

Subject: Biology Foundation Code: 2801

Session: January Year: 2002

Mark Scheme

MAXIMUM MARK

90

ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

1. Please ensure that you use the **final** version of the Mark Scheme.
You are advised to destroy all draft versions.
2. Please mark all post-standardisation scripts in red ink. A tick (✓) should be used for each answer judged worthy of a mark. Ticks should be placed as close as possible to the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks ($\frac{1}{2}$) should never be used.
3. The following annotations may be used when marking. No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.

x = incorrect response (errors may also be underlined)
^ = omission mark
bod = benefit of the doubt (where professional judgement has been used)
ecf = error carried forward (in consequential marking)
con = contradiction (in cases where candidates contradict themselves in the same response)
sf = error in the number of significant figures
4. The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
5. In cases where candidates are required to give a specific number of answers, (e.g. 'give three reasons'), mark the first answer(s) given up to the total number required. Strike through the remainder. In specific cases where this rule cannot be applied, the exact procedure to be used is given in the mark scheme.
6. Correct answers to calculations should gain full credit even if no working is shown, unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
7. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
8. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words that appear in the mark scheme. If the science is correct and answers the question, then the mark(s) should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance.

Mark Scheme Page 3 of 10	Unit Code 2801	Session January	Year 2002	Version Final
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Abbreviations, annotations and conventions used in the Mark Scheme	/	= alternative and acceptable answers for the same marking point
	;	= separates marking points
	NOT	= answers which are not worthy of credit
	()	= words which are not essential to gain credit
	<u> </u>	= (underlining) key words which must be used to gain credit
	ecf	= error carried forward
AW	= alternative wording	
ora	= or reverse argument	

Question	Expected Answers	Marks
1 (a)	<p><i>Method ~</i> <i>NOT Biuret test alone.</i> add / use , biuret (solution) / copper (II) sulphate & (few drops of) sodium hydroxide ; (A) Biuret A + B</p> <p><i>Observation ~</i> (blue to) lilac / purple / mauve ;</p>	2
(b)	<p><i>NOT covalent</i></p> <p>(i) A hydrogen ; (A) H NOT H_2 / polar B ionic ;</p> <p>(ii) C glycosidic ; D peptide ; E disulphide ;</p>	2
(c)	<p><i>Letters stand alone. Award marks for the letters shown.</i> <i>Do not accept a choice for (i) – (iii).</i> <i>Only accept a choice in (iv) if B & E are the only answers given..</i></p> <p>(i) C ;</p> <p>(ii) D ;</p> <p>(iii) A ;</p> <p>(iv) B / E ;</p>	3
		4

[Total: 11]

Mark Scheme Page 4 of 10	Unit Code 2801	Session January	Year 2002	Version Final
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Question **Expected Answers** **Marks**

2 (a) A phospholipid ; *ignore ref. to bilayer*
 B protein / extrinsic protein / enzyme / external protein / receptor protein
 / globular protein ; *NOT intermembrane*
 C channel / carrier / transmembrane / transport / intrinsic , protein ;
 D glycoprotein ;
 E glycolipid ; (A) *glycophospholipid*
 F cholesterol ; **6**

(b) 7 nm ; (A) *5 – 10 nm / correct conversion / standard form* **1**

(c) *yes = ✓ no = ✗*

For Left Hand Side of the table only
If only ticks are shown, assume blanks are crosses.
If only crosses are shown, assume blanks are ticks.

✓	✗	;	✗	;	
✗	✓	;	✗	;	
✓	✗	;	✓	;	6

Mark Scheme Page 5 of 10	Unit Code 2801	Session January	Year 2002	Version Final
------------------------------------	---------------------------------	---------------------------	---------------------	-------------------------

(d) *Quality of written communication assessed in this answer.*

Mark to a maximum of 3 for each process.

A1 active transport & detail ;

A2 suitable detail ; ;

A3 e.g. suitable substance
use of , energy / ATP
against concentration gradient
use of protein carriers

D1 diffusion & suitable detail ;

D2 suitable detail ; ;

D3 e.g. suitable substance
no , energy / ATP
KE of molecules
down concentration gradient
route

F1 facilitated diffusion & suitable detail ;

F2 suitable detail ; ;

F3 e.g. suitable substance
no , energy / ATP
down concentration gradient
use of protein channels

E1 endocytosis / exocytosis / bulk transport , & suitable detail ;

E2 suitable detail ; ;

E3 e.g. description
mixture of substances / suitable substance
use of , energy / ATP
phagocytosis and solid material
pinocytosis and liquid

max 6

QWC ~ legible text with accurate spelling, punctuation & grammar ;

**1
max 7**

[Total: 20]

Mark Scheme Page 6 of 10	Unit Code 2801	Session January	Year 2002	Version Final
------------------------------------	---------------------------------	---------------------------	---------------------	-------------------------

Question	Expected Answers	Marks
3 (a) (i)	denitrification / denitrifying ; <i>NOT bacteria</i>	1
(ii)	(denitrifying) bacterium / bacteria ; (A) <i>Pseudomonas / prokaryote / Monerans</i>	1
(iii)	lightning / nitrogen fixation ; (A) <i>description</i>	1
(iv)	<u>nitrifying</u> bacteria ; <i>take 1st answer if more than one type of bacteria given.</i> <i>Nitrobacter ;</i> <i>Nitrosomonas ;</i>	max 2
(b)	<i>N.B. protein in animal tissues, not in diet.</i> decay / decomposition / putrefaction / rotting ; saprotrophs / fungi / bacteria ; protein converted to amino acids ; by , hydrolysis / (protease) enzymes ; deamination / AW ;	max 3
(c)	consumer ; trophic level ; <i>NOT tropic</i> population ; community ; ecosystem ;	5
[Total: 13]		

