PEARSON EDEXCEL IGCSE BIOLOGY · 4BI1

BIOLOGY



MARK SCHEME

SECTION 1: THE NATURE AND VARIETY OF LIVING ORGANISMS (PACK 1)

SCORE	PERCENTAGE
/77	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	Mark
(a)(i)	The only correct answer is D (protoctists) A is incorrect as the animals do not have chloroplasts B is incorrect as bacteria do not have nuclei C is incorrect as plants are multicellular	**1**

Question Number	Answer	Mark
(a)(ii)	The only correct answer is B (cell membrane and mitochondrion) A is incorrect as animal cells do not have chloroplasts C is incorrect as animal cells do not have chloroplasts D is incorrect as animal cells do not have cell walls	**1**

Question Number	Answer	Additional guidance	Mark
(b)	• one mark for $6CO_2 + 6H_2O$ (on LHS) (1) • one mark for $C_6H_{12}O_6$ (on RHS) (1)	**Accept** $6H_2O + 6CO_2$	**2**

Question Number	Answer	Additional guidance	Mark
(c)(i)	An explanation that makes reference to two of the following. • low / less / no light (1) • photosynthesis is slower than respiration / photosynthesis is less than respiration / respiration is faster than photosynthesis / eq (1) • more oxygen taken in than released / more oxygen used than produced / there is a net movement of oxygen in / eq (1)	 **Accept** dark **Accept** no photosynthesis but respiration occurs **Ignore** respiration gets faster **Accept** less oxygen released than taken in	**2**

Question Number	Answer	Additional guidance	Mark
(c)(ii)	An explanation that makes reference to three of the following. • at 10 (au) respiration (rate) and photosynthesis (rate) are equal / at the compensation point respiration and photosynthesis are equal (1) • rate of photosynthesis increases (as light intensity increases) (1) • photosynthesis rate is greater than respiration rate (1) • levels off / eq, because another factor / temperature / carbon dioxide is limiting (1)	**Accept** converse **Accept** levels off as light is no longer limiting **Accept** at (value between 45 (a.u.) and 55(a.u.) / 40 mm^3) another factor / temperature / carbon dioxide is limiting)	**3**

Question Number	Answer	Additional guidance	Mark
(c)(iii)	**two marks** for 48 (2)	**one mark** for correct reading of 38 (1) OR **one mark** for +10 (1)	**2**

Question Number	Answer	Additional guidance	Mark
(d)	A description that makes reference to three of the following. • move lamp different distances / eq (1) • place same mass / number / volume / concentration *Chlorella* / algae, in (hydrogen-carbonate indicator) (1) • same volume / concentration of indicator / same temperature / leave for same or stated time / same starting colour of indicator / use a control tube (with no *Chlorella*) (1) • (indicator turns) yellow with low light / covered tube / **and** red / purple with high light / uncovered tube (1)	**Accept** other correct methods e.g. cover with cloths / foil / change bulb power / use of variable resistor **Ignore** place in dark and light unqualified **Ignore** amount **Accept** place bung in / seal tubes **Accept** yellow with increase in carbon dioxide / and red / purple with decrease of carbon dioxide **Accept** correct references to photosynthesis and respiration	**3**
			(Total for Question = 14 marks)

Q2.

Question Number	Answer	Mark
(a)	An answer that makes reference to two of the following points: • cytoplasm (1) • ribosomes (1) • cell membrane (1) • DNA (1)	**2**

Question Number	Answer	Mark
(b)(i)	The only correct answer is B bacteria are pathogens *A is not correct because it is not possible to conclude that the bacteria are decomposers* *C is not correct because it is not possible to conclude that the bacteria are microscopic* *D is not correct because it is not possible to conclude that the bacteria are non-living*	**1**

Question Number	Answer	Mark
(b)(ii)	An answer that makes reference to two of the following points: • vaccination / inoculated (1) • (same) antigens / (same) protein (on bacteria) (1) • <u>secondary</u> immune response (1) • memory cells (1) • (make) <u>large numbers</u> antibodies / (make) antibodies produced <u>fast</u> / <u>soon</u> / eq (1)	**4**
		Total = 7 marks

Q3.

