

Mark Scheme (Results)

Summer 2010

GCE O

GCE O Human Biology (7042) Paper 02

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7042/02 O-LEVEL HUMAN BIOLOGY MARK SCHEME - SUMMER 2010

SECTION A

Question number	Answer	Marks
1 (a) (i)	nucleus becomes granular - chromatin seen; chromosomes contract / thicken / become visible; chromosomes seen to be made of two threads / chromatids, nuclear membrane disappears; nuclear spindle forms; chromosomes arranged around equator of spindle / A/W; threads of chromosomes / chromatids pulled apart; one goes to each pole of cell; collect at poles of cell/AW; nuclear membranes reformed; Any eight - 1 mark each (order is important)	8
(b) (i)	in ovary; in testis;	2
(ii)	mitosis produces diploid nuclei / cells/ A/W; meiosis produces haploid nuclei / cells / A/W; mitosis - offspring identical (genetically); R - similar to meiosis - daughter cells not identical (genetically); mitosis - 2 cells / nuclei formed; meiosis - 4 cells / nuclei formed; Any two pairs - 2 marks each	4
(c) (i)	exposure to radioactive substances / alpha, beta, gamma rays; exposure to X rays; exposure to certain <u>named</u> chemicals / carcinogens / cigarette tar; R - smoke exposure to UV light; Any two - 1 mark each	2
(ii)	change in gene / DNA / chromosome / chromosome number; proteins / enzymes produced may be changed / A/W; may result in change in structure of cell; may result in change in reactions in cell / A/W; most cells ideal for their purpose; changes could lead to less efficient cell; may cause uncontrolled cell division / cancers; Any four - 1 mark each	4

Total 20 Marks

Question number	Answer	Marks
2 (a) (i)	<p>response to a stimulus; which is rapid; automatic / involuntary; conscious part of brain not involved; R - brain not involved often protective (against further damage);</p> <p>Any four - 1 mark each</p>	4
(ii)	<p>diagram size at least 10 lines depth; synapses in grey matter; dorsal and ventral roots shown;</p> <p>labels - structures must be correctly drawn grey matter; white matter; receptor organ; sensory neurone; relay neurone; motor neurone; effector organ; synapse;</p> <p>Any five - 1 mark each</p>	3 5
(b) (i)	<p>damage to bones may damage nerves / A/W; may sever / damage spinal cord; leg muscles controlled by nerves that run via spinal cord / A/W; could result in connection to brain being lost; impulse / information does not reach brain / A/W; leads to loss of feeling; feeling and movement controlled from brain; no way to send impulses to muscles / A/W; leads to paralysis / A/W;</p> <p>Any 6 - 1 mark each</p>	6
(ii)	<p>broken nerve cells almost impossible to reunite; do not regenerate either / repair themselves; cannot grow new nerve cells / spinal cord cannot repair itself;</p> <p>Any two - 1 mark each</p>	2

Total 20 Marks

Question number	Answer	Marks
3 (a) (i)	<p>diagram large enough to fill most of space; humerus; ulna and radius; biceps muscle contracts; *attached to scapula / top of humerus; and to radius; triceps muscle relaxes; *attached to humerus; *and to back of ulna hinge joint; biceps pulls on radius to raise radius / ulna / lower arm;</p> <p>Accept any point on annotated diagram Any eight - 1 mark each</p>	8
(ii)	<p>shoulder joint - ball and socket joint; almost universal / all round movement;</p> <p>elbow - hinge joint; presence of olecranon process / structure at end of ulna; prevents movement through more than 180° / in one plane only; R one direction</p> <p>Any four - 1 mark each</p>	4
(b) (i)	<p>energy from glucose; (release of energy) in mitochondria; involving enzymes (in mitochondria); oxygen and glucose react / aerobic respiration; a lot of energy released; suitable ref. to ATP;</p> <p>Any four - 1 mark each</p>	4
(ii)	<p>anaerobic respiration; reference to oxygen debt; glucose only partially broken down; <u>end product</u> lactic acid; reconverted into glycogen; broken down into water and carbon dioxide in presence of oxygen; little/small amount of energy released;</p> <p>Any four - 1 mark each</p>	4

Total 20 Marks

Question number	Answer	Marks
4 (a) (i)	<p>blood plasma is liquid part of blood; forced out of capillaries; becomes tissue fluid; bathes / surrounds cells; some tissue fluid drains back into capillaries; rest drains into lymphatics / becomes lymph; eventually returns to blood plasma;</p> <p>Any four - 1 mark each</p>	4
(ii)	<p>plasma transports materials to tissues; e.g. glucose / oxygen / digested foods; (plasma) carries waste materials / urea / carbon dioxide; to e.g. lungs / kidneys / excretory surfaces; tissue fluid transfers materials in to / out of cells; by diffusion; lymph returns surplus fluid to blood system / A/W; transports fatty acids; major role in defence of body; produces lymphocytes;</p> <p>Any six - 1 mark each</p>	6
(b) (i)	<p>(vigorous) exercise requires (more) energy; cells need more oxygen / glucose; pulse helps to force blood along; higher pressure - blood circulates more rapidly; delivery more rapid; removal of waste more rapid;</p> <p>Any four - 1 mark each</p>	4
(ii)	<p>can damage capillaries; leads to bleeding; strokes (if this occurs in brain) / coma; can damage retina of eye; causes headaches;</p> <p>Any three - 1 mark each</p>	3
(iii)	<p>reducing salt in diet; avoiding stress; take gentle exercise; stop smoking; reduce alcohol intake; reduce / lose weight; reduce fat intake / cholesterol;</p> <p>Any three - 1 mark each</p>	3

Total 20 Marks

Question number	Answer	Marks
5 (a) (i)	<p>two kidneys; each consists of many kidney tubules / nephrons; ureters carry urine from kidneys; to bladder; stores urine; sphincter muscle at exit of bladder; urethra carries urine from bladder to exterior;</p> <p>Accept points on annotated diagram Any five - 1 mark each</p>	5
(ii)	<p>remove harmful / toxic / unwanted materials from the blood; regulate water content of blood / osmoregulation; blood filtered / high pressure filtration; in Bowman's capsule; selective reabsorption; most of salts; <u>all</u> glucose; water reabsorption adjusted; by secretion of ADH; by the pituitary;</p> <p>Any six - 1 mark each</p>	6
(b) (i)	<p>hot day body temperature rises; body sweats; water lost by evaporation; cools body/ref latent heat; blood water content falls; more ADH secreted; more water reabsorbed; urine more concentrated;</p> <p>Any five - 1 mark each</p>	5
(ii)	<p>proteins absorbed as amino acids; excess amino acids broken down / deamination; releases ammonia / ammonium; which is toxic; changed to urea; transported in blood / plasma; concentration in urine increases;</p> <p>Any four - 1 mark each</p>	4

Total 20 Marks

SECTION A TOTAL: 60 MARKS

SECTION B

Question number	Answer	Marks
6 (a) (i)	sewage contains human excreta / faeces; with large quantities of bacteria / pathogens; e.g. cholera / typhoid bacilli / A/W; easily transferred through water supply; consumed or drunk; may also contain toxic material; Any three - 1 mark each	3
(b)	eutrophication; excess nitrates ; cause algal bloom / algae reproduce rapidly; algae block light from deeper plants; algae / plants die; bacteria feed on dead organisms; reproduce rapidly; (bacteria) use up oxygen; conditions become anaerobic; fish and other animals die; because of lack of oxygen; Any seven - 1 mark each	7
(c)	grids to remove large objects; grit removal; flow slows so that grit particles settle out; settlement tanks; sludge settles at bottom; liquid / effluent flows over top; sludge drawn off to fermenter; broken down by anaerobic bacteria; methane formed; <u>digested</u> sludge used as fertiliser; effluent taken to filter beds / aerobic tank; microorganisms digest particles; food chain described; clear water passed to river; Accept any points on annotated diagram Any ten - 1 mark each	10

Total 20 Marks

Question number	Answer	Marks
7 (a)	<p>fungi have nuclei and bacteria do not; fungi multicellular / coenocytic and bacteria are single celled; fungi have mitochondria / etc but bacteria have no double membrane structures / mitochondria; fungi no plasmids but bacteria have plasmids;</p> <p>Must give both parts for award of mark Any two - 1 mark each</p>	2
(b)	<p>heterotrophic; some are parasitic; obtain food from other living animals / plants; absorb ready digested food materials; cause damage / disease to host; some are saprophytes; feed on dead organisms; secrete enzymes; external digestion;</p> <p>Any six - 1 mark each</p>	6
(c)	<p>transmission skin to skin/direct contact; use well ventilated footwear / sandals; via damp / wet floors; sharing socks / towels; wash feet thoroughly (to remove sweat); use footbath at swimming pools; dry thoroughly / use a powder; change socks etc regularly; use of fungicidal creams / named cream; R ref to antibiotics</p> <p>Any five - 1 mark each</p>	5
(d)	<p>some are edible / for food; e.g. mushrooms; yeasts; some used in bread making; some used to produce alcohol / for fermentation; used to manufacture antibiotics; bring about decay; recycling / release salts etc from dead organisms; ref to carbon / nitrogen cycles any other valid points;</p> <p>Any seven - 1 mark each</p>	7

Total 20 Marks

Question number	Answer	Marks
8 (a) (i)	<p>diagram of reasonable size; only the structures noted below shown; protein coat / capsids / capsomeres labelled; loop / thread of DNA / RNA;</p> <p>Any three - 1 mark each</p>	3
	(ii)	6
	<p>can only reproduce inside a living cell; attaches to host cell; secretes <u>enzymes</u> to enter cell; viral DNA / RNA enters host cell; enters host nucleus; "re-programmes" host DNA; produce more viral DNA / RNA; uses host cell to form capsids / protein coats; virions burst out of host cell;</p> <p>Any six - 1 mark each</p>	
	(iii)	3
	<p>much smaller than bacterium; cannot be active outside of host cell/ can only reproduce in living cell; lacks cytoplasm; has a protein coat/no cell wall or membrane; not destroyed by antibiotics; Any three - 1 mark each</p>	
(b) (i)	<p>vaccine is weakened / dead pathogen; injected; antigens on surface of virus; stimulates white blood cells; to produce antibodies; these remain in blood for some time; memory cells are formed; next infection pathogen destroyed before it causes symptoms;</p> <p>Any five - 1 mark each</p>	5
	(ii)	3
	<p>rest; good nursing; help with breathing / iron lung; physiotherapy; walking aids</p> <p>Any three - 1 mark each</p>	

Total 20 Marks

Question number	Answer	Marks
9 (a) (i)	<p>green plants photosynthesise / are producers/autotrophs; absorb light (energy); convert this to chemical energy; produces / manufactures carbohydrates / glucose / starch; containing chemical energy; in chloroplast; from carbon dioxide and water; which form basis of other molecules / fats / amino acids; oxygen formed as by-product; released to atmosphere;</p> <p>Any six - 1 mark each</p>	6
(ii)	<p>herbicide incorporated into plant; plant eaten directly by humans; plant eaten by animal / herbivore; not excreted / broken down; passed along food chain; eventually collects in top carnivore (human);</p> <p>Any four - 1 mark each</p>	4
(b) (i)	<p>sulphur present in many fossil fuels; sulphur dioxide released (by combustion); by power stations / vehicles / etc; irritates lining of lungs / A/W; ref to asthma/bronchitis; dissolves in rain water; forms acid rain; acidifies lakes / etc; kills fish / aquatic invertebrates; damages forests / etc; dissolves limestone buildings / building stone;</p> <p>Any five - 1 mark each</p>	5
(ii)	<p>Look for at least 1 reason and one method of reduction reasons</p> <p>more humans breathing carbon dioxide out; greater energy demands; more fossil fuels burnt; releasing carbon dioxide / sulphur dioxide; more vehicles used; more factories; deforestation;</p>	5

<p>reduced by</p> <p>increased use of alternative energy sources; named example; measures to reduce energy demand; named example; plant more trees / sustainable forestry; any other valid measure;</p>	<p>look for positive actions</p>
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Any five - 1 mark each

Total 20 Marks

SECTION B TOTAL: 40 MARKS

PAPER TOTAL: 100 MARKS

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