Markscheme

May 2018

Biology

Standard level

Paper 2

15 pages

Section B

Extended response questions – quality of construction

- Extended response questions for SLP2 carry a mark total of **[16]**. Of these marks, **[15]** are awarded for content and **[1]** for the quality of the answer.

- **[1]** for quality is awarded when:
  - the candidate's answers are clear enough to be understood without re-reading.
  - the candidate has answered the question succinctly with little or no repetition or irrelevant material.

Section A

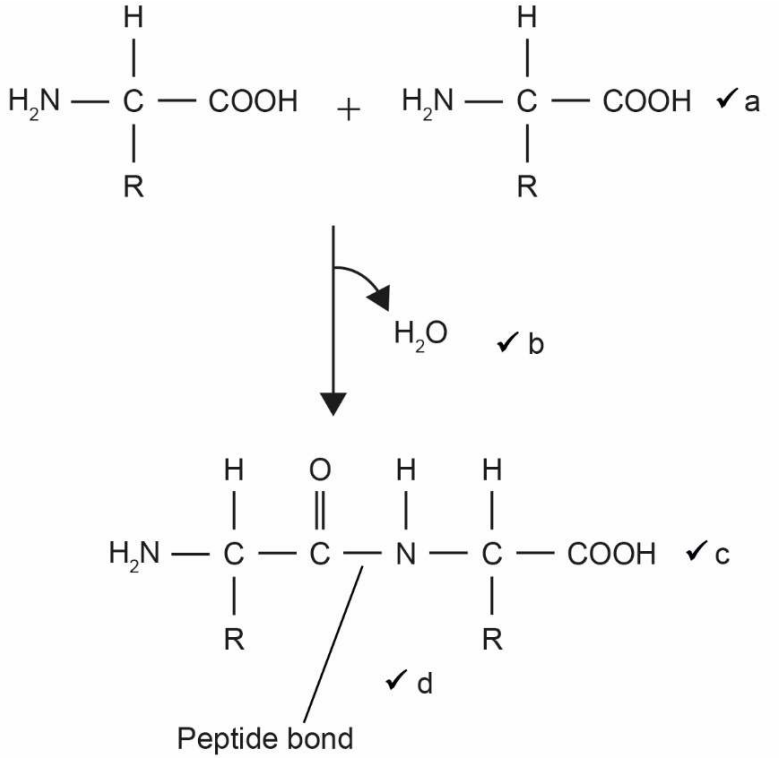
Question			Answers	Notes	Total
1.	a		78(%) ✓	*Accept answers ranging between 77 and 80 %.*	1
1.	b		advantage: camouflage ***OR*** disadvantage: visibility ✓		1
1.	c		a. more yellow in fields (than in woods) / *vice versa* ✓ b. more unbanded in woods (than in fields) / *vice versa* ✓ c. more overlap within banding than within yellow colour ***OR*** yellow colour range greater than banding range ✓ d. very little overlap between fields and woods / some outliers ✓	*Do not accept answers with only numerical data.*	2
1.	d		a. brown most frequent ✓ b. pink least frequent ✓		2
1.	e		*Evidence that colour plays a role:* a. few yellow adults (relative to juveniles) means that yellow juveniles do not survive into adulthood ✓ b. frequent brown adults (relative to juveniles) means brown juveniles survive well into adulthood ✓ *Evidence that colour does not play a role:* c. similar numbers of adult and juvenile pink individuals means pink colour does not play a role ✓ d. all three colours show wide variation/considerable overlap therefore evidence is not strong ✓		3

(continued…)

(Question 1 continued)

Question			Answers	Notes	Total
1.	**f**		a. natural selection requires that snails become adults /live to reproduce their variations/undergo differential predation ***OWTTE*** ✓ b. higher adult frequency of brown shows selection ✓ c. but results for pink do not show selection ✓ d. more brown juveniles survive into adulthood showing that brown is selected for / *vice versa* against yellow ✓ e. not enough alone to support theory of natural selection but may be added evidence to similar observations in other organisms / ***OWTTE*** ✓		**3 max**

2.	**a**	**i**	amylose unbranched/helical while amylopectin branched / *vice versa* ✓		**1**
2.	**a**	**ii**	enzymes required to digest cellulose not present in the human gut / ***OWTTE*** ***OR*** undigested cellulose provides bulk/fibre ✓		**1**

