

Mark Scheme January 2009

GCE

GCE O Biology (7040)

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7040/01 Biology Paper 1

Question Number	Answer	Mark																				
1	<table border="1"> <thead> <tr> <th>Group</th> <th>Are multicellular</th> <th>Have cell walls</th> <th>Can carry out photosynthesis</th> </tr> </thead> <tbody> <tr> <td>Plants</td> <td>Always;</td> <td>Always;</td> <td></td> </tr> <tr> <td>Animals</td> <td></td> <td>Never;</td> <td>Never;</td> </tr> <tr> <td>Fungi</td> <td></td> <td>Always</td> <td>Never;</td> </tr> <tr> <td>Bacteria</td> <td>Never</td> <td></td> <td>Sometimes;</td> </tr> </tbody> </table> <p>1 mark for any correct row</p>	Group	Are multicellular	Have cell walls	Can carry out photosynthesis	Plants	Always;	Always;		Animals		Never;	Never;	Fungi		Always	Never;	Bacteria	Never		Sometimes;	(4)
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Plants	Always;	Always;																				
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Bacteria	Never		Sometimes;																			

(Total 4 marks)

Question Number	Answer	Mark															
2	<table border="1"> <thead> <tr> <th>Disease</th> <th>Type of organism</th> <th>How spread</th> </tr> </thead> <tbody> <tr> <td>athlete's foot</td> <td></td> <td></td> </tr> <tr> <td>AIDS</td> <td><u>virus</u>;</td> <td>body fluid/eq;</td> </tr> <tr> <td>cholera</td> <td>bacterium;</td> <td>Water/food/eq;</td> </tr> <tr> <td>amoebic dysentery</td> <td>Protoctist / protozoa /eq;</td> <td></td> </tr> </tbody> </table>	Disease	Type of organism	How spread	athlete's foot			AIDS	<u>virus</u> ;	body fluid/eq;	cholera	bacterium;	Water/food/eq;	amoebic dysentery	Protoctist / protozoa /eq;		(5)
Disease	Type of organism	How spread															
athlete's foot																	
AIDS	<u>virus</u> ;	body fluid/eq;															
cholera	bacterium;	Water/food/eq;															
amoebic dysentery	Protoctist / protozoa /eq;																

(Total 5 marks)

Question Number	Answer	Mark
3(a)	1 mark for each correct answer. X = trachea / cartilage rings; Ignore pharynx / windpipe Y = diaphragm;	(2)

Question Number	Answer	Mark
3(b)(i)	8.4;	(1)
3(b)(ii)	red (blood) cells / erythrocytes ;	(1)
3(b)(iii)	pulmonary artery;	(1)
		(3)

Question Number	Answer	Mark
3(c)	1 mark for each correct answer from any of the following - maximum 5 marks. diffusion; dissolves / film of moisture /eq; ref. to concentration gradient / eq; diaphragm; <u>intercostal</u> muscles; relax; rib cage lowers / eq; increase pressure; decrease volume; bronchioles / bronchi/ trachea;	(5)

Question Number	Answer	Mark
3(d)	1 mark for each correct answer glucose; water;	(2)

(Total 12 marks)

Question Number	Answer	Mark														
4(a)	1 mark for each correct answer.															
	<table border="1"> <thead> <tr> <th>Step</th> <th>Order of step</th> </tr> </thead> <tbody> <tr> <td>restriction enzyme cuts human DNA</td> <td>(1)</td> </tr> <tr> <td>transgenic bacteria cultured in a fermenter</td> <td>5;</td> </tr> <tr> <td>ligase used to join pieces of DNA together</td> <td>3;</td> </tr> <tr> <td>large amounts of insulin manufactured</td> <td>(6)</td> </tr> <tr> <td>restriction enzyme cuts plasmid DNA</td> <td>2;</td> </tr> <tr> <td>recombinant plasmid inserted into bacteria</td> <td>4;</td> </tr> </tbody> </table>	Step	Order of step	restriction enzyme cuts human DNA	(1)	transgenic bacteria cultured in a fermenter	5;	ligase used to join pieces of DNA together	3;	large amounts of insulin manufactured	(6)	restriction enzyme cuts plasmid DNA	2;	recombinant plasmid inserted into bacteria	4;	(4)
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Question Number	Answer	Mark
4(b)	1 mark for each correct answer from any of the following - maximum 3 marks.	
	<p>human insulin made / fewer side effects / safe / eq; reliable supply / large quantity / eq; lowers glucose/ balance / control of glucose/eq; glycogen; prevents osmotic damage; diabetics;</p>	(3)

