BY1 (LEGACY)
1071/01**

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCE BIOLOGY - BY1 (LEGACY)

SUMMER 2016 MARK SCHEME

Question		Marking details		Marks Available
1	(a)	<i>organic molecule</i>	Starch / amino acid ;	5
		<i>tissue</i>	Blood ;	
		<i>ion</i>	Phosphate ;	
		<i>polymer</i>	Starch ;	
		<i>element</i>	Phosphorus ;	
	(b)	(i)	Hydrophobic {fatty acids / tail} are non-polar; Hydrophilic {phosphate / head} is polar ; Accept: ref to charged	2
		(ii)	<i>triglyceride</i> Source / store of energy / metabolic water ; Accept: ref to steroid/hormone/glycolipid synthesis Reject: ref to waterproofing/insulation/protection <i>phospholipid</i> (component of cell) membranes / control of molecules entering/leaving cell ;	2
	(c)	(i)	{Chain / linked / bonded} of repeating / many {nucleotides/monomers }; Accept: description of monomer Reject: chain of polynucleotides / incorrect monomer.	1
		(ii)	Pyrimidine ;	1
		(iii)	Condensation ;	1
Question 1 total			[12]	

Question		Marking details	Marks Available
2	(a)	A = Golgi body / Golgi {apparatus/ cisternae} ; B = mitochondrion / mitochondria ; C = endoplasmic reticulum; NOT ER /RER / SER D = {cell / plasma} membrane ; E = cell wall ; F = ribosomes ;	6
	(b)	Plasmodesmid / plasmodesmata ;	1
	(c)	(i) Protein / glycoprotein / pectin/ lipid; Accept: enzymes Reject: lysosome	1
	(ii)	<ul style="list-style-type: none"> • <u>membrane</u> of {secretory vesicles / vesicles containing product} , fuses with cell membrane ; • contents released from cell ; (secreted is neutral) • exocytosis ; 	3
Question 2 total			[11]

Question		Marking details	Marks Available												
3	(a)	1) polar molecule / dipole ; 2) $H^{\delta+}O^{\delta-}$ / hydrogen slightly positive and oxygen slightly negative charges ; 3) forms bonds between hydrogen and oxygen on adjacent molecules ;	5												
	(b)	<table border="1"> <thead> <tr> <th>Property</th> <th>Biological Significance</th> </tr> </thead> <tbody> <tr> <td><i>ice less dense than water</i></td> <td> <ul style="list-style-type: none"> so floats on surface, to provides a habitat to live on / insulation of water so life can survive when ice forms ; </td> </tr> <tr> <td>high latent heat of evaporation / vaporisation ;</td> <td><i>has a role in cooling body</i></td> </tr> <tr> <td><i>Cohesion between water molecules</i></td> <td> <ul style="list-style-type: none"> allows movement through xylem Accept: transpiration stream (surface tension) allows insects to walk / live on water surface or example ; </td> </tr> <tr> <td>high (specific) heat capacity ;</td> <td><i>minimises temperature fluctuation in aquatic habitats</i></td> </tr> <tr> <td><i>dissolves ionic substances;</i></td> <td>used for {transport/ movement } of molecules / {metabolic /chemical} reactions occur in solution ;</td> </tr> </tbody> </table>		Property	Biological Significance	<i>ice less dense than water</i>	<ul style="list-style-type: none"> so floats on surface, to provides a habitat to live on / insulation of water so life can survive when ice forms ; 	high latent heat of evaporation / vaporisation ;	<i>has a role in cooling body</i>	<i>Cohesion between water molecules</i>	<ul style="list-style-type: none"> allows movement through xylem Accept: transpiration stream (surface tension) allows insects to walk / live on water surface or example ; 	high (specific) heat capacity ;	<i>minimises temperature fluctuation in aquatic habitats</i>	<i>dissolves ionic substances;</i>	used for {transport/ movement } of molecules / {metabolic /chemical} reactions occur in solution ;
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Question 3 Total		[8]													

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4	(a)	<p>1) (Between 0 and 2% as polyphenol oxidase) concentration doubles the time taken (for the standard brown colour to develop) halves ;</p> <p>Accept: correct ref to data e.g.: 0.5% takes 40s, 1% takes 20s. Reject: rate</p> <p>2) Above 1% time taken plateaus/ flattens out ;</p>	2	
	(b)	i	0.1 ;	1
		ii	Substrate/ catechol concentration ;	1
	(c)	I	<p>Any 2 from:</p> <p>1) enzyme {not at / below} optimum pH ;</p> <p>2) enzymes {inactivated / denatured} / change to {shape of active site / charge} ;</p> <p>3) {less/no} Enzyme-Substrate complexes formed/ or description ;</p> <p>NOT: ESC (abbreviation)</p>	Max 2
		II	<p>1) Low <u>kinetic</u> energy (or correct description) ;</p> <p>2) {less/no/low} frequency of Enzyme - Substrate complex formation / fewer successful collisions;</p>	2
	III	<p>1) No oxygen present ;</p> <p>2) Oxygen needed for {oxidase/ enzyme} activity / Oxidation (of phenolic compounds / banana puree) cannot take place ;</p>	2	
Question 4 Total			[10]	

