

Mark Scheme Summer 2008

GCE

GCE O Level Human Biology (7042)

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7042/01 O LEVEL HUMAN BIOLOGY MARK SCHEME - JUNE 2008

Question Number	Answer	Mark
1(a)	<ul style="list-style-type: none"> • X - pelvis / hip; • Y - tibia / patella; 	(2)

Question Number	Answer	Mark
1(b)(i)	<ul style="list-style-type: none"> • blood cells; 	(1)

Question Number	Answer	Mark
1(b)(ii)	<ul style="list-style-type: none"> • lighter (but still strong) / stronger per unit mass; • less energy to move around; • less minerals needed to form it; 	max (2)

Question Number	Answer	Mark
1(c)(i)	<ul style="list-style-type: none"> • to prevent / reduce friction / shock absorber; 	(1)

Question Number	Answer	Mark																					
1(c)(ii)	<p>1 mark for each difference - maximum 3 marks</p> <table border="1"> <thead> <tr> <th>Difference</th> <th>Bone</th> <th>Cartilage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>rigid/ not flexible</td> <td>flexible</td> </tr> <tr> <td>2</td> <td>heavy</td> <td>light</td> </tr> <tr> <td>3</td> <td>contains marrow</td> <td>no marrow</td> </tr> <tr> <td>4</td> <td>contains calcium salts</td> <td>no calcium salts</td> </tr> <tr> <td>5</td> <td>internal blood vessels</td> <td>no internal / has external blood vessels</td> </tr> <tr> <td>6</td> <td>muscle attached</td> <td>muscle not attached</td> </tr> </tbody> </table>	Difference	Bone	Cartilage	1	rigid/ not flexible	flexible	2	heavy	light	3	contains marrow	no marrow	4	contains calcium salts	no calcium salts	5	internal blood vessels	no internal / has external blood vessels	6	muscle attached	muscle not attached	max (3)
Difference	Bone	Cartilage																					
1	rigid/ not flexible	flexible																					
2	heavy	light																					
3	contains marrow	no marrow																					
4	contains calcium salts	no calcium salts																					
5	internal blood vessels	no internal / has external blood vessels																					
6	muscle attached	muscle not attached																					

Question Number	Answer	Mark
1(c)(iii)	<ul style="list-style-type: none"> allows bone / bone shaft to increase in length / grow; Reject stretch	(1)

Question Number	Answer	Mark
1(c)(iv)	<ul style="list-style-type: none"> rib attachment to sternum; base of sternum; in trachea; ear / pinna; (intervertebral) discs; nose; 	max (2)

(Total 12 marks)

Question Number	Answer	Mark
2(a)(i)	<ul style="list-style-type: none"> inverse relationship / less fibre - more cases of bowel cancer / ORA; 	(1)

Question Number	Answer	Mark
2(a)(ii)	<ul style="list-style-type: none"> 87/88 per 100 000 / range 87-88 per 100 000; 	(1)

Question Number	Answer	Mark
2(a)(iii)	<ul style="list-style-type: none"> 2.50 g; 	(1)

Question Number	Answer	Mark
2(a)(iv)	<p>2.22g gives 93 deaths, 2.50g gives 8- deaths per 100 000;</p> <ul style="list-style-type: none"> (change is) decrease of 13 deaths per 100 000; <p>2 marks for correct answer without working shown</p>	(2)

Question Number	Answer	Mark
2(b)(i)	<ul style="list-style-type: none"> any leafy vegetable; root vegetable; fruits; all bran / any whole grain cereal; (wholemeal) bread; (brown) rice 	max (2)

Question Number	Answer	Mark
2(b)(ii)	<ul style="list-style-type: none"> increases / aids peristalsis; prevents constipation / removes faeces easily; reduces risk of bowel cancer / eq; less time for toxins to accumulate; 	max (2)

(Total 9 marks)

Question Number	Answer	Mark	
3	1 mark for each correct answer (x).	(9)	

(Total 9 Marks)

Question Number	Answer	Mark
4(a)(i)	<ul style="list-style-type: none"> • trachea - P; • bronchi - R; • diaphragm - S; 	(3)

Question Number	Answer	Mark
4(a)(ii)	<ul style="list-style-type: none"> • heart / pericardium; 	(1)

Question Number	Answer	Mark
4(a)(iii)	<ul style="list-style-type: none"> • breathing is movement of air in and out / ventilation of lungs; • respiration is the release of energy (in cells); 	(2)