(Total 7 marks)

Question Number	Answer	Mark
5 (a) (i)	1; 0.0036;	(2)
5 (a) (ii)	water vapour;	(1)

Question Number	Answer	Mark
5 (b) (i)	burn less fossil fuel / eq; alternative energy solar/wind / eq; energy saving bulbs/ switch off appliances /eq; plant more trees / eq;	(2)
5 (b) (ii)	1 mark for each correct answer from any of the following - maximum 4 marks ice caps melt; increased sea levels / flooding; habitat destruction / desertification / eq; extinction / loss of species / less organisms / animals / plants / food chain disruption/eq; migration of species;	(4)

(Total 9 marks)

Question Number	Answer	Mark
6(a) (i)	46 / 23 pairs;	(1)
6(a) (ii)	male; different sized chromosomes / XY / not 2 X / not homologous / eq;	(2)

Question Number	Answer	Mark
6(b) (i)	testis; Accept testicles	(1)
6(b) (ii)	secondary sexual characteristic ;	(1)
6(b) (iii)	less cholesterol; (less) blockage; (of) arteries / blood vessels; allow converse	Maximum (2)

Question Number	Answer	Mark
6(c)	1 mark for each correct answer from the following. reduces / less diffusion / eq; blocks tubes / increases distance / less surface area / eq;	(2)

(Total 9 marks)

Question Number	Answer	Mark																		
7(a)(i)	1 mark for order - rest of marks for examples.	(5)																		
	<table border="1"> <thead> <tr> <th>Level of organisation</th> <th>Order</th> <th>Example</th> </tr> </thead> <tbody> <tr> <td>Cell</td> <td></td> <td>Palisade/eq;</td> </tr> <tr> <td>Organ</td> <td></td> <td>Heart/eq;</td> </tr> <tr> <td>Organelle</td> <td>1</td> <td>Nucleus/eq;</td> </tr> <tr> <td>System</td> <td>5</td> <td>Circulation/eq;</td> </tr> <tr> <td>Tissue</td> <td>3;</td> <td></td> </tr> </tbody> </table>		Level of organisation	Order	Example	Cell		Palisade/eq;	Organ		Heart/eq;	Organelle	1	Nucleus/eq;	System	5	Circulation/eq;	Tissue	3;	
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	Organelle		1	Nucleus/eq;																
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Tissue	3;																			

(Total 5 marks)

Question Number	Answer	Mark
8(a)	2.7/500; 0.54;;	(2)

Question Number	Answer	Mark
8(b)(i)	Causes disease / illness / infection / eq;	(1)
8(b)(ii)	<u>flies</u> ; feeds / sucks / bites / eq;	(2)

Question Number	Answer	Mark												
8(c) (i)	0.54 million / 540 000;	(1)												
8(c) (ii)	<table border="1"> <thead> <tr> <th>Method</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>draining ponds</td> <td>(kills larvae)</td> </tr> <tr> <td>biological control</td> <td>kills <u>larvae</u>;</td> </tr> <tr> <td>tablets containing drugs</td> <td>kills pathogen / <i>Plasmodium</i> malarial parasite;</td> </tr> <tr> <td>Vaccines</td> <td>produces memory cells / immune response / reference to antibodies;</td> </tr> <tr> <td>chemical repellents</td> <td>stops insects / mosquitoes biting/ keeps flies away / eq;</td> </tr> </tbody> </table>	Method	Description	draining ponds	(kills larvae)	biological control	kills <u>larvae</u> ;	tablets containing drugs	kills pathogen / <i>Plasmodium</i> malarial parasite;	Vaccines	produces memory cells / immune response / reference to antibodies;	chemical repellents	stops insects / mosquitoes biting/ keeps flies away / eq;	(4)
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chemical repellents	stops insects / mosquitoes biting/ keeps flies away / eq;													