Question number	Answer	Mark
(a)	An explanation that makes reference to the following two points: • ice caps melt/flooding/rise of sea levels/climate change/ extreme weather (1) • therefore loss of habitat/extinction/effect on food webs/ effect on crop growth (1)	2

Question number	Answer	Mark
(b)	Transfers virus (from sheep to sheep)	1

Question number	Answer	Mark
(c)	An explanation that makes reference to the following points: • evaporation of water (1) • therefore reduces body temperature/heat loss/equivalent (1) • enzymes not denatured (1)	2

Question number	Answer	Mark
(d)	Too cold for midge to move/survive/reproduce/equivalent	1

Question number	Answer	Additional guidance	Mark
(e)	• (100 × 20) ÷ 995 (1) • 2.01% (1)	award full marks for correct numerical answer without working	2

Question number	Answer	Mark
(f)	An explanation that makes reference to two of the following points: • less blood/(oxy) haemoglobin/oxygen (1) • narrowing of blood vessels (1) • vasoconstriction (1)	2

Question number	Answer	Mark
(g)	An explanation that makes reference to three of the following points: • sheep injected with dead/attenuated/harmless virus/antigens (1) • (sheep produces) memory cells (1) • (sheep produces) antibodies (1) • faster/greater/quicker response (1)	3

Question number	Answer	Mark
(h)	An explanation that makes reference to the following points: • midges cannot bite/feed (1) • reduce spread of virus (1)	2

(Total for question = 15 marks)

Q4.

Question Number	Answer	Mark
(a)(i)	The only correct answer is C thread-like hyphae *A is incorrect because fungi lack chloroplasts* *B is incorrect because fungi do not store starch* *D is incorrect because fungi walls are made of chitin*	**1**

Question Number	Answer	Mark
(a)(ii)	The only correct answer is D maltose *A is incorrect because amino acids are products of protease digestion* *B is incorrect because fatty acids are products of lipase digestion* *C is incorrect because glycerol is a product of lipase digestion*	**1**

Question Number	Answer	Mark
(a)(iii)	A description that makes reference to five of the following points: • transcription / transcripts / transcribes (1) • mRNA/messenger RNA **and** leaves nucleus / mRNA/messenger RNA **and** enters cytoplasm (1) • ribosomes (1) • tRNA/transfer RNA (brings) attached amino acids (1) • codons / anticodons / complementary bases (1) • translation / translated / translates / amino acid chain / polypeptide chain (1)	**5**

Question Number	Answer	Mark
(b)(i)	70.475 to 70.5	**1**

Question Number	Answer	Additional guidance	**Mark**
(b)(ii)	(70.5 – 50 =) 20.5	Allow (answer from 3(b)(i) – 50) eg: 70.4 – 50 = 20.4	**1**

Question Number	Answer	Additional guidance	**Mark**
(b)(iii)	An answer that makes reference to four of the following points: • same surface area / mass / thickness / area / size (1) • remove soil from square (before weighing) (1) • control <u>temperature</u> / oxygen / moisture / water (1) • (soil) same mass / same amount / same volume / same type / same soil / decomposers / bacteria / fungi (1) • repeat / use more squares / obtain average / remove anomalies (1) • increase range of pH / use different pHs / more pHs (1)	Ignore more time Mp3 Ignore light / carbon dioxide Mp4 Ignore sterile soil	**4**

Q5.

