

Mark Scheme (Results)

January 2009

GCE

GCE O level Human Biology
7042/02

Question Number	Answer	Mark
1(a)(i)	<p>1 mark for each correct answer from any of the following - maximum 3 marks. (must include*)</p> <ul style="list-style-type: none"> • urine in test tube / suitable container; • add Benedict's / Fehling's solution / Clinistix; * • heat; NB - use of water bath inadequate • colour change / blue to red / blue to violet; 	(3)

Question Number	Answer	Mark
1(a)(ii)	<p>1 mark for each correct answer from any of the following - maximum 3 marks.</p> <ul style="list-style-type: none"> • large amounts of glucose in blood / blood glucose level rises; • level not reduced to normal by insulin / not enough insulin released / glucose not converted to glycogen; • filtered by Bowman's capsule; • only some reabsorbed / too much in filtrate for all to be reabsorbed / A/W; • excess passes out in urine; 	(3)

Question Number	Answer	Mark
1(b)	<p>1 mark for each correct answer from any of the following - maximum 4 marks. Accept any other valid point.</p> <ul style="list-style-type: none"> • major component of plasma • transport medium; • solvent; • e.g. glucose in plasma / oxygen in alveoli; • major component of cytoplasm; • chemical reactant / hydrolysis; • e.g. digestion of starch; • temperature regulation / A/W; • sweat; 	(4)

Question Number	Answer	Mark
1(c)	<p>1 mark for each correct answer from any of the following - maximum 10 marks.</p> <ul style="list-style-type: none"> • by hypothalamus; • level of water in blood decreases; • more ADH secreted; A/W • by pituitary; • passes in blood; • to kidney; • increases permeability; • of collecting duct / tubule; • more water reabsorbed; • into blood; • normal level restored; • increased water levels in blood; A/W • reduced secretion of ADH; 	(10)

(Total 20 marks)

Question Number	Answer	Mark
2(a)(i)	<p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • grind / chop potato into small fragments / pieces / (with water); • add iodine/iodine in KI <u>solution</u>; • potato changes to black; • from brown; 	(3)

Question Number	Answer	Mark
2(a)(ii)	<p>1 mark for each correct answer from any of the following - maximum 8 marks</p> <ul style="list-style-type: none"> • chewed by teeth / masticated / mechanical digestion; • increases surface area for enzyme action; • mixed with saliva; • (salivary) amylase digests starch; • to maltose*; • starch enters stomach; • no carbohydrase / starch digesting enzyme present; • enters duodenum; • pancreatic amylase added; • digests remaining starch; • to maltose*; • enters ileum; • maltase secreted; • maltose digested to glucose; 	(8)

Question Number	Answer	Mark
2(a)(iii)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • glucose used for energy / source of energy; • (released by) aerobic; • respiration; • manufacture of ATP; • used for movement / chemical reactions / named activity; • converted to glycogen for storage; • converted to fat for storage; • converted to amino acids; • for protein manufacture; 	(4)

Question Number	Answer	Mark
2(b)	<p>1 mark for each correct answer from any of the following - maximum 5 marks</p> <ul style="list-style-type: none">• not a balanced diet / essential nutrients missing;• protein required;• for cell growth;• enzyme manufacture;• antibody production;• no protein weak immune system;• vitamins required;• lack of vitamins leads to deficiency diseases / named example;• fats required;• cell membrane formation;• minerals required;• named mineral and deficiency disease;	(5)

(Total 20 marks)

Question Number	Answer	Mark
3(a)(i)	<p>2 marks for <u>diagram quality</u></p> <ul style="list-style-type: none"> • size appropriate, at least six lines; • small nucleus at centre; • roughly oval in shape; <p>Accept electron micrograph type drawings</p> <p>2 marks for <u>labels/description</u></p> <ul style="list-style-type: none"> • nucleus; • cytoplasm; • cell membrane; 	(4)

Question Number	Answer	Mark
3(a)(ii)	<p>1 mark for each correct answer from any of the following - maximum 6 marks</p> <ul style="list-style-type: none"> • tracheal cells have cilia / A/W; R - hairs • line the respiratory / breathing tubes; • cheek cells don't have cilia; • cilia beat / waft; • move mucus up trachea; • taking trapped bacteria / dust / particles; • passed to back of throat / oesophagus; • swallowed; • passes into stomach; • bacteria destroyed; • prevents lung infection; 	(6)

Question Number	Answer	Mark
3(b)(i)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • protein; • contains nitrogen; • also contains carbon, hydrogen and oxygen; • chain / polymer; • of amino acids; • linked by peptide bonds; • specific shape / conformation; • ref. active site; 	(4)

Question Number	Answer	Mark
3(b)(ii)	<p>1 mark for each correct answer from any of the following - maximum 6 marks</p> <ul style="list-style-type: none"> • enzymes denatured; • increases kinetic energy; • increased vibrations of molecules; • breakage of bonds; • hydrogen (bonds); • loss of enzyme shape; • loss / change of shape of active site; • substrate no longer fits; • catalytic activity lost / enzymes stop working; • reactions slow / stop; 	(6)

