

# Mark Scheme (Results) January 2010

GCE O

GCE O Human Biology (7042) Paper 02

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Question Number	Answer	Mark
1 (a)	maintenance of a constant / within narrow limits; of internal environment; despite external changes; allows humans to survive in range of environments; (optimum conditions) for enzyme activity; constant metabolic rate; ref. to negative feedback;	Max (5)
(b) (i)	rise in water content in blood detected; (information to) hypothalamus; thirst centre in brain; pituitary; reduce / less ADH secreted / produced; reduced permeability of collecting duct / tubule; less water reabsorbed; more removed in urine / urine less concentrated;	Max (5)
(ii)	carbon dioxide is acidic; causes pH of blood to fall; detected by hypothalamus; impulses to medulla; impulses to diaphragm; and intercostal muscles; increase rate of breathing; increase depth of breathing; (excess) carbon dioxide passes out;	Max (5)
(iii)	detection by beta cells / islet cell; of pancreas; insulin secreted; travels via blood / plasma; causes liver; to convert glucose to glycogen; for storage in liver / muscle; increases rate of respiration; causes fall in blood glucose level;	Max (5)

(Total 20 marks)

Question Number	Answer	Mark															
2 (a)	produces haploid gametes; whereas mitosis would produce diploid; diploid number restored; at fertilisation; otherwise doubling of chromosomes; could lead to genetic abnormalities / diseases;	Max (5)															
(b)	<table style="border: none; margin-left: 20px;"> <tr> <td>parents</td> <td>XX</td> <td>XY;</td> </tr> <tr> <td>gametes</td> <td>X</td> <td>X or Y;</td> </tr> <tr> <td>fertilisation</td> <td>XX</td> <td>XY;</td> </tr> <tr> <td></td> <td>female</td> <td>male;</td> </tr> <tr> <td></td> <td>1</td> <td>: 1;</td> </tr> </table>	parents	XX	XY;	gametes	X	X or Y;	fertilisation	XX	XY;		female	male;		1	: 1;	(4)
parents	XX	XY;															
gametes	X	X or Y;															
fertilisation	XX	XY;															
	female	male;															
	1	: 1;															
(c) (i)	<ol style="list-style-type: none"> <li>1. site of exchange of materials / substances;</li> <li>2. between mother's blood and fetal circulation;</li> <li>3. diffusion;</li> <li>4. oxygen to fetus;</li> <li>5. nutrients / glucose / amino acids;</li> <li>6. carbon dioxide / urea;</li> <li>7. from fetus to mother;</li> <li>8. ref. to antibodies;</li> <li>9. production of progesterone during pregnancy;</li> </ol>	Max (5)															
(ii)	<p>head lies downwards / above cervix; ref. to oxytocin; * rupture of amnion / waters break; rhythmic contractions of uterine wall / A/W; cervix dilates; more powerful uterine contraction; fetus expelled; umbilical cord cut; expels placenta / afterbirth;</p> <p>*May occur at any time during the process</p>	Max (6)															

(Total 20 marks)

Question Number	Answer	Mark
3 (a)	reduced sweating; less evaporation; ref latent heat; *less heat lost from body; vasoconstriction; less blood through skin capillaries; more through shunt vessels; less heat brought to over layers of skin; *less heat lost from body; by radiation / convection; goose pimples/contraction of hair erector muscles; hair erection / pulled upright; traps more air; air good insulator; ref. shivering; *award once only	(8) max
(b)	each layer traps air; air is a good insulator; more layers result in more air trapped; therefore greater insulation; less heat lost; body temperature maintained;	(4) max
(c)	outer layer keratinized; waterproof / impermeable; prevents loss of water from body / dehydration; protects organs from mechanical damage / A/W; such as knock and bangs; prevents entry of pathogens; R - germs so less risk of infection; contains melanin / pigment; absorbs / protects against uv light; reduces / prevents skin cancer; contains sense organs / receptors; touch / temperature / pressure; fat layer -energy store;	(8) max

(Total 20 marks)

Question Number	Answer	Mark
4 (a)	(external) intercostals muscles contract; ribs move up / out; R - pushed diaphragm (muscles) contract; flattens diaphragm; increase volume of thorax; decreases pressure in lungs; air pressure greater outside / A/W; air forced into lungs;	(6) max
(b)	protection; skull, brain / eyes / ears; ribs, heart and lungs; vertebral column, spinal cord; (max two examples) movement; joints; bones act as levers; muscle attachment; holds body upright / support; red /white blood cell formation; girdles; for limb attachment;	(8) max
(c)	(balanced) diet needs to contain all required nutrients (listed below); in right amounts; bone formation requires calcium (salts); and phosphate; (minerals) needed for bone hardness; vitamin D; for absorption of calcium; protein; to form cellular structures;	(6) max

(Total 20 marks)