Question			Answers	Notes	Total
2.	b		a. correct structure of two amino acids ✓ b. H_2O lost ✓ c. C from COOH of one links to N of NH_2/NH_3^+ from the other ✓ d. correct labelling of the peptide bond ✓ *e.g.*  		**3 max**

(continued…)

(Question 2 continued)

Question			Answers	Notes	Total
2.	**c**		a. number of strands ***OR*** (usually) only one strand in RNA/two strands in DNA ✓ b. base composition ***OR*** uracil only in RNA / thymine only in DNA ✓ c. type of pentose ***OR*** ribose only in RNA / deoxyribose only in DNA ✓		**2 max**

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Notes</th><th>Total</th></tr>
<tr><td>3.</td><td>a</td><td></td><td>a. correct gametes of one parent as I^A AND i in header line/column
AND
correct gametes of other parent as I^B AND i in header column/line ✓
b. correct corresponding genotypes in inner squares as I^AI^B, I^Ai, I^Bi, ii ✓
c. corresponding phenotypes of children identified as AB, A, B and O ✓
d. ratio of phenotypes is 1:1:1:1 ✓ OWTTE

<table>
<tr><td>Gametes</td><td>I^A</td><td>i</td></tr>
<tr><td>I^B</td><td>I^AI^B</td><td>I^Bi</td></tr>
<tr><td>i</td><td>I^Ai</td><td>ii</td></tr>
</table>
</td><td>Allow ECF.</td><td>3 max</td></tr>
</table>

(continued…)

(Question 3 continued)

Question			Answers	Notes	Total
3.	**b**		a. arteries have thicker (muscular) walls/layer/tunica (media) ***OR*** veins have thinner (muscular) walls/layer/tunica (media) ✓ b. arteries have no valves ***OR*** veins have valves ✓ c. arteries have thicker elastic layer ***OR*** veins have thinner elastic layer ✓ d. arteries have a smaller lumen/bore ***OR*** veins have a larger lumen/bore ✓	*Accept answers presented in a table.*	**3**
3.	**c**		a. clotting factors released from platelets ✓ b. clotting process involves a cascade/series of reactions ✓ c. produces thrombin ✓ d. causes rapid conversion of fibrinogen into fibrin ✓ e. fibrin makes a mesh to seal the wound/***OWTTE*** ✓		**2 max**

Question			Answers	Notes	Total
4.	a	i	a. they do not have a metabolism/homeostasis/other specifically named life function ✓ b. cannot reproduce by themselves ✓ c. they are not cells/they need a host cell ✓		1 max
4.	a	ii	bryophyta ✓		1
4.	b		a. unsegmented body (whereas arthropods are segmented) ✓ b. shell (versus exoskeleton in arthropods) ✓ c. <u>muscular foot</u> (which arthropods do not have) ✓ d. no (jointed) appendages/(jointed) legs (whereas arthropods have jointed legs/appendages) ✓ e. slimy/mucus-covered / arthropod is not slimy ✓	*Do not award marks for any answers after the first two given.*	2 max
4.	c		a. pigments/chlorophyll absorb light ✓ b. red and blue/violet light absorbed ✓ c. absorption of light energy is necessary for photolysis/use of water in photosynthesis ✓ d. other pigments allow for wider action spectrum than the absorption spectrum of chlorophyll ✓		3 max

Section B

Clarity of communication: [1]

The candidate's answers are clear enough to be understood without re-reading. The candidate has answered the question succinctly with little or no repetition or irrelevant material.

Question			Answers	Notes	Total
5.	**a**		Draw a labelled diagram to show the fluid mosaic model of the plasma membrane. a. two correctly oriented layers of <u>phospholipids/phospholipid bilayer</u> shown with heads facing in opposite directions ✓ b. phospholipids shown with two parts labelled <u>hydrophilic</u>/<u>phosphate</u> head AND <u>hydrophobic</u>/<u>hydrocarbon</u> tail c. <u>protein</u> (any) shown as a globular structure embedded in one/both layers of phospholipid ✓ d. <u>peripheral protein,</u> shown as globular structure at the surface of the membrane AND <u>integral protein</u> shown as embedded globular structures ✓ e. <u>glycoprotein</u> shown as embedded globular structure with antenna-like carbohydrate protruding / <u>carbohydrate</u> shown as a branched/antenna-like structure either on a protein or on a phospholipid ***OR*** <u>channel</u> protein(s) shown with a pore passing through it ***OR*** <u>pump</u> protein shown as a transmembrane globular structure ✓ f. <u>cholesterol</u> shown in between adjacent phospholipids ✓	*Do not award the mark unless the structure is labelled with the underlined name.*	**4 max**

(continued…)

(Question 5 continued)

Question			Answers	Notes	Total
5.	**b**		a. nutrition: process by which organisms take in and make use of food//nutrients ***OWTTE*** ✓ b. metabolism: conversion of organic molecules/chemical reactions in an organism ✓ c. growth: increase in size/mass/number of cells within an organism✓ d. response/irritability/sensitivity: reactions/responsiveness to stimuli/factors ✓ e. homeostasis: regulating/maintaining constant/stable interior environment ✓ f. reproduction: production of similar cells/organisms from existing ones/offspring ✓ g. excretion: elimination of (metabolic) wastes ✓		**4 max**

(continued…)

(Question 5 continued)

Question			Answers	Notes	Total
5.	**c**		a. autotrophs/producers absorb carbon (dioxide} from atmosphere/air/water ✓ b. autotrophs make carbohydrates/organic compounds / perform photosynthesis ✓ c. carbon (compounds) pass along food chains/trophic levels (as consumers feed) ✓ d. respiration releases carbon (dioxide) into atmosphere/water ✓ e. carbon (dioxide} is released from dead matter /by decomposition/respiration ✓ f. methane is produced during anaerobic respiration of organic matter / by methanogens in cattle/herbivores ✓ g. methane is oxidized into carbon dioxide in the atmosphere ✓ h. fossil fuels/peat were made from partially decomposed organic matter ✓ i. combustion of fossil fuels/forest fires/biomass releases carbon (dioxide} into the atmosphere ✓ j. volcanic eruptions may add large quantities of carbon (dioxide) into the atmosphere ✓ k. limestone (from shells/reefs)/trees/permafrost are <u>sinks</u> of carbon ✓		**7 max**

Question			Answers	Notes	Total
6.	a		a. the (spherical) wall of an alveolus maximizes/allows gas exchange ✓ b. pneumocytes I (optimize) gas exchange ✓ c. pneumocytes II produce surfactant ✓ d. adjacent capillaries enclose alveolus for efficient gas exchange with blood ✓ e. surfactant reduces surface tension/prevents collapse of alveolus f. (alveolar) macrophages/phagocytes help with defense/homeostasis/response to foreign substances ✓		**4 max**
6.	b		a. antibiotic resistance exists as a genetic variation (within the population) ✓ b. (antibiotic resistance) may occur from transfer of genetic material ***OR*** (antibiotic resistance) may occur through mutation ✓ c. resistance is specific to one antibiotic ✓ d. only bacteria with resistance gene reproduce in the presence of antibiotic ✓ e. frequency of resistant bacteria increases in population ✓ f. resistant population replaces non-resistant over time ✓		**4 max**

(continued…)

(Question 6 continued)

Question			Answers	Notes	Total
6.	**c**		Since this question is open-ended here is how it may be marked: For any non-pathogenic disease being addressed, look for the following components ● name of disease/condition. ● factor/category *e.g.: genetic, lifestyle, environmental, psychological, multi-factoral.* ● description/symptoms of disease. ● cause of disease. At least 2 of these qualities must be present to earn any marks for a disease or category/factor For this question use the unlettered tick. Award 4 MAX if only one condition is explained. *Sample answers*: *e.g.* *cystic fibrosis* ✓ *genetic* ✓ *multiple lung infections/sticky mucus allows opportunistic bacterial infections of lungs / patients lack lipases/cannot digest fat/do not "thrive"* ✓ *recessive (autosomal) allele / homozygous recessive subjects display cystic fibrosis phenotype / chloride channels are faulty* ✓ *e.g.* *rickets* ✓ *environmental / lifestyle / nutritional* ✓ *bones are soft/do not calcify* ✓ *lack of vitamin D* ✓	*Award **[4 max]** if only one disease is explained.* *For accuracy of individual answers, check resources.*	**7 max**