Question Number	Answer	Mark
4(b)	<ul style="list-style-type: none"> • intercostal muscles contract; • ribs swing up and outwards; • diaphragm (muscles) contracts; • diaphragm less dome shaped / flattened; Rejct moves down • leads to increase in volume of thorax / chest cavity; 	max (4)

Question Number	Answer	Mark
4(c)	<ul style="list-style-type: none"> • particles / pollen / dust / eq; • trapped by mucus; • air warmed; • by radiation / surrounded by tissues at higher temperature; • air moistened; • by evaporation from lining of trachea / mucus; 	max (4)

(Total 14 Marks)

Question Number	Answer	Mark
5(a)(i)	<ul style="list-style-type: none"> • ureter; 	(1)

Question Number	Answer	Mark
5(a)(ii)	<ul style="list-style-type: none"> • urine; Reject urea	(1)

Question Number	Answer	Mark
5(a)(iii)	<ul style="list-style-type: none"> • cortex - filtration / ultra filtration / eq; • medulla - (selective) reabsorption / eq; 	(2)

Question Number	Answer	Mark
5(b)	<ul style="list-style-type: none"> • glucose used by kidney cells for respiration; 	(1)

Question Number	Answer	Mark
5(c)(i)	<ul style="list-style-type: none"> • bulk of water in filtrate reabsorbed; • some solutes reabsorbed; • urea left behind / not reabsorbed; 	max (2)

Question Number	Answer	Mark
5(c)(ii)	<ul style="list-style-type: none"> • all glucose reabsorbed; • from filtrate / kidney tubule into blood; 	(2)

Question Number	Answer	Mark
5(d)(i)	<ul style="list-style-type: none"> • sweating; • less water in the blood; • ref. to ADH; • produced by pituitary; • stimulates nephrons to reabsorb more water; 	max (3)

Question Number	Answer	Mark
5(d)(ii)	<ul style="list-style-type: none">• it will increase / eq;	(1)

(Total 13 Marks)

Question Number	Answer	Mark
6(a)(i)	<p>1 mark for correct answer.</p> <ul style="list-style-type: none"> male; <p>(1 Mark)</p> <p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> ref. to unpaired X chromosome in males / male XY; recessive (allele / gene) present in male always shows feature; females can have recessive allele hidden by dominant allele; females must receive a recessive allele from both parents / be homozygous recessive to show feature; <p>(3 Marks)</p>	(4)

Question Number	Answer	Mark
6(a)(ii)	<ul style="list-style-type: none"> $X^h Y$; 	(1)

Question Number	Answer	Mark
6(b)(i)	<p>1 mark for each correct answer from any of the following (Accept other logical explanations for these points) - maximum 3 marks.</p> <ul style="list-style-type: none"> haemophilia allele is recessive; Sarah heterozygous / carries recessive X^h; Ian's mother / Catherine inherits X^h from her mother / Sarah / carrier; Ian inherits X^h from his mother / carrier; 	max (3)

Question Number	Answer	Mark
6(b)(ii)	<ul style="list-style-type: none"> Colin is not affected / does not carry X^h / does not carry X^H; thus girl cannot have $X^h X^h$ / have two recessive alleles / must have an X^H; 	(2)

(Total 10 Marks)

Question Number	Answer	Mark
7(a)	<ul style="list-style-type: none"> • mother's blood has higher carbon monoxide content than normal; • mother's blood carries reduced amount of oxygen / A/W; • fetus receives reduced / too little oxygen supply; • baby born with reduced birth weight / mass / small; • may show brain damage symptoms; 	max (3)

Question Number	Answer	Mark
7(b)	<ul style="list-style-type: none"> • may cause sunburn / blistering; • can damage skin tissues / cells; • ultra-violet can cause cell / nucleus / chromosome damage; • could lead to (more) mutations; • could lead to skin cancer / melanoma; 	max (4)

Question Number	Answer	Mark
7(c)	<ul style="list-style-type: none"> • loud noise causes large vibrations of eardrum; • this causes large vibrations of middle earbone / malleus; • ligaments to middle ear bone / malleus slackens; • person cannot hear / suffers temporary deafness; • (extensive exposure) can lead to cochlea damage / deafness; 	max (3)

(Total10 Marks)