Question		Marking details	Marks Available
5	(a)	1. Diffusion ; 2. As concentration (difference) increases rate of uptake increases ; 3. {Not limited by carriers/Not affected by respiratory inhibitors} because {No ATP / energy required / passive} ;	3
	(b)	1. Facilitated diffusion ; 2. At high concentration (differences), rate of uptake levels/ plateaus 3. {transport/carrier/channel} proteins / pores} {saturated / full/ are a limiting factor} ; 4. Not affected by respiratory inhibitors because {no ATP / energy required / passive} ;	Max 3
	(c)	1. Active transport ; 2. At high concentration (differences), {rate of uptake levels/ carriers are saturated} ; 3. {Affected / slowed} by respiratory inhibitors because process needs {ATP / energy};	Max 3
	Question 5 Total		[9]

Question			Marking details	Marks Available
6	(a)	(i)	<p>1. water moves in by osmosis ;</p> <p>2. {higher <u>water potential</u> outside rbc / lower inside} / down <u>water potential</u> gradient into the cell;</p> <p>Accept: correct ref to water potential less negative outside cell</p> <p>Reject: ref water concentration</p> <p>Neutral: ref to solute concentration / hypotonic/hypertonic</p> <p>3. ref. no cell wall to prevent bursting / cell membrane unable to withstand pressure ;</p> <p>4. Most haemoglobin is released therefore lowest transmission of light / less light reaches sensor;</p>	4
		(ii)	<p>Different cells have different {(solute) concentrations / solute potential / water potential};</p> <p>Reject: water concentration</p> <p>Each cell would require a different {external water potential / solute concentration}, before haemolysis / bursting ;</p>	2
	(b)	(i)	<p>Any 3 from</p> <p>1. cell plasmolysis ;</p> <p>2. cytoplasm decreases in volume ;</p> <p>3. cell membrane pulls away from cell wall ;</p> <p>4. vacuole decreases in volume ;</p>	3
		ii	<p>0 <u>kPa</u></p>	1
Question 6 Total				[10]

Question		Marking details	Marks Available
7	(a)	<p>The photomicrograph below shows a root tip squash. With reference to the cells labelled 1- 4, describe and explain the sequence of events in mitosis.</p> <p>A Prophase and 3 ;</p> <p>B chromosomes appear as {two/sister/ a pair of } chromatids / (DNA/chromatin) condensation ;</p> <p>C Joined at centromere ;</p> <p>D Nuclear membrane disappears/ nucleolus disappears ;</p> <p>E spindle formation ;</p> <p>F metaphase and 4 ;</p> <p>G Chromosomes/ chromatids line up at equator ;</p> <p>H Chromosomes/ chromatids attach to spindle <u>by centromeres</u> ;</p> <p>I anaphase and 2 ;</p> <p>J Centromere divides;</p> <p>K Chromatids/chromosomes move to opposite poles;</p> <p>L Contraction/shortening of spindle fibres;</p> <p>M Telophase and 1 ;</p> <p>N Nuclear membrane/ nucleolus reforms;</p> <p>O chromosomes decondense ; Reject: chromatids Note: ref. to each event must take place in correct stage</p> <p>Question 7a total</p>	[10]

Question			Marking details	Marks Available
7	(b)	(i)	<p>Explain what is meant by an immobilised enzyme and with reference to suitable examples, discuss the advantages of their application in fields such as medicine and industry.</p> <p>A Enzyme molecules that are fixed / bound /trapped ; (not: immobilised/do not move)</p> <p>B alginate beads / gel membrane / meshwork of inert material / cellulose ;</p> <p><i>The following are general; award once at any point throughout essay</i></p> <p>C They are more stable at higher temperatures ;</p> <p>D They can tolerate <u>wider range</u> of pH ;</p> <p>E enzyme easily recovered for reuse ;</p> <p>F Product not contaminated by enzyme/no need for product to be separated from enzyme ;</p> <p>G {More than one enzyme type / differing optimal pH} can be used at a time ;</p> <p>H Reaction can be more easily controlled by adding or removing enzymes ;</p> <p><i>Medical</i></p> <p>I Biosensor (in medical diagnosis) / named condition e.g. diabetes ;</p> <p>J They are specific so can select one type of molecule in a mixture ;</p> <p>K rapid detection ;</p> <p>L quantitative result/ detected in low concentrations ;</p> <p><i>Industrial/commercial</i></p> <p>M Named industrial application e.g.: environmental monitoring, lactose free products, pectinase digestion etc. ;</p> <p>N reaction rates may be faster by using higher temps ;</p> <p>O {Cost effective / cheaper} because {more rapid production / continuous process};</p> <p>Question 7 b Total</p>	[10]