Question Number	Answer	Mark
5 (a)	(i) controls activities of cell; contains genetic material; ref chromosomes / genes; ref DNA; role in producing RNA; to produce proteins; enzymes; triggers / initiates cell division;	(4) max
	(ii) surrounds cell; is partially permeable / A/W; controls movement in / out of cell; forms vesicles; during phagocytosis;	(3) max
	(iii) contains cell organelles / named example; site of chemical reactions / named example; store of substances; supports cell / skeletal role; largely made of water;	(3) max
	(b) group / many similar cells; working together; to carry out a function; muscle consists of many fibres; (all can) contract; to cause movement / named example;	(4) max
	(c) DNA replicates; chromosomes as chromatids; joined at centromere; nuclear membrane breaks down; chromatids align at equator; held in place by spindle fibres; fibres shorten; centromeres split; chromatids to opposite poles; nuclear membrane reforms; cell divides into two;	(6) max

(Total 20 marks)

Question Number	Answer	Mark
6 (a)	plants absorb / use carbon dioxide; for photosynthesis; lowers concentration in atmosphere; oxygen released (during photosynthesis); increases oxygen concentration in the atmosphere; used for respiration by plants and animals / all living things; releases carbon dioxide; increases concentration in the atmosphere;	(5) max
(b)	ozone absorbs uv light; CFCs thin ozone layer / create holes in ozone; so more uv light reaches humans / A/W; affects / damages skin; burning / tanning; cell / DNA mutates; results in skin cancer; damage to eye / retina;	(4) max
(c) (i)	photosynthesis; chlorophyll absorbs/traps sunlight; * combines carbon dioxide and water; * to form glucose and oxygen; glucose converted to starch (for storage); combined with nitrates; absorbed by roots; to form protein/amino acids; for growth; glucose used to make cellulose; used as energy source; * accept in a relevant equation	(6) max
(ii)	cell walls made of cellulose / fibre; indigestible; gives bulk to food; gut muscles can grip; during contraction/peristalsis; prevents constipation; absorbs / retains water for soft faeces;	(5) max

(Total 20 marks)



Question Number	Answer	Mark
7 (a)	platelets trigger clotting; by disintegration; release enzyme / thrombokinas; in presence of calcium ions; prothrombin converted to thrombin; causes conversion of fibrinogen into fibrin; fibrin insoluble / forms fibres/mesh; traps red blood cells / prevents excessive bleeding; forms a scab; acts as a barrier; prevents entry of pathogens;	(7) max
(b)	produced by fungi; penicillin / correct named example; destroy / kill <u>bacteria</u> ; prevents reproduction of <u>bacteria</u> ; no harm to human cells;	(3) max
(c)	vaccination (programmes) / BCG vaccine; use of antibiotics / streptomycin; TT cattle; pasteurisation of milk; improved living conditions / reduce overcrowding; better education about how the disease spreads; better treatment / improved diet; isolation of sufferers; spread of bacteria reduced; early detection methods / mass X-rays / skin tests; prevents spread of disease;	(6) max
(d)	(severe) vomiting; (severe) diarrhoea; loss of salts / electrolytes from body; dehydration of body (cells); body fluids more concentrated; (ORT is a drink which) contains water and salts / electrolytes; sugar for energy / respiration; allows body fluids to regain normal concentration;	(4) max

(Total 20 marks)

Question Number	Answer	Mark
8 (a)	from sewage / farm waste / eq; (run off) from fertiliser on fields; eutrophication; rapid growth of algae; low light to bottom rooted plants; plants / algae die; (aerobic) bacteria; grow rapidly; decomposers; use up all of oxygen in water; becomes anaerobic; kills fish; blue baby syndrome;	(7) max
(b)	burning of fossil fuels / named example; power stations/car exhausts; soluble gas/dissolves in water; forms acid rain; causes die-back of plants; rivers/lakes become acidic/lowers pH; destroys fish; erodes buildings; irritates lungs; ref bronchitis/asthma; ref smog; damages structure / demineralisation of clay soils;	(7) max
(c)	vehicle exhausts; cigarettes; toxic (in low concentrations) / causes death; passes into red blood cells; high affinity for / combines with haemoglobin; forms carboxyhaemoglobin; stable compound; reduced oxygen carriage; low birth weight;	(6) max

(Total 20 marks)

Question Number	Answer	Mark
9 (a) (i)	disease always present; at low level;	(2)
(ii)	contains/carries disease organism; not affected by organism; transmits it to human; who suffers from disease;	(3) max
(b)	diagrams with four stages; adult; flying; female sucks blood; adults mate; eggs laid on water; larvae and pupae hang from water surface; to obtain oxygen; via air trumpets / breathing tubes; larvae feed in water; ref complete metamorphosis;	(8) max
(c) (i)	sudden outbreak of disease; large numbers; spreads rapidly;	(2) max
(ii)	vaccination; contains weakened / dead organisms; antibodies formed; rapid response on infection; wash hands; to remove bacteria; boil / chlorinate water before use; to kill bacteria; hygienic disposal of faeces; prevent flies settling on food; isolation of patients; treatment of infected people with antibiotics; named example / chloromycetin / tetracycline;	(5) max

(Total 20 marks)

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