(Total 10 marks)

Question Number	Answer	Mark
9(a) (i)	1;	(1)
9(a) (ii)	27;	(1)
9(a) (iii)	protein;	(1)
9(a) (iv)	1 mark for each correct answer from any of the following - maximum 2 marks. vitamins / named vitamin; minerals / named mineral; fibre / roughage;	(2)

Question Number	Answer	Mark
9(b)	ethanol / paper /eq; emulsion /cloudy / translucence/eq;	(2)

Question Number	Answer	Mark
9(c)	1 mark for each correct answer from any of the following - maximum 3 marks. Digestion / break down / eq; large/insoluble to small/soluble; lipase; fatty acids/glycerol; bile; emulsify / large particles to small;	(3)

(Total 10 marks)

Question Number	Answer	Mark														
10	<table border="1"> <thead> <tr> <th>Statement</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td>The number of blood vessels taking blood into the heart is</td> <td>(2)</td> </tr> <tr> <td>The number of chromosomes in a human sperm cell is</td> <td>23</td> </tr> <tr> <td>The number of chromosomes in a red blood cell is</td> <td>0;</td> </tr> <tr> <td>The number of hormones released by the ovary</td> <td>2;</td> </tr> <tr> <td>The number of different types of cell in a typical leaf that contain chloroplasts is</td> <td>3;</td> </tr> <tr> <td>The number of enzymes released by the pancreas that digest fat is</td> <td>1;</td> </tr> </tbody> </table>	Statement	Number	The number of blood vessels taking blood into the heart is	(2)	The number of chromosomes in a human sperm cell is	23	The number of chromosomes in a red blood cell is	0;	The number of hormones released by the ovary	2;	The number of different types of cell in a typical leaf that contain chloroplasts is	3;	The number of enzymes released by the pancreas that digest fat is	1;	(5)
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	The number of enzymes released by the pancreas that digest fat is	1;														

(Total 5 marks)

Question Number	Answer	Mark
11(a)(i)	1 mark for each correct answer from any of the following - maximum 3 marks. increases; more energy for molecules /more KE/more movement /eq; more collisions; reference to enzymes /eq;	(3)
11(a)(ii)	1 mark for each correct answer from any of the following - maximum 2 marks. increases rate; more light trapped/absorbed ; ref to limiting factor/eq;	(2)

Question Number	Answer	Mark
11(b)	1 mark for each correct answer from any of the following - maximum 3 marks against concentration gradient /eq; <u>root hair cells</u> ; energy / ATP / respiration; use of <u>named</u> mineral ion;	(3)

(Total 8 marks)

Question Number	Answer	Mark
12(a)(i)	respiration / eq;	(1)
12(a)(ii)	exhaled air / breathing /sweat/ evaporation;	(1)

Question Number	Answer	Mark
12(b)(i)	1 mark for each correct answer from any of the following - maximum 4 marks. Sweating / sweat glands; cooling/heat loss/eq; ONCE. Vasodilation / described; more blood closer to skin surface/eq; hair erector muscles relax/ hair flat/eq; less insulation / less air trapped/eq;	(4)
12(b)(ii)	more water loss / less water in body /blood; less urine volume /more conc urine;	(2)

Question Number	Answer	Mark
12(c)	1 mark for each correct answer from any of the following can control enzymes / reactions/ metabolism / eq; live in different regions / climates / temperatures / active at night / eq;	(2)

(Total 10 marks)

Question Number	Answer	Mark
13(a)(i)	1 mark for each correct answer from any of the following - maximum 4 marks. phagocytes; ingest / digest / eq; (phagocytosis=2) lymphocytes; antibodies; antigens; clump / eq;	(4)
13(a)(ii)	1 mark for each correct answer from any of the following - maximum 2 marks. remove clothes; cool with water / cold drink; fans; ice packs / cold place; administer drug / medicine/ named drug/eq;	(2)

(Total 6 marks)

(Total for paper: 100 marks)

7040/02 Biology Paper 2

Section A

Question Number	Answer	Mark
1(a) (i)	taken into cell / engulfed / eq;	(1)
1(a) (ii)	breakdown / large / insol. / protein to small / sol. / amino acid;	(1)
1(a) (iii)	oxygen / carbon dioxide; (into) blood / (out of) blood;	(2)

