

Markscheme

November 2018

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 to be 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.
- Candidates that score very highly on the content marks need not necessarily automatically gain **[1]** for quality (and *vice versa*).

Section A

Question		Answers	Notes	Total
1.	a	«-» 44 «%» ✓	Allow answers in the range of 43 «%» to 45 «%»	1
1.	b	<p><i>similarity:</i></p> <p>a. both show an overall decrease OR both decrease after 1970 ✓</p> <p><i>difference:</i></p> <p>b. proportion of male smokers is always higher than female OR men decrease more OR women first increase «till 1970» and then decrease whereas men decrease throughout OR males highest value in 1950 and females in 1970 ✓</p>	There should be one similarity and one difference	2
1.	c	<p>a. more smoking leads to more deaths OR there is a correlation between smoking and deaths from lung cancer ✓</p> <p>b. «nevertheless» male mortality peaks in 1960 when declining numbers of smoking ✓</p> <p>c. cancer takes time to develop causing delay between changes in smoking and cancer ✓</p> <p>d. correlation does not prove causation ✓</p> <p>e. the data shows deaths from lung cancer, not incidence ✓</p>		3 max

(continued...)

(Question 1 continued)

Question		Answers	Notes	Total
1.	d	a. highest incidence with continual smoking ✓ b. negative correlation/incidence decreases with length of time not smoking ✓ c. decrease «in incidence» occurs at less than 10 years since stopping smoking ✓ d. after 30 years incidence is not much more than non-smokers ✓		2 max
1.	e	a. incidence of lung cancer decreases the earlier the smoker gives up smoking ✓ b. continuing smoking increases incidence of lung cancer ✓ c. after 30 years of not smoking the risk of lung cancer is low/similar to non-smokers ✓	<i>Accept vice versa</i>	2 max
1.	f	passive smoking/second hand smoke/exposure to radon/asbestos/pollution/smog/genetic predisposition ✓		1
1.	g	a. emphysema ✓ b. bronchitis ✓ c. COPD ✓ d. asthma ✓ e. pneumonia ✓	<i>Only mark first two</i>	2 max

Question			Answers	Notes	Total
2.	a	i	label placed anywhere along outside perimeter/cell wall of plant cell ✓		1
2.	a	ii	a. unbranched/straight chain of glucose molecules OR unbranched/straight-chain polysaccharide ✓ b. formed of <u>beta</u> glucose; c. formed by condensation reactions/glycosidic bonds OR 1, 4 linkage ✓ d. hydrogen bonds form between cellulose chains ✓ e. form microfibrils ✓	Award marks to an accurate annotated diagram Do not allow carbohydrate	3 max
2.	b		humans lack cellulase/appropriate enzyme ✓		1
2.	c		a. lipid is long-term energy storage OR carbohydrate is short-term energy storage/readily available ✓ b. lipids are insoluble, so easier to store OR carbohydrates/sugars are soluble, so easy to transport by blood ✓ c. lipids store more energy «per gram» OR lipids occupy less space «per energy/kJ» ✓	OWTTE	2 max

Question		Answers	Notes	Total
3.	a	coniferophyta/conifer/coniferous/gymnosperms/pinophyta ✓		1
3.	b	a. waterlogged soil/poor drainage OR acidic soil OR anaerobic conditions/soil ✓ b. organic matter is not «fully» decomposed «leading to peat formation» OR decomposers/saprotrophs less active/fewer in cold «temperatures» ✓		2 max
3.	c	a. higher temperatures so more transpiration/droughts/dehydration/water shortage ✓ b. more forest fires ✓ c. more/new pests/diseases because of the changed conditions ✓ d. competition from trees/plants «that colonize/spread to boreal forests» ✓ e. trees/«named» organisms «of boreal forests» not adapted to warmer conditions OR trees/«named» organisms migrate/extend range due to the warmer conditions ✓ f. trees die so there is loss of habitat for animals ✓ g. faster decomposition/nutrient cycling «so conditions in the ecosystem change» ✓ h. standing water/floods due to more snow/permafrost melting ✓		2 max
3.	d	a. x-axis labelled as light intensity/amount of light AND y-axis labelled as rate of photosynthesis/rate of oxygen release/rate of carbon dioxide uptake ✓ b. curve starting at/slightly to the right of the x-axis origin and rising rapidly and then more slowly and plateauing but never dropping ✓		2

Question		Answers	Notes	Total
4.	a	X: pulmonary artery ✓ Y: <u>left</u> atrium ✓	<i>Accept auricle</i>	2
4.	b	a. contraction of ventricle creates high pressure ✓ b. blood at high pressure is carried out of the heart through arteries ✓ c. thick muscular walls of arteries resist pressure/prevent leaks ✓ d. elastic recoil of arterial walls helps to push blood ✓ e. narrow lumen of arteries maintain pressure ✓	<i>Features require an explanation, a list is inadequate</i>	3 max
4.	c	a. nerve impulse from medulla/brain acts on heart/right atrium ✓ b. pacemaker/sinoatrial node/SAN increases/controls contraction of heart ✓ c. epinephrine/adrenaline «rapidly» increases heart rate ✓		2 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	<p>a. cell wall — a uniformly thick wall ✓</p> <p>b. pili — hair-like structures connected to cell wall OR flagellum — at one end only, longer than pili ✓</p> <p>c. plasma/cell membrane — represented by a continuous single line ✓</p> <p>d. «70S» ribosomes — drawn as small discrete dots not circles ✓</p> <p>e. naked DNA/nucleoid — region with DNA not enclosed in membrane ✓</p> <p>f. cytoplasm — the non-structural material within the cell ✓</p>	<p><i>Award [1] for each structure clearly drawn and correctly labelled</i></p> <p><i>Award [2 max] if any eukaryotic structure is drawn and labelled</i></p> <p><i>May be labelled as the innermost wall line</i></p>	4 max

(continued...)

(Question 5 continued)

Question		Answers	Notes	Total
5.	b	a. all the genome is the same in all the cells of an organism ✓ b. the genome/DNA/genes instructs the production/expression of proteins/proteome ✓ c. the proteome is all the proteins produced by a cell ✓ d. the proteome varies with the function/location/cell differentiation/environmental conditions of the cell ✓ e. specific genes are expressed/turned on/off in different cells ✓ f. «turning on/off» according to a required function ✓	Accept a specific example (eg: insulin only produced in pancreas)	4 max

(continued...)

(Question 5 continued)

Question		Answers	Notes	Total
5.	c	<p><i>cell theory:</i></p> <p>a. cell theory is the accepted explanation of life ✓</p> <p>b. organisms are composed of «one or more» cells ✓</p> <p>c. cells are the basic/fundamental/smallest units of life ✓</p> <p>d. cells can only come from pre-existing cells ✓</p> <p>e. spontaneous generation of life has been disproven ✓</p> <p><i>limitations:</i></p> <p>f. striated muscle cells contain many nuclei «while most eukaryotic cells have one nucleus» OR red blood cells have no nucleus «while most eukaryotic cells have one nucleus» ✓</p> <p>g. giant algae have complex single cell structure OR organisms as large as giant algae would be expected to be multicellular, but they have only one cell with one nucleus ✓</p> <p>h. aseptate fungal hyphae are tube-like structures that contain no cell membranes between the many nuclei OR slime molds contain many nuclei ✓</p> <p>i. viruses have some characteristics of living organisms but are not cells ✓</p> <p>j. if all cells come from pre-existing cells, where did the first one come from? ✓</p>	<p><i>Allow description of Pasteur's experiments</i></p> <p><i>Do not accept a list of limitations without explanation</i></p>	7 max

(Plus up to [1] for quality)

Question		Answers	Notes	Total
6.	a	<p>a. sex linked/gene is on the X chromosome ✓</p> <p>b. allele «for red-green colour blindness» is recessive/colour blindness is recessive trait/disorder ✓</p> <p>c. heterozygous females are unaffected/carriers ✓</p> <p>d. X^B denotes normal allele and X^b denotes colour blindness allele ✓</p> <p>e. more frequent in males because they only have one X chromosome ✓</p> <p>f. 50% chance of colour blindness in sons whose mother who is heterozygote/$X^B X^b$ ✓</p>	<p><i>Accept any other letter for the alleles.</i></p> <p><i>Award mpb, mpc, mpd and mpf if these points are clearly made on a Punnett grid.</i></p>	3 max
6.	b	<p>a. «happens in a group of species that» evolve from a common ancestor ✓</p> <p>b. evolution «of a structure» in different ways ✓</p> <p>c. for different functions ✓</p> <p>d. common features remain «despite the differences» ✓</p> <p>e. <u>homologous</u> structures are evidence «of adaptive radiation» ✓</p> <p>f. an example of adaptive radiation ✓</p> <p>g. example of specific adaptation ✓</p> <p>h. second description of a specific adaptation ✓</p>	<p><i>Must see “homologous”</i></p> <p>example 1:</p> <p><i>f. pentadactyl limb</i></p> <p><i>g. human hand is adapted for grasping/climbing/manipulation</i></p> <p><i>h. front limb of mole is adapted for digging»</i></p> <p>example 2:</p> <p><i>f. «Darwin’s» finches’/birds’ beaks</i></p> <p><i>g. nectar feeding has a long/thin beak</i></p> <p><i>h. seed feeding has a short/stout beak</i></p>	5 max

(continued...)

(Question 6 continued)

Question		Answers	Notes	Total
6.	c	a. skin/mucous membranes primary/first defence against pathogens ✓ b. tears/mucus contain enzymes/lysozymes which destroy pathogens ✓ c. stomach/skin/some mucus produces acid which kills pathogens ✓ d. phagocytic white blood cells/phagocytes/macrophages ingest pathogens OR lysosomes in phagocytes/macrophages release enzymes that digest pathogens ✓ e. phagocytes/macrophages give non-specific immunity «to diseases» ✓ f. specific immunity provided by lymphocytes ✓ g. lymphocytes divide to produce clones «of plasma cells» ✓ h. plasma cells/lymphocytes produce antibodies ✓ i. antibodies are specific to a pathogen/antigen ✓ j. memory cells provide immunity against future attacks by same pathogen ✓ k. blood clotting/fibrin closes opening in the body so pathogens cannot enter ✓	Accept leukocytes instead of white blood cells	7 max

(Plus up to [1] for quality)