

# Markscheme

**November 2018**

**Biology**

**Standard level**

**Paper 2**

13 pages

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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 <b>OR</b> both decrease after 1970 ✓</p> <p><i>difference:</i></p> <p>b. proportion of male smokers is always higher than female <b>OR</b> men decrease more <b>OR</b> women first increase «till 1970» and then decrease whereas men decrease throughout <b>OR</b> males highest value in 1950 and females in 1970 ✓</p>	There should be <b>one</b> similarity and <b>one</b> difference	2
1.	c	<p>a. more smoking leads to more deaths <b>OR</b> 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 <b>OR</b> unbranched/straight-chain polysaccharide ✓  b. formed of <u>beta</u> glucose;  c. formed by condensation reactions/glycosidic bonds <b>OR</b> 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 <b>OR</b> carbohydrate is short-term energy storage/readily available ✓  b. lipids are insoluble, so easier to store <b>OR</b> carbohydrates/sugars are soluble, so easy to transport by blood ✓  c. lipids store more energy «per gram» <b>OR</b> 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 <b>OR</b> acidic soil <b>OR</b> anaerobic conditions/soil ✓  b. organic matter is not «fully» decomposed «leading to peat formation» <b>OR</b> 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 <b>OR</b> 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 <b>AND</b> 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 <b>OR</b> 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»  <b>OR</b>                      red blood cells have no nucleus «while most eukaryotic cells have one nucleus» ✓</p> <p>g. giant algae have complex single cell structure  <b>OR</b>                      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  <b>OR</b>                      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. <math>X^B</math> denotes normal allele and <math>X^b</math> 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/<math>X^B X^b</math> ✓</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><b>example 1:</b></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><b>example 2:</b></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 <b>OR</b> 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)