Question Number	Answer	Mark
1(b)	1 mark for each correct answer from any of the following - maximum 3 mark. alveoli / air sacs; digested / destroyed / eq; less surface area; less (gas) exchange of oxygen/ eq; emphysema;	(3)

Question Number	Answer	Mark
1(c)	1 mark for each correct answer from the following. need oxygen / unable to get enough oxygen; for respiration / energy;	(2)

Question Number	Answer	Mark
1(d)	Aa and Aa; A and a A and a; AA Aa Aa aa; normal normal normal emphysema /eq ; Accept carrier for heterozygotes	(4)

Question Number	Answer	Mark
1(e) (i)	blood group / tongue roll / eq;	(1)
1(e) (ii)	height / weight / eq;	(1)

(Total 15 marks)

Question Number	Answer	Mark
2(a)	945;	(1)

Question Number	Answer	Mark
2(b)(i)	minus; 25.49 / 25.5(%);; Allow one for 25 / minus 25 = 2	(3)

Question Number	Answer	Mark
2(b)(ii)	light (intensity); temperature; increased rate of photosynthesis;	(3)

Question Number	Answer	Mark
2(c)	1 mark for each correct answer - maximum 3 mark. (pH) rose in A/alkaline/ fell in B; carbon dioxide (used in A) / produced in B; less respiration (of animals) in A / more in B; more plants in A/more photosynthesis / less in B;	(3)

(Total 10 marks)

Question Number	Answer	Mark
3(a)	1 mark for each correct answer - maximum 3 mark. More active at night / nocturnal ; no predators / hidden from predators; more food ; more humid ; warmer ; animals cannot see / fall into trap / eq;	(3)

Question Number	Answer	Mark
3(b)(i)	stop animals being eaten (by predators) / stop being washed out / stop escape / prevent bait stolen;	(1)
3(b)(ii)	attract animals / keep animals alive / eq;	(1)
3(b)(iii)	same mass / amount / age; same species / eq;	(2)

(Total 7 marks)

Question Number	Answer	Mark
4 (a)	Step	Reason for step
	1. soak one set of peas in water for 24 hours	allow seeds to germinate;
	2. boil second batch of seeds	kill seeds / set up control / describe control;
	3. wash both sets of peas in disinfectant	remove/kill surface bacteria / eq;
	4. place each set of peas in different vacuum flask and leave for several days	(Compare heat production)
		(3)

Question Number	Answer	Mark
4(b)	retain heat / insulates / eq;	(1)

Question Number	Answer	Mark
4(c)	carbon dioxide out / air / oxygen in; seeds not killed / gas release / explosion / eq;	(2)

Question Number	Answer	Mark
4(d)	1 mark for each correct answer - maximum 2 marks. live seeds increased/higher temperature / dead seeds decreased/lower temperature; respiration; produces heat;	(2)

(Total 8 marks)

Question Number	Answer	Mark
5(a)	S scale at least half and linear; L line straight and through points; A labelled and correct way; P points correctly plotted; ;	(5)

Question Number	Answer	Mark
5(b)(i)	1 mark for correct answer - maximum 2 marks. increase; decrease;	(2)
5(b)(ii)	1 mark for correct gas - maximum 3 marks. respiration; bacteria / microorganisms / decomposers / eq; reproduction / increase in number; less food available / eq;	(3)

Question Number	Answer	Mark
5(c)	1 mark for each correct answer - maximum 4 marks eg temperature; increases rate / increased energy of molecules / enzymes / eq; eg moisture / humidity; increased rate; solution / activity of enzymes / eq; pH; affects enzyme activity; oxygen; increases rate / respiration;	(4)

(Total 14 marks)

Question Number	Answer	Mark
6	<p>1 mark for each correct answer from any of the following - maximum 6 marks.</p> <p>C + / - cigarettes / 1 group of smokers / 1 group of non-smokers / different numbers per day;</p> <p>O same person / people / gender / mass / eq;</p> <p>R more than one person / 2 or more in each group / repeat;</p> <p>M1 Finger on wrist / neck / artery / pulse;</p> <p>M2 per minute / per unit time;</p> <p>S same temperature; same exercise / at rest; same time of day; same diet / eq;</p>	(6)