Question Number	Answer	Mark
8(a)	<p><u>Cerebral hemispheres</u></p> <ul style="list-style-type: none"> controls intelligence / reasoning / learning / controls voluntary muscle / memory / vision / hearing / personality; <p>(1 Mark))</p> <p><u>Cerebellum</u></p> <ul style="list-style-type: none"> balance / involuntary control of skeletal muscles / learned reflexes / named example; <p>(1 Mark)</p>	(2)

Question Number	Answer	Mark
8(b)	<ul style="list-style-type: none"> death; part C controls all involuntary muscles / gut / heartbeat / breathing; 	(2)

Question Number	Answer	Mark
8(c)	<ul style="list-style-type: none"> spinal cord; no impulses below break / lower body; no sensations (below break); paralysis (below break); <p>Reject</p>	max (3)

(Total 7 Marks)

Question Number	Answer	Mark
9(a)	<p>1 mark for each correct answer - maximum 4 marks</p> <pre> graph TD A["Blood vessel cut or damaged"] --> B["platelets;"] B --> C["Soluble prothrombin is changed into thrombin"] C --> D["plasma;"] D --> E["fibrin;"] E --> F["Erythrocytes/ red blood cells"] F --- G["Clot formed"] </pre>	(4)

Question Number	Answer	Mark
9(b)(i)	<ul style="list-style-type: none"> prevents further blood loss; prevents entry of bacteria / pathogens; Reject germs	(2)

Question Number	Answer	Mark
9(b)(ii)	<ul style="list-style-type: none"> clots / thromboses could occur in blood vessels and block them / cause strokes / heart attack / eq; 	(1)

(Total 7 Marks)

Question Number	Answer	Mark
10(a)(i)	<ul style="list-style-type: none"> grinding / crushing / chewing (food); 	(1)
10(a)(ii)	<ul style="list-style-type: none"> molars / (type) A; 	(1)
10(a)(iii)	<ul style="list-style-type: none"> remove all bacteria / food remains / plaque collecting here; 	(1)
10(b)	<ul style="list-style-type: none"> enamel; dentine; calcium; bacteria; acid; erodes / corrodes / dissolves; 	(6)

(Total 9 Marks)

7042/02 PAPER 2 MARK SCHEME - JUNE 2008

Question Number	Answer	Mark
1(a)(i)	<ol style="list-style-type: none"> 1. right atrium; 2. atrium (wall) contracts; 3. pushes blood into ventricle; 4. (via) cuspid valve; Reject bicuspid <ol style="list-style-type: none"> 5. ventricle (wall) contracts; 6. forces blood into pulmonary artery; 7. (via) semilunar valves; 8. through lung capillaries; 9. via pulmonary vein to left atrium; 10. valves prevent backflow of blood; 	max (7)

Question Number	Answer	Mark
1(a)(ii)	<ol style="list-style-type: none"> 1. blood in vena cava has raised carbon dioxide level; 2. blood in vena cava has lower oxygen level; R - none 3. carbon dioxide produced by body cells; 4. oxygen removed from blood as it passes through tissues; 5. blood in vena cava has low pressure; 6. pressure increased by pumping of heart; 7. alveolar air has high concentration of oxygen; 8. oxygen diffuses into capillaries; 9. combines with haemoglobin / forms oxyhaemoglobin; 10. low carbon dioxide concentration in alveolar air; 11. carbon dioxide diffuses out of blood; 12. suitable ref. to concentration gradient; 13. glucose level drops; 14. reference to respiration in alveoli; 	max (9)

Question Number	Answer	Mark
1(b)	<p>2 marks for each correct answer from any of the following pairs - maximum 4 marks.</p> <ul style="list-style-type: none"> • cardiac muscle involuntary; • skeletal muscle voluntary; • cardiac muscle single cells; • skeletal muscle fibres with scattered nuclei / coenocyte described; • cardiac muscle no fatigue; • skeletal muscle fatigues; • cardiac muscle not joined to skeleton; • skeletal muscle joined to bones; • cardiac muscle myogenic; • skeletal muscle neurogenic; 	<p style="text-align: right;">max (4)</p>

(Total 20 marks)

Question Number	Answer	Mark
2(a)	<ul style="list-style-type: none"> • they detect a stimulus / eq ; Accept changes in environment <ul style="list-style-type: none"> • they respond by generating electrical impulse; • pass this to CNS / brain / sensory neurone; • one example from following list: skin / tongue / cochlea / semi-circular canals / nose / eye ; Reject senses	max (3)

