

# Markscheme

**May 2019**

**Biology**

**Standard level**

**Paper 2**

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## 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**

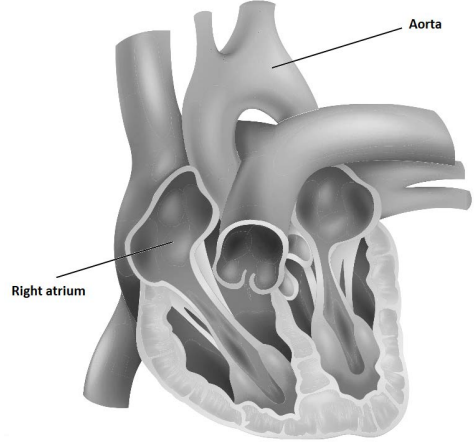
Question			Answers	Notes	Total
1.	a	i	Sierra Leone ✓		1
1.	a	ii	Liberia ✓		1
1.	b		country with biggest population/Mali has lowest number of deaths <b>OR</b> country with smallest population/Liberia has biggest number of deaths ✓	<i>OWTTE</i>	1
1.	c		greater density means more frequent contact with infected people/animals ✓	<i>Need both greater density and frequency of contact</i>	1
1.	d		a. overall pattern similar in both/both show a rise and a fall in the infections ✓  b. both countries show an increase during 2014 <b>OR</b> neither country shows an increase in 2015 ✓  c. both show a sudden drop at one point <b>OR</b> sudden drop earlier «Oct–Nov 14» in Liberia than in Guinea «Dec 14, Jan 15» ✓  d. Guinea fluctuates whereas Liberia rises to a peak and then decreases/no fluctuations ✓  e. epidemic starts earlier «in April 14» in Guinea than in Liberia «in June 14» ✓  f. epidemic peaks earlier «Sept 14» in Liberia than in Guinea «Dec 14» ✓  g. epidemic lasts longer in Guinea than it does in Liberia <b>OR</b> last case recorded in Liberia Feb 15 while cases continue «at least» until May 15 in Guinea ✓  h. numbers of cases in Guinea generally lower than in Liberia <b>OR</b> number of cases higher in Liberia than in Guinea ✓		3 max

*(continued...)*

(Question 1 continued)

Question		Answers	Notes	Total
1.	e	a. improved medical care/support/supplies/equipment/training of staff/hygiene/distribution of vaccine ✓ b. improved understanding of how to avoid infection «amongst public»/greater awareness in society/better education ✓ c. rise in number of deaths means fewer infectious individuals ✓ d. impact of disease control measures/control policies/quarantine/isolation ✓ e. drop in the number of fruit bats ✓ f. maybe seasonal changes/weather changes ✓ g. people may have left the area ✓ h. international aid arrives ✓	OWTTE	2 max
1.	f	a. cells not killed/few cells killed «even at high concentrations» ✓ b. «T-705» effective/viruses reduced/viruses killed at 100 µM <b>OR</b> «T-705» very effective/viruses much reduced/nearly all viruses killed at 1000 µM ✓ c. virus concentration decreases as T-705 concentration increases ✓ d. drug has «high» potential for treatment «at high enough concentration» ✓		2 max
1.	g	raise awareness/provide information for local population/supply health workers/equipment/train local staff/share expertise/provide financial support/provide vaccine/travel ban alert to affected country ✓		1

Question		Answers	Notes	Total
2.	a	«micrograph» <u>C</u> cristae/double membrane is visible/«folds of» membranes inside ✓	<i>Must state observation</i>	1
2.	b	a. «double» membrane may have formed when engulfed ✓ b. replicate by binary fission like free-living prokaryotes <b>OR</b> reproduce separate from «host» cell replication ✓ c. they have their own «circular» DNA <b>AND</b> reproduce on their own ✓ d. they have «70s» ribosomes <b>AND</b> can manufacture «their own» proteins ✓ e. have organelle«s» similar to free-living prokaryotes ✓ f. similar in size to free-living prokaryotes ✓ g. mitochondrial inner membranes manufacture ATP like bacterial membranes ✓ h. currently there is no free-living prokaryote like a mitochondrion ✓		3 max

Question			Answers	Notes	Total
3.	a	i & ii	<p>both labelled clearly as in diagram ✓</p> 		2
3.	b		<p>a. valves open and close in response to changes in blood pressure/heart contraction/pumping ✓                      b. valve prevents backflow/maintains direction of blood flow ✓                      c. valves allow heart chambers to fill/to empty ✓</p>		2 max
3.	c		<p>a. coronary heart disease/CHD/coronary artery disease/CAD occurs when there is reduction of oxygen to the heart muscle ✓                      b. high ratio of LDL to HDL/fatty diet leads to plaque formation in arteries ✓                      c. plaque breaks off causing damage that activates blood clot formation ✓                      d. clots «in the bloodstream» may block a coronary artery/coronary thrombosis reducing blood flow/oxygen  <b>OR</b>                      clots can cause heart attack/muscle death ✓                      e. sickle cell anemia «crisis» produces blood clots «that can cause coronary/arterial blockage» ✓</p>		2 max

(continued...)

(Question 3 continued)

Question		Answers	Notes	Total
3.	d	a. produce antibodies ✓ b. memory cells confer immunity ✓ c. specific immunity results from production of antibodies specific to a particular antigen ✓ d. recognize pathogens ✓ e. destroy foreign cells/cancer cells ✓		2 max
4.	a	type I: a. carry out gas exchange <b>OR</b> diffusion of gases/CO <sub>2</sub> /O <sub>2</sub> ✓  type II: b. secrete fluid/surfactant ✓		2 max
4.	b	a. O <sub>2</sub> concentration in alveolar air greater than in capillary/blood «prior to gas exchange» <b>OR</b> hemoglobin in blood binds oxygen maintaining the concentration gradient ✓  b. O <sub>2</sub> gas dissolves in water lining the alveolus ✓ c. O <sub>2</sub> <u>diffuses</u> through wall of alveolus and capillary into blood ✓ d. CO <sub>2</sub> concentration in blood greater than in alveolar air «prior to gas exchange» ✓ e. CO <sub>2</sub> <u>diffuses</u> through wall of capillary and alveolus into alveolar airspace ✓		3 max



Question		Answers	Notes	Total
5.	a	fur/hair/mammary glands/feed young with milk/three inner-ear bones/lungs ventilated by diaphragm/lungs contain alveoli ✓		1
5.	b	<i>Canis aureus</i> /golden jackal <b>AND</b> <i>Canis lupus</i> /grey wolf ✓	<i>Both needed</i>	1
5.	c	<i>Hapalemur aureus</i> /Golden bamboo lemur <b>AND</b> <i>Canis aureus</i> /golden jackel/ <i>Canis lupus</i> /grey wolf/ <i>Vulpes vulpes</i> /red fox <b>OR</b> <i>Vulpes vulpes</i> /red fox <b>AND</b> <i>Canis aureus</i> /golden jackal/ <i>Canis lupus</i> /grey wolf/ <i>Hapalemur aureus</i> /golden bamboo lemur ✓		1
6.	a	male because Y chromosome present <b>OR</b> male because sex chromosomes/last two chromosomes/pair 23 are unpaired/different «from each other»/not homologous ✓		1 max
6.	b	21 <b>AND</b> Down syndrome/trisomy 21 ✓	<i>Both needed</i>	1

**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
7.	a	a. DNA is unwound/strands are separated «by RNA polymerase» ✓ b. new nucleotides attached to template strand «by RNA polymerase» ✓ c. <u>complementary</u> base pairing/base pairing with an example <b>OR</b> adenine with thymine/uracil with adenine/cytosine with guanine/guanine with cytosine ✓ d. mRNA detaches from template ✓ e. DNA rewinds ✓		4 max
7.	b	a. facilitated diffusion by channel proteins ✓ b. active transport by protein pumps <b>OR</b> protein pumps eg sodium-potassium ✓ c. cell recognition by glycoproteins/protein receptors ✓ d. communication/receptors for hormones/signal molecules ✓ e. cell adhesion ✓ f. allow up to one additional mark for AHL material ✓		4 max

(continued...)

(Question 7 continued)

Question		Answers	Notes	Total
7.	c	<p>a. natural selection is caused by selection pressures in the environment <b>OR</b> example of a selection pressure ✓</p> <p>b. natural selection requires that variation exists within a species ✓</p> <p>c. variation arises randomly due to mutation <b>OR</b> variation is enhanced by meiosis/sexual reproduction ✓</p> <p>d. over-production of offspring promotes selection <b>OR</b> natural selection occurs when there is competition/overpopulation/predators/environmental changes/changes in selection pressures ✓</p> <p>e. well adapted individuals/individuals with best variations survive to reproduce/survival of fittest ✓</p> <p>f. «frequency of» genes/alleles conferring an advantage are selected for <b>OR</b> genes/alleles conferring a disadvantage are selected against ✓</p> <p>g. genetic divergence/difference increases <b>OR</b> natural selection «genetically» isolates members of a species so eventually they can no longer produce fertile offspring ✓</p> <p>h. genetic divergence» leads to reproductive isolation ✓</p> <p>i. geographical/behavioural/ecological factors may lead to «reproductive» isolation ✓</p> <p>j. prolonged «reproductive» isolation leads to speciation ✓</p> <p>k. up to one additional mark for AHL information ✓</p>		7 max

(Plus up to [1] for quality)

Question		Answers	Notes	Total
8.	a	a. «detritivores» obtain nutrition from detritus/waste/dead bodies ✓ b. are heterotrophic ✓ c. removes large waste/cleans up the ecosystem <b>OR</b> helps control spread of disease ✓ d. facilitates further decomposition ✓ e. contribute to the supply of «inorganic» nutrients for autotrophs/nutrient cycling <b>OR</b> improve soil conditions/aeration ✓		4 max
8.	b	a. amylase is an enzyme ✓ b. secreted by salivary glands/pancreas ✓ c. active/released into the mouth/small intestine ✓ d. acts on starch/polysaccharides ✓ e. breaks «glycosidic» bond by hydrolysis/adding water ✓ f. converts insoluble/large molecule to soluble/small molecules ✓ g. product is maltose/disaccharide/sugar molecule ✓		4 max

(continued...)

(Question 8 continued)

Question		Answers	Notes	Total
8.	c	a. plants convert light energy into chemical energy by photosynthesis ✓ b. photosynthesis takes place in chloroplasts ✓ c. chloroplasts «are organelles that» contain the pigment chlorophyll ✓ d. chloroplasts/chlorophyll «in plants» absorb sunlight ✓ e. «chlorophyll» absorbs red <b>AND</b> blue light most effectively ✓ f. light causes photolysis/splits water molecule ✓ g. carbon dioxide <b>AND</b> water are reactants «in photosynthesis» ✓ h. glucose <b>AND</b> oxygen are products «of photosynthesis» ✓ i. light <u>intensity</u> is a limiting factor for the <u>rate</u> of photosynthesis ✓ j. organic/carbon compounds/glucose provide food/stored energy «for plant itself, animals, food chains» ✓ k. up to one additional mark for an accurate detail from AHL ✓		7 max

(Plus up to [1] for quality)