Question Number	Answer	Additional guidance	Mark
(a)	A description that makes reference to three of the following: • enzymes (1) • (feed on) dead / decaying organisms (1) • for <u>extracellular digestion</u> (1) • absorb the digested food / nutrients (1)	**Accept** named nutrients **Accept** broken down food	**3**

Question Number	Answer	Additional guidance	Mark
(b)(i)	A description that makes reference to one of the following: • judgement of cloudiness is subjective / is qualitative / not quantitative / cloudiness cannot be accurately measured / cannot be repeated by other people / eq (1)	**Accept** cloudiness is judged by eye **Accept** cannot see small differences / it is imprecise **Accept** cannot measure difference in cloudiness	**1**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	An explanation that makes reference to two of: • less kinetic energy / lower collision frequency / not at optimal temperature for enzymes / eq (1) • less fungal growth / less mould / only slight fungal growth (1) • less respiration (1)	**Accept** fewer E-S complexes formed **Accept** microbes / bacteria for fungi **Accept** less decay / less spoilage / less digestion	**2**

Question Number	Answer	Additional guidance	Mark
(b)(iii)	An explanation that makes reference to two of: • enzymes denature (in acid / low pH / vinegar) (1) • active site shape changes / enzymes do not bind with substrate / eq (1) • fungal growth decreases (1)	**Reject** enzymes denature due to **high temperature** **Accept** fungi killed / less spoilage / less decomposition / less respiration **Accept** bacteria / microbes for fungi	**2**

Q6.

Question Number	Answer	Mark
(a)(i)	The only correct answer is A B is not correct as B is not Nitrogen fixation C is not correct as C is not Nitrogen fixation D is not correct as D is not Nitrogen fixation	**1**

Question Number	Answer	Mark
(a)(ii)	The only correct answer is D A is not correct as A is not decomposition B is not correct as B is not decomposition C is not correct as C is not decomposition	**1**

Question Number	Answer	Mark
(a)(iii)	The only correct answer is C A is not correct as A is not nitrification B is not correct as B is not nitrification D is not correct as D is not nitrification	**1**

Question Number	Answer	additional guidance	Mark
(a)(iv)	• (nitrifying) bacteria / fungi allow correctly named genus / species (1)	ign denitrifying / nitrogen fixing bacteria / microorganisms	**1**

Question Number	Answer	Mark
(b)(i)	An explanation that makes reference to two of the following points • compare / (look at growth in) test solution / without **nitrate** / eq (1) • compare with (growth of) control / shows normal growth /eq(1) • if control had no minerals / other minerals absent would not show normal growth (1)	**2**

Question Number	Answer	Mark
(b)(ii)	• remove nitrates / all minerals /eq (1)	**1**

Question Number	Answer	Mark
(b)(iii)	An explanation that makes reference to two of the following points • block out light (from roots) /eq (1) • prevent photosynthesis (1) • prevent algal growth (1)	**2**

Question Number	Answer	Mark
(b)(iv)	An explanation that makes reference to two of the following points • measure height / length / leaf area / mass of plants (1) • using ruler / balance / scales / eq (1) • of both solutions / seedlings complete with minus nitrates (1)	**2**
	Total 11 marks	

Q7.

Question Number	Answer	additional guidance	Mark
(a)	A description that makes reference to six of the following points: • **virus** non-living organisms / small particles / protein coat / capsid / relies on other organisms for reproduction/ eq (1) • AIDS / eq (1) • **bacteria** microscopic single-celled / prokaryotic / no nucleus / have nucleoid / plasmids (1) • pneumonia / eq (1) • **fungus** not able to carry out photosynthesis / saprotrophic / single-celled / hyphae / cell wall chitin/eq (1) • athlete's foot / eq (1) • **protoctist / protozoa** *Plasmodium* / microscopic single-celled (1) • malaria / eq (1)	pathogen **and** description for first mark disease mark must **match pathogen** type allow plant disease eg TMV HIV / AIDS scores disease mark but not pathogen description mark Virus non-living causing cholera scores pathogen description but not disease mark	**6 exp**

Question Number	Answer	additional guidance	Mark
(b)	An explanation that makes reference to three of the following points: • dead / weakened / harmless / attenuated pathogen / eq (1) • produce memory cells / lymphocytes (1) • (secondary) immune response (1) • **<u>faster / more</u>** antibodies production (1)	allow weakened strain	**3 exp**
			Total 9 marks