Question Number	Answer	Mark
2(b)	Accept points on labelled / annotated diagram <ol style="list-style-type: none"> 1. light rays (almost) parallel; 2. enter via cornea; 3. rays refracted / bent; 4. pass (unaltered) through aqueous humour; 5. enters lens via pupil; 6. lens made less convex / flatter; 7. by relaxation of ciliary muscles; 8. suspensory ligaments pull on lens; 9. fine adjustment / final refraction by lens; 10. pass (unaltered) through vitreous humour; 11. final focus on fovea / yellow spot; 	max (7)

Question Number	Answer	Mark
2(c)	<u>hard lens</u> <ul style="list-style-type: none"> • more difficult to change shape of lens / accommodation difficult; • difficult to form sharp focus; • especially on distant / very close objects; <u>cloudy lens</u> <ul style="list-style-type: none"> • light rays cannot penetrate / scattered; • image is blurred / fuzzy; 	max (4)

Question Number	Answer	Mark
2(d)(i)	<ul style="list-style-type: none"> • (mechanism that) keeps internal conditions / cell environment; • constant / within narrow limits; 	(2)

Question Number	Answer	Mark
2(d)(ii)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • regulates the amount of light reaching the retina; • too much / bright light / ORA; • circular muscles of iris contract / ORA; • radial muscles of iris relax / ORA; • pupil becomes smaller / less light enters / ORA; 	(4)

(Total 20 marks)

Question Number	Answer	Mark
3(a)(i)	<ul style="list-style-type: none"> • respiration; • glucose; • energy released in mitochondria; • suitable ref. to enzymes; • present on cristae / inner membranes; • (glucose) reacts with oxygen; • waste products are carbon dioxide and water; • in aerobic respiration; • energy released used to form ATP; 	max (6)

Question Number	Answer	Mark
3(a)(ii)	<ul style="list-style-type: none"> • energy is used to form ATP; • combines ADP and phosphate group; • stored in cell; • when energy required ATP breaks down; 	max (3)

Question Number	Answer	Mark
3(b)(i)	<p>Any three pairs - up to 2 marks each</p> <ul style="list-style-type: none"> • anaerobic - end product is lactic acid; • aerobic - end products are carbon dioxide and water; • aerobic - requires oxygen; • anaerobic - no oxygen needed; • aerobic - glucose molecule completely broken down; • anaerobic - glucose molecule only partially broken down; • aerobic - large number of ATP molecules formed / a lot of energy released; • anaerobic - few ATP molecules formed / little energy; <p style="text-align: right;">(6)</p> <p>1 mark for correct answer</p> <ul style="list-style-type: none"> • only minimal amount of lactic acid tolerated as it is toxic / causes cramp; • anaerobic respiration wasteful of energy reserves / eq; <p style="text-align: right;">(1)</p>	max (7)

Question Number	Answer	Mark
3(b)(ii)	<ul style="list-style-type: none"> • carbon dioxide removed via alveoli / lungs; • carbon dioxide used to form urea; • water removed via alveoli / lungs; • water removed by kidney; • lactic acid oxidised (when oxygen is available); • lactic acid converted to glycogen; • in the liver; 	max (4)

(Total 20 marks)

Question Number	Answer	Mark
4(a)(i)	<ul style="list-style-type: none"> • long structure/folded internally; • large surface area; • ref. to entry of bile / pancreatic ducts; • secretion of enzymes; • presence of villi; • muscles move food along / mixing; 	max (4)

Question Number	Answer	Mark
4(a)(ii)	<ul style="list-style-type: none"> • for absorption materials must be soluble; • enzymes activated by alkaline conditions / higher pH; • bile produces alkaline conditions; • bile emulsifies fats / eq; • lipase; • fats to fatty acids and glycerol; • amylase; • starch to maltose; • maltase; • maltose to glucose; • peptidase / relevant named example e.g. trypsin; • protein / peptides to amino acids; (Accept any other relevant enzyme and effect) 	max (8)

Question Number	Answer	Mark
4(a)(iii)	<ul style="list-style-type: none"> • glucose absorbed into blood capillaries; • amino acids absorbed into blood capillaries; • fatty acids / glycerol absorbed into lacteals; • ref. to diffusion gradient / relative concentrations; • ref. active uptake; 	max (3)

Question Number	Answer	Mark
4(b)	<ul style="list-style-type: none"> • metabolism of products of digestion / eq; • glucose converted to glycogen; • stored in liver; • excess amino acids deaminated; • urea formed; • alcohol broken down / oxidised; • harmful substances detoxified; 	<p style="text-align: right;">max (5)</p>

