



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 references 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) Rods activated, do not detect colour;
OR 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 associated 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 and fetus picks it up; 2

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

Total 5 marks

Question 6

(a) Noradrenaline / norepinephrine; 1

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

(ii) Rate increased 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]
 References 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