ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCE

Biology / Human Biology A

Unit BYA7

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Question 1

(a)	(i)	X;		1
	(ii)	W S X V T ;		1
(b)	(i)	Contains <u>enzymes</u>;		1
	(ii)	250;; [*Note: if incorrect or no final answer look for,* concept of image size divided by 24 = 1 mark] [*Ignore: units & value*]		2

Total 5 marks

Question 2

(a)		Correct reference to <u>refraction</u>; <u>By</u> cornea and/or lens; Shape of lens changes;	max	2
(b)	(i)	<u>Any **two** from</u>: Rods; [*Ignore all referenses to cones in this answer*] Have poor <u>acuity</u>; As several connected to one (bipolar/ganglion cell/neurone)/synaptic/ retinal convergence; [*Ignore: references to summation*]	max	2
	(ii) OR	Rods activated, do not detect colour; Cones not activated, do detect colour;		1

Total 5 marks

Question 3

(a)	(i)	8412 - 8413 (kJ);; [Note: if incorrect or no final answer look for, 500 - 501 (g of glycogen) = 1 mark]		2
	(ii)	Lower; Because no/little insulin / insulin receptors no longer "functional" / no <u>glucose</u> to glycogen / less <u>glucose</u> taken up by cells;		2
(b)		(Insoluble), no osmotic effect / (large), cannot diffuse out of cell / (branched), easy to breakdown / easy to hydrolyse, to <u>glucose</u> / (compact), large amount of <u>glucose</u> stored in small space; [*Ignore: references to energy release*]		1

Total 5 marks

Question 4

(a) Pituitary; 1
[*Ignore: references to lobes*]

(b) Increased ribosomes/more (rough) ER; [*Reject: SER*]
Protein synthesis/transport;

Increased number/size of vesicles; [*Reject: lysosomes*]
Secretion / production / transport / exocytosis (of milk);

Increased microvilli; [*Reject: villi*]
Increased surface area for secretion / exocytosis; [*Reject: diffusion*] 4

[*Note:Mark a maximum of two features / changes and a maximum of two <u>associated</u> explanations*]

Total 5 marks

Question 5

(a) High affinity for oxygen / saturated at low pO_2;
[*Ignore: reference to " associates at low pO_2"*]
Adult/mother gives up O_2 <u>and</u> fetus picks it up; 2

(b) Oxygen remains bound to / not released from, (fetal) haemoglobin;
In low oxygen partial pressures / body tissues / muscles;
<u>Aerobic</u> respiration / more <u>anaerobic</u> respiration;
Less ATP / less energy available / ref. to lactate;
Muscle fatigue / inefficient muscle contraction; max 3

Total 5 marks

Question 6

(a) <u>Nor</u>adrenaline / <u>nor</u>epinephrine; 1

(b) (i) 1 (Resting heart rate) controlled by both (divisions);
2 Heart rate changes when parasympathetic/sympathetic (nerve) cut;
3 Parasympathetic nerve is <u>most</u> active / larger change in heart rate when parasympathetic nerve is cut;
4 Parasympathetic reduces heart rate / sympathetic increases heart rate; max 3

(ii) Rate <u>increased</u> by, activity of sympathetic / decreased activity of parasympathetic / change in activity of both; 1

Total 4 marks

Question 7

(a) Essential / all nutrients / **two** named components;
[*Accept: calcium or iron as one named component*]
Correct amounts;
Correct proportions; max 2

(b) Copper coil;
Transfers more heat to water;

Stirrer;
Distributes heat evenly / to area of the thermometer;

(Biscuit burnt in) oxygen / not in air;
Allows more combustion/burning;

(Biscuit burnt inside) sealed container/water jacket;
Less/little loss of heat (to atmosphere);

Position of thermometer;
More accurate measurement of temperature; max 4

[*Note: Mark a maximum of two features/changes and a maximum of two associated explanations*].

(c) (i) Males require more between 11 and 18 years;
(Calcium) needed for bones/skeleton;
Greater increase in (bone) length/mass/growth; 3
[*Ignore: references to teeth*]

(ii) Females require more between 11 and 50 years;
(Iron) needed for red blood cells/haemoglobin;
IUD / menstrual loss / fetal requirements / pregnancy; 3

(d) (i) Fewer proteins, therefore water potential of blood/plasma/lymph is high/is not as low; [*Ignore references to osmotic pressure*]
Tissue fluid cannot be reabsorbed into capillaries/lymph vessels/lymphatics; [*Ignore: lymph*]
Osmosis; max 2

(ii) less fibrinogen/fibrin/thromboplastin/named protein involved in clotting; 1

Total 15 marks

Question 8

(a) [*Ignore: references to digestion in mouth*]
Amylase (digests) starch/amylose/amylopectin to maltose;
Secreted from pancreas/pancreatic amylase;
Maltase (digests) maltose to glucose;
In membranes / cytoplasm of epithelial cells of duodenum / small intestine; [*Reject: secretion*]
Reference to hydrolysis/breaking of glycosidic bond; max 3
[*Allow: in any context*]

(b) Less surface area/fewer microvilli;
Less absorption of (named) monosaccharide/amino acids/fatty acids/ lipids; [*Ignore: energy*]
Refences to breakdown of (named) energy stores;
To supply energy/molecules, for essential processes/maintenance/repair;
[*Ignore: references to loss of villi in faeces*]
Fewer protein carriers / less active uptake / less diffusion; max 3

(c) Bacteria;
Breakdown/respire lactose to produce gas / stimulate inflammation / stimulate immune system;
(Lactose)/lowers water potential (of gut);
Water enters gut /less water absorbed/causes diarrhoea; max 2

(d) (i) As a control;
To observe the effect of lactase; 2

(ii) Idea of probability/use of 'p';
Differences could be due to chance; 2

(e) 1 Lactase needed for lactose digestion;
2 Lactase decreases colic;
3 In previously untreated babies/compared to control group/babies given distilled water/group B;
4 Distilled water has no effect on colic;
5 Reference to statistical significance; max 3

Total 15 marks

Question 9

(a)
1 Stimulus to threshold / critical firing level;
2 Sodium channels/gates open;
3 Sodium ions enter;
4 Down electrical/chemical gradient;
5 Positive feedback;
6 Depolarisation;
7 Inside becomes positive / membrane potential reverses;
8 Potassium channels/gates open;
9 Potassium ions leave;
10 Down electrical/chemical gradient
[*Note: only credit if not awarded earlier in point 4*]
11 Repolarisation;
12 Sodium channels/gates close;
13 Undershoot / hyperpolarisation;
14 Sodium-potassium pump restores resting potential; max 6

(b)
1 Presynaptic membrane depolarises;
2 Calcium channels/gates open;
3 Calcium ions enter;
4 Vesicles move to/fuse with presynaptic membrane;
5 Release of transmitter / exocytosis;
6 Diffusion across gap/cleft;
7 Binds to receptors in postsynaptic membrane;
[*Reject: references to active site*]
8 Sodium channels open / sodium ions enter; max 4

(c)
1 Polypeptide (chain) folds;
2 Named bond; [*Reject: peptide bond*]
3 Between R groups;
4 Receptors/binding sites are proteins;
5 Reference to neurotransmitter shape;
6 Acetylcholinesterase/breakdown enzyme, is protein;
7 Carrier/channel protein;
8 Protein has a shape;
9 Idea of complementary/fit/bind/attach to; [*Note: in correct context*] max 5
[*Ignore: 'lock and key'*]

Total 15 marks