(Total 20 marks)

Question Number	Answer	Mark
5(a)	<ul style="list-style-type: none"> • progesterone produced / level high; • fertilised egg cell / zygote passes to uterus; • moved along oviduct (by cilia); • uterine lining rich in blood vessels; • zygote settles on / sinks into / attaches to uterine lining / implants; • zygote divides to form ball of cells; • cells differentiate / eq; • some cells form placenta / attach to uterine lining; • other cells become embryo / fetus; 	max (5)

Question Number	Answer	Mark
5(b)(i)	<ul style="list-style-type: none"> • interlocking of maternal and fetal tissues; • ref. to villi; • large surface area in contact; • a rich blood supply in both maternal and fetal tissues; • very thin barrier between blood supplies; • allows diffusion to occur readily (from one system to the other); • ref. to concentration gradients; • blood systems are not connected to each other / no mixing of blood; 	max (5)

Question Number	Answer	Mark
5(b)(ii)	<p><u>small intestine</u></p> <ul style="list-style-type: none"> • higher concentration in maternal blood; • glucose / amino acids / vitamins / mineral salts / fatty acids / glycerol; • diffusion into fetal blood; <p><u>lungs</u></p> <ul style="list-style-type: none"> • oxygen higher concentration in maternal blood; • carbon dioxide higher concentration in fetal blood; • diffusion down concentration gradient; <p><u>kidneys</u></p> <ul style="list-style-type: none"> • urea in fetal blood diffuses to maternal blood; 	max (6)

Question Number	Answer	Mark
5(c)	<ul style="list-style-type: none"> • progesterone; • prevents breakdown of uterine lining; • thus prevents miscarriage abortion; • uterine lining further vascularised / blood vessels grow into lining; • stimulates placental growth; • prevents further ovulation / implantation / FSH production; 	<p style="text-align: right;">max (4)</p>

(Total 20 marks)

Question Number	Answer	Mark
6(a)	<ul style="list-style-type: none"> • an organism that transfers pathogens from host to host; • not itself harmed by the pathogen; 	(2)

Question Number	Answer	Mark
6(b)(i)	<p>1 mark for correct answer.</p> <ul style="list-style-type: none"> • louse; <p>(1 Mark)</p> <p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • pathogen / bacterium / microbe on body / in faeces of louse; R - germ • left on human skin; • louse bites cause irritation; • scratching breaks skin surface / allows pathogen entry; <p>(max 3 Marks)</p>	(4)

Question Number	Answer	Mark
6(b)(ii)	<p>1 mark for correct answer.</p> <ul style="list-style-type: none"> • anopheline mosquito; <p>(1 Mark)</p> <p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • bites/ stab and sucks human blood; • if victim has malaria parasite enters mosquito with blood; • when biting injects saliva to prevent blood clotting; • saliva contains parasite; <p>(max 3 Marks)</p>	(4)

Question Number	Answer	Mark
6(c)	<ul style="list-style-type: none"> • (Schistosoma) eggs present in faeces / urine; • hatch in water to release larva; • larva enters body of snail; • develops into second type of larva; • released into water; • this larva can penetrate human skin 	max (5)

Question Number	Answer	Mark
6(d)	<ul style="list-style-type: none"> • objects that pierce skin / named example; • may be contaminated by virus from user; • if not sterilised can pass virus to second user; • direct transfusion of contaminated blood / blood products; • sexual transmission; • lining of penis / vagina has no epidermis; • transmission from mother to fetus / child; • across placenta / during birth; 	max (5)

(Total 20 marks)

Question Number	Answer	Mark
7(a)(i)	<p>1 mark for each correct answer from any of the following - maximum 4 marks If nucleus included - maximum 3 marks Accept marks on a labelled diagram</p> <ul style="list-style-type: none"> • ref. to small size / possible shape; • cell wall; • cell membrane; • cytoplasm; • thread / coil of nucleic acid / DNA; • flagellum / flagella; • presence of plasmids; 	max (4)

Question Number	Answer	Mark
7(a)(ii)	<p>Accept points on a labelled diagram</p> <ul style="list-style-type: none"> • most cannot manufacture own food; • parasites or saprophytes; • saprophytes secrete enzymes / eq; • external digestion; • (both groups) absorb / take in digested foods; • by diffusion; • food sources - living organism / dead organic matter; • ref. to chemotrophs; • ref. to photosynthetic bacteria; 	max (5)

Question Number	Answer	Mark
7(b)(i)	<p>1 mark for correct answer.</p> <ul style="list-style-type: none"> • name / description of disease; (must be a bacterial example); <p style="text-align: right;">(1 mark)</p> <p>1 mark for each correct answer from any of the following - maximum 4 marks (treatments and controls must be specific to named disease) For non-bacterial diseases allow treatment and control</p> <ul style="list-style-type: none"> • use of antibiotics; • named example; • second method of treatment; • vaccination / medical method of control; • environmental method of control; <p style="text-align: right;">(maximum 4 marks)</p>	(5)

Question Number	Answer	Mark
7(b)(ii)	<p>Accept any three recognised processes with examples - 2 marks each</p> <ul style="list-style-type: none"> • food production; e.g. yoghurt / cheese / soy sauce; • decomposition; formation of humus / manure / compost / etc; • recycling; e.g. nitrogen cycle / carbon cycle / sewage treatment; • biotechnological processes; genetic engineering / named example; <p>accept any relevant examples need explanation /description for second mark</p>	<p style="text-align: right;">max (6)</p>

(Total 20 marks)

Question Number	Answer	Mark
8(a)	<ul style="list-style-type: none"> • an injection / oral liquid; • containing weakened / dead pathogens / antigens; 	max (2)

Question Number	Answer	Mark
8(b)(i)	<ul style="list-style-type: none"> • antigens; • proteins on surface of pathogen • stimulate white blood cells / lymphocytes; • to form antibodies; • action of antibody / destroy / agglutinate pathogens; • remain in blood for some time; • memory cells retain ability to make specific antibody; • thus can respond to future infections; • before symptoms appear; 	max (6)

Question Number	Answer	Mark
8(b)(ii)	<ul style="list-style-type: none"> • takes some time for antibodies to be formed; • if infected antigens already present; • thus white blood cells already stimulated; 	max (2)

Question Number	Answer	Mark
8(b)(iii)	<ul style="list-style-type: none"> • antibodies present in mother's blood; • from infections / immunisations she has had; • antibodies can cross placenta; • antibodies active in child at birth; • memory cells do not cross placenta; • child's organs destroy / excrete antibodies within months; • presence of future antigens needed to trigger child's own immune system; 	max (5)

Question Number	Answer	Mark
8(c)	<ul style="list-style-type: none"> • white blood cells / lymphocytes needed to form immune system; • baby not able to form antibodies; • therefore unable to destroy pathogens; • even normally mild infections can become fatal; • white blood cells formed in bone marrow; • tissue matching necessary for donor tissue to avoid rejection; • successful transplant will form new active white blood cells; 	max (5)

(Total 20 marks)

Question Number	Answer	Mark
9(a)(i)	<ul style="list-style-type: none"> • process of photosynthesis; • light energy; • absorbed by chloroplasts / chlorophyll; • converted to chemical energy; • used to combine carbon dioxide and water; • to form glucose / simple sugar; • glucose converted to other substances; • e.g. starch / fats / proteins; • passed to consumers; • some ATP formed; 	max (6)

Question Number	Answer	Mark
9(a)(ii)	<ul style="list-style-type: none"> • suitable food chain; (must start with producer have a suitable herbivore and end with human) • eaten / digestion by consumers; • materials assimilated in body of consumer; • energy lost at each stage of chain; <p>Maximum of 2 marks from</p> <ul style="list-style-type: none"> • by respiration; • by defaecation; • excretion; • heat / movement undigested material; 	max (4)

Question Number	Answer	Mark
9(b)(i)	<ul style="list-style-type: none"> • for manufacture of proteins; • nitrates needed for conversion glucose to amino acids; • amino acids formed into proteins; • nitrates supply increased by use of manure / compost / humus; • increased by use of chemical fertilisers; • use of leguminous crop (explained); 	max (4)

Question Number	Answer	Mark
9(b)(ii)	<ul style="list-style-type: none"> • nitrates very soluble; • easily leached into lakes / rivers; • eutrophication can occur; • rapid growth of algae (on surface) / algal bloom; • light excluded from deeper layers; • death of algae and other aquatic plants; • provide food for bacteria; • rapid reproduction of bacteria; • use up oxygen / create anaerobic conditions; • aquatic animals die from lack of oxygen; 	<p style="text-align: right;">max (6)</p>

(Total 20 marks)

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