(Total 20 marks)

Question Number	Answer	Mark
4(a)(i)	<p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • consists of DNA; • with protein backbone; • threadlike; • centromere; • (chain of) genes; • double helix; • ref. sugars phosphate; • ref. bases; 	(3)

Question Number	Answer	Mark
4(a)(ii)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • genes; • determine phenotype; • DNA sequence; • codes for a (particular) protein / polypeptide; • ref to enzymes; • ref to structural proteins; • copies made during mitosis; • genes passed to next generation determine their characteristics / eq; 	(4)

Question Number	Answer	Mark
4(b)(i)	<p>parents man $X^H Y$ woman $X^H X^h$;</p> <p>gametes X^H Y X^H X^h;</p> <p>offspring $(X^H X^H)$ $(X^H Y)$ $(X^H X^h)$ $X^h Y$;</p> <p>phenotype haemophiliac male identified;</p> <p>50% chance / 1 in 2; R - 25% / 1 in 4</p>	(5)

Question Number	Answer	Mark
4(b)(ii)	<p>1 mark for each correct answer from any of the following – maximum 4 marks</p> <ul style="list-style-type: none"> • X^H is dominant (allele) / X^h is recessive (allele); • allele for haemophilia rare in the population; • females need to inherit X^h from both parents (to have condition); • less likely to reach breeding age/ ref to menstruation; • because serious condition / leads to early death; • heterozygous possible in female / female may be carrier; • heterozygotes / carrier does not show condition; 	(4)

Question Number	Answer	Mark
4(c)	<ul style="list-style-type: none"> • allele for blood group B is dominant / O recessive; • both parents heterozygous; • produce gametes of two types, I^B and I^O; • child with group O produced from fusion of I^O alleles from both parents; • 25% / 1 in 4 chance; <p><i>If shown by genetic diagram for points 2-5 above</i></p> <p>parents $I^B I^O$ x $I^B I^O$;</p> <p>gametes I^B I^O I^B I^O;</p> <p>offspring $I^B I^B$ $I^B I^O$ $I^B I^O$ $I^O I^O$;</p> <p>phenotypes group O identified;</p>	(4)

(Total 20 marks)

Question Number	Answer	Mark
5(a)(i)	<p>1 mark for each correct answer from any of the following – maximum 4 marks</p> <ul style="list-style-type: none"> • deamination of; • excess amino acids; • releases ammonia; • toxic / can't be stored; • converted to urea; • which is less toxic; • urea very soluble; • excreted in urine; 	(4)

Question Number	Answer	Mark
5(a)(ii)	<p>1 mark for each correct answer from any of the following – maximum 7 marks</p> <ul style="list-style-type: none"> • in the blood; • in solution; • in plasma; • passes via hepatic vein; • to vena cava; • via heart; • reference to pulmonary vessels; • via lungs; • passes via aorta; • to renal arteries into kidneys; 	(7)

Question Number	Answer	Mark
5(b)	<p>1 mark for each correct answer from any of the following – maximum 6 marks</p> <ul style="list-style-type: none"> • reference to nephron; • high blood pressure; • in glomerulus; • ultrafiltration; • filtrate formation; • in Bowman's capsule; • filtrate passes along tubule; • urea not reabsorbed; • passes into collecting duct; • out in urine; 	(6)

Question Number	Answer	Mark
5(c)	<p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none">• amount of protein in diet varies;• amount of protein used by body varies;• broken down / converted to amino acids;• if in excess more urea produced / less protein intake, less urea produced;• less passes out in urine;	(3)

(Total 20 marks)

Question Number	Answer	Mark
6(a)(i)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • phagocytes can move between cells/ out of blood; • bacteria engulfed / A/W; • by white blood cells / phagocytes; • enclosed in a vacuole; • enzymes enter vacuole / A/W; • digest bacteria; • bacteria destroyed / killed; <p>Accept points on labelled diagram</p>	(4)

Question Number	Answer	Mark
6(a)(ii)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • produced by white blood cells / lymphocytes; • antibodies are specific to the antigen / A/W; • destroy bacteria / A/W; • make them clump together / A/W; • for easier digestion; • neutralise toxins; 	(4)

Question Number	Answer	Mark
6(a)(iii)	<p>1 mark for each correct answer from any of the following - maximum 4 marks.</p> <ul style="list-style-type: none"> • blood washes out bacteria / toxins that have entered; • forms a seal; • over wound / cut; • prevents loss of blood; • prevents entry of bacteria / microorganisms; R - germs 	(4)

Question Number	Answer	Mark
6(b)	<p>1 mark for each correct answer from any of the following - maximum 8 marks.</p> <ul style="list-style-type: none">• passive;• serum injected;• contains antibodies;• formed in another animal;• immediate effect;• short lasting / temporary;• active;• by vaccination;• organism / toxin / antigen injected;• weakened / dead / A/W;• causes lymphocytes;• to produce antibodies;• and memory cells;• long lasting / remain in blood for a long time;	(8)

(Total 20 marks)