(Total 6 marks)

Total for Section A: 53 marks

Section B

Question Number	Answer	Mark
7(a)	1 mark for each correct answer from any of the following - maximum 4 marks. oxygen used; carbon dioxide produced; water produced; no lactic acid produced; higher energy / ATP yield;	(4)

Question Number	Answer	Mark
7(b)	1 mark for each correct answer from any of the following - maximum 4 marks. SA:Vol; small have high (SA:Vol); (greater) heat loss; need to keep body temperature constant / eq; respiration generates heat;	(4)

(Total 8 marks)

Question Number	Answer	Mark
8(a)	<p>1 mark for each correct answer from any of the following - maximum 4 marks.</p> <p>oxygen used / decreases / eq; death of organisms; bacteria / microorganisms / fungi; respiration; decomposers / decomposition decay; algal growth / eutrophication;</p>	(4)

Question Number	Answer	Mark
8(b)	<p>1 mark for each correct answer from any of the following - maximum 4 marks.</p> <p>not enough energy available / energy loss; respiration; heat; excretion / urine; egestion / faeces / uneaten; death;</p>	(4)

(Total 8 marks)

Question Number	Answer	Mark
9(a)	1 mark for each correct answer from any of the following - maximum 4 marks. less growth; less (contact with) oxygen; less (contact with food) / nutrients; less aerobic respiration / more anaerobic respiration; build up of (toxic) waste products	(4)

Question Number	Answer	Mark
9(b)	1 mark for each correct answer from any of the following - maximum 4 marks. Identical / exact copy / eq; genes from different species/other organisms/foreign; make useful proteins; large quantities; e.g. human antibodies / insulin / factor VIII / eq; organ transplants;	(4)

(Total 8 marks)

Total for Section B: 16 marks

Section C

Question Number	Answer	Mark
10	<p>1 mark for each correct answer from any of the following - maximum 12 marks.</p> <p>glasshouses / Polythene tunnels / eq; heaters / fire / paraffin heater; increase temp; increase carbon dioxide; increases rate of photosynthesis; (inorganic) fertilisers; organic fertiliser/ manure; increase nitrate/ mineral /eq; light;</p> <p>pest control / pesticide; insecticide; less plants eaten; herbicide; fungicide prevents competition; biological control; selective breeding; cloning; GM; water / irrigation; crop rotation;</p>	(12)

(Total 12 marks)

<ul style="list-style-type: none"> • Question Number 	<ul style="list-style-type: none"> • Answer 	<ul style="list-style-type: none"> • Mark
<ul style="list-style-type: none"> • 11 	<ul style="list-style-type: none"> • 1 mark for each correct answer from any of the following - maximum 12 marks. • <ul style="list-style-type: none"> • arteries; • thick walls; • muscle / elastic walls; • high pressure; • small lumen; • <ul style="list-style-type: none"> • arterioles; • muscle fibres; • change lumen size; • vasoconstriction / dilation; • divert blood; • <ul style="list-style-type: none"> • capillaries; • small; • thin walled / one cell thick; • allow exchange / diffusion; • glucose / oxygen / co₂ / eq. • <ul style="list-style-type: none"> • veins; • thin walled; • larger lumen; • <u>less</u> muscle and elastic tissue in walls; • valves; • lower pressure; 	<ul style="list-style-type: none"> • (12)

(Total 12 marks)

Question Number	Answer	Mark
12	<p>1 mark for each correct answer from any of the following - maximum 12 marks.</p> <p>glomerulus; renal/Bowman's capsule; nephron; ultra filtration; ref. pressure; out of blood / into capsule; ions/ urea/ water/glucose;</p> <p>(selective) reabsorption; ONCE water/ glucose / amino acids / eq. back into blood; distal / proximal convoluted tubule;</p> <p>loop of Henle; osmoreceptors; increase in blood concentration; ADH; pituitary; changes permeability of; collecting duct; less urine; more concentrated urine; (urine enters) bladder; excreted;</p>	(12)

Total for Section C: 24 marks

Total for Paper: 100 marks

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