Mark Scheme Page 7 of 10	Unit Code 2801	Session January	Year 2002	Version Final
-----------------------------	--------------------------	--------------------	--------------	------------------

Question	Expected Answers	Marks
4 (a)	<p>(is a tissue because ...) group / collection , of cells ; mixed / more than one / two , types ; vessels / vessel elements , and fibres ; specialised / adapted ; perform particular , function(s) / role(s) ; transport / support ;</p>	max 4
(b)	<p>1 magnification = enlargement ; AW 2 to reveal (further) detail ; AW</p> <p>3 resolution = clarity ; 4 resolution = ability to distinguish between two (separate) points ;</p> <p>5 electron microscope can magnify (successfully) to higher levels ; NOT better, but (A) greater 6 resolution of light microscope is less ; (ora) 7 <u>resolution</u> limits , detail revealed / magnification ;</p> <p><i>light microscope</i></p> <p>8 increased magnification (beyond a certain limit) produces , poor resolution / a blurred image ; 9 maximum (practical) magnification = x 1500 ;</p> <p>10 AVP ; ; (two marks) 11 e.g. maximum resolution of light microscope = 200 nm objects closer than 200 nm are seen as one point limit of resolution is one half the wavelength (of the radiation used) electrons have much shorter wavelength than light (shortest) wavelength of light = 400 nm electron wavelength approx. wavelength of X-rays</p>	max 4

[Total: 8]

Mark Scheme Page 8 of 10	Unit Code 2801	Session January	Year 2002	Version Final
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Question	Expected Answers	Marks
5 (a)	1 formation of , new / more , cells ; 2 formation of genetically identical cells ; (A) clone 3 growth ; 4 ref. major growing time ; 5 <u>asexual</u> reproduction ; 6 e.g. (of method of asexual reproduction) ; 7 repair / replacement of damaged cells / formation of scar tissue ; 8 specific location ; 9 AVP ; e.g. consequence / purpose maintain chromosome number	max 4
(b) (i)	blocks UV rays / UV rays are harmful ;	1
(ii)	tar is , carcinogenic / mutagenic ;	1
(iii)	(lead) blocks X-rays / X-rays are harmful / ref. frequent exposure ;	1
(c)	<i>Quality of written communication assessed in this answer.</i> <i>Accept points from labelled diagram.</i> <i>Credit chromosomes throughout.</i> 1 DNA replication ; 2 detail ; 3 chromosome consists of 2 chromatids ; 4 chromosome , condenses / spirals ; 5 becomes visible ; 6 chromosome aligns at equator ; 7 attached to spindle (fibre) ; 8 by centromere ; 9 spindle (fibres) , contracts / shortens ; 10 centromere splits ; 11 (sister) chromatids separate ; 12 (chromatids) pulled to (opposite) , poles / ends , of , cell / spindle ; 13 centromere first ; 14 chromosome , elongates / uncoils ; 15 AVP ;	max 7
	QWC ~ clear, well organised using specialist terms	1
		max 8
		[Total: 15]

Mark Scheme Page 9 of 10	Unit Code 2801	Session January	Year 2002	Version Final
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Question	Expected Answers	Marks
6 (a)	1 tertiary structure determines (3D) shape of , molecule / enzyme ; 2 tertiary structure forms active site ; 3 active site has , specific / particular , shape / 3D structure ; 4 shape of active site , matches / complementary to , shape of substrate ; NOT the same as 5 substrate can , fit into / bond to , active site ; 6 if tertiary structure , incorrect / damaged , then enzyme cannot function ; 7 ref. denaturation ; 8 ref. secondary site ; 9 (secondary site) matching shape of regulator ;	max 4
(b) (i)	(vinegar is) acidic / has low pH ; ref. H ions ; pH not optimum ; denatures enzyme ; (A) destroy changes active site ;	max 2
(ii)	(high temperatures) denature enzymes ; (A) destroy active site changed ; ref. bonds breaking ; prevents , growth / spoilage , when food cannot be seen (after canning) ; ref. botulism ; microorganisms , killed / stop growing / stop reproducing ; <i>NOT reduce</i>	max 2
	<i>Credit <u>either</u> in (i) <u>or</u> (ii), whichever will give the candidate most marks.</i>	
(c)	enzyme would (start to) be denatured above 40°C ; AW ref. (mammalian) body temperature ; enzyme working at <u>optimum</u> temperature / ref. maximum turnover rate ; below 30°C enzymes would , be working too slowly / be working slower / have less KE / ref. $Q_{10} = 2$; AW	max 2

[Total: 10]

Mark Scheme Page 10 of 10	Unit Code 2801	Session January	Year 2002	Version Final
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Question	Expected Answers	Marks
7 (a) (i)	<p>A phosphate ; <i>NOT molecule</i></p> <p>B pentose / 5-carbon sugar / deoxyribose ;</p> <p>C base / adenine / thymine / cytosine / guanine ; (A) purine / pyrimidine</p>	3
(ii)	base / C ;	1
(b)	<p>1 1 , template / original / old , and 1 new ; AW</p> <p>2 complementary base pairing ;</p> <p>3 2 isotopes in molecule ;</p> <p>4 half / 1 (original) strand with , 'heavy' N / ¹⁵N ;</p> <p>5 half / 1 (new) strand with , 'light' N / ¹⁴N ;</p> <p>6 no molecules with only 1 isotope ;</p>	max 3
(c)	<p>A ;</p> <p>C ;</p> <p>B <u>and</u> C ;</p>	3
(d)	<p>bar drawn in ¹⁴N' column <u>and</u> ¹⁴N/¹⁵N' column ;</p> <p>75% for ¹⁴N' ;</p> <p>25% for ¹⁴N/¹⁵N' ;</p>	3

[Total: 13]