



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

# June 2003

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## GCE

## Biology B

### Unit BYB8/A

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## Section A

### Question 1

- (a) larger/greater body mass;  
 requiring more energy for movement / more cells therefore increased metabolic  
 rate/respiration; 2  
*(reject more active, growth rate)*  
*(no mark for higher metabolic rate without qualification)*
- (b) (i) at 17 still growing/at 25 growth complete 1
- (ii) (age 25 –70) protein still required for tissue replacement / named example;  
*(accept enzymes / hormones)* 1
- Total 4
- 

### Question 2

- (a) (i) better nutrition / better knowledge of spread of disease /  
 reduction in infectious diseases / application of medical advances /  
 clean water / improved living conditions (specific e.g. sanitation) /  
 use of smallpox vaccine;  
*(ignore general reference to vaccines/antibiotics)*  
*(reject health care) (allow specific reference to smallpox)* 1
- (ii) lack of contraception / large families needed to help family provide  
 sufficient food/earn income / pressure to have many children due to  
 high infant mortality rate / cultural/religious idea of extended family; 1
- (b) link between changes in birth and death rates and population change;  
 decrease in both birth and death rates leading to rise in population description  
 of population rising then levelling off; 2
- Total 4
-

**Question 3**

- (a) tumour cells carried in bloodstream/lymphatic system / by growth into other organs; 1
- (b) (i)  $\frac{4013 + 2157}{30775} \times 100 = 20\%$
- principle of correct calculation/correct equation but incorrect calculation = 1 mark*  
*correct answer = 2 marks*
- (ii) men smoke(d) more/ explained/example of work-related reason; 1
- (c) mutation in DNA/ of skin cells/ specific example; (*allow damage to DNA*)  
 caused by UV light/ UV light is mutagenic/carcinogenic;  
 uncontrolled cell division; (*reject faster*)  
 switches on/makes cancer-causing gene/oncogenes/ switches off cell division  
 suppressor genes; 3 max
- Total 7
- 

**Question 4**

- (a) (i) operant (conditioning); 1
- (ii) (gradual) decrease in time to escape;  
 not a reasoned response / idea of trial and error/ chance/ accidental/  
 natural action; 2
- (b) the reward of (the food);  
 makes a particular action/behaviour occur