Question Number	Answer	Mark
7(a)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • (sewage) contains bacteria / microorganisms; • contains eggs of worms; • which cause disease / are pathogenic; • (sewage) very good conditions for them to multiply; • if sewage in contact with food / drinking water; • cholera; • typhoid; • epidemics caused; 	(4)

Question Number	Answer	Mark
7(b)	<p>1 mark for each correct answer from any of the following - maximum 8 marks</p> <ul style="list-style-type: none"> • sewage contains nitrogen / nitrates; • eutrophication; • rapid growth of algae; • and bacteria; • algal bloom; • death of algae; • broken down / decomposed by bacteria; • aerobic; • use all oxygen in water; • plant life dead; • so no longer any oxygen replacement; • fish have no oxygen; • suffocate / die; 	(8)

Question Number	Answer	Mark
7(c)	<p>1 mark for each correct answer - maximum 8 marks.</p> <ul style="list-style-type: none"> • water pumped from river; • filtered through coarse grid; • removes large objects; • settling tank; • suspended matter settles; <p><u>either</u></p> <ul style="list-style-type: none"> • slow sand filter; • algae in water reproduce; • form jelly on sand particles; • which traps bacteria in water; • protozoa; • feed on bacteria; <p><u>or</u></p> <ul style="list-style-type: none"> • rapid sand filter; • alum / aluminium sulphate added to water; • forms jelly on sand particles; • traps particles / suspended matter; • jelly removed periodically; • by forcing water under pressure upwards / from base of filter; <p>Only allow marks for one method of filtration</p> <ul style="list-style-type: none"> • chlorination; • destroys any remaining bacteria; <p>Accept points on annotated diagrams</p>	(8)

(Total 20 marks)

Question Number	Answer	Mark
8(a)(i)	<p>1 mark for each correct answer - maximum 6 marks</p> <ul style="list-style-type: none"> • lands on faeces; • of infected person; • bacteria (of typhoid) present; • stick to hairy legs; • and pads on feet; • feeds on faeces; • alights on food; • secretes saliva / vomits stomach contents; • sucks up digested products; • including bacteria; • transferred to human food; 	(6)

Question Number	Answer	Mark
8(a)(ii)	<p>1 mark for each correct answer from any of the following - maximum 4 marks</p> <ul style="list-style-type: none"> • bacterial numbers low (at infection); • increase by cell division / binary fission / reproduction; • takes time for numbers to increase; • (higher numbers) produce more toxins; • these cause symptoms to appear; 	(4)

Question Number	Answer	Mark
8(a)(iii)	<p>1 mark for each correct answer from any of the following - maximum 6 marks</p> <ul style="list-style-type: none"> • appropriate storage / cover food; • prevents access of houseflies; • put in refrigerator / cool place; • any bacteria present won't breed very quickly; • thorough cooking; • high temperature; • destroys bacteria present; • prevents infection; • washing hands before handling food; • washing / sterilising food preparation surfaces / utensils / etc; 	(6)

Question Number	Answer	Mark
8(b)	<p>1 mark for each correct answer from any of the following – maximum 4 marks</p> <ul style="list-style-type: none">• role in biotechnology (explained);• recycling;• decomposition;• dead plants / animals;• returning nutrients to the soil;• production of biogas;• sewage treatment;• cheese flavouring;• accept any other valid point; <p>Ignore any references to yeasts / antibiotics</p>	(4)

(Total 20 marks)

Question Number	Answer	Mark
9(a)	<p>1 mark for <u>diagram</u> quality - maximum 2 marks</p> <ul style="list-style-type: none"> • large diagram (minimum 10 lines); • deep pit; <p>1 mark for each correct answer from any of the following - maximum 6 marks</p> <ul style="list-style-type: none"> • suitable shelter with ventilation / mesh; • concrete / slab floor; • easy cleaning; • no puddles around top; • upper part lined; • bricks / concrete; • prevents rats burrowing; • lid / cover; • prevent entry of flies / flying insects; • cockroaches; • as they spread disease / bacteria; <p>Accept points in diagrams or in text</p>	(8)

Question Number	Answer	Mark
9(b)(i)	<p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • liquid drains; • no accumulation; • otherwise overflow; • shorten life of latrine / A/W; • less risk of disease spreading; • allows bacterial decomposition; 	(3)

Question Number	Answer	Mark
9(b)(ii)	<p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • downhill from wells; • otherwise seepage into / contamination of drinking water; • effluent contains bacteria; • pathogenic; • drinking water will cause disease / sickness; • e.g. cholera / typhoid; 	(3)

Question Number	Answer	Mark
9(c)	<p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • microorganisms / bacteria; • act as decomposers; • break down solid material in latrine; • disinfectant kills all bacteria; • so solid material would accumulate; • would not be recycled / A/W; 	(3)

Question Number	Answer	Mark
9(d)	<p>1 mark for each correct answer from any of the following - maximum 3 marks</p> <ul style="list-style-type: none"> • can only accommodate a small amount of material; • more people in larger towns; • more sewage produced; • too much for pit latrines / not enough latrines; • (possibly) little space available; • higher risk of seepage into water supplies; • specialised sewage plant required; • to deal with large volumes; 	(3)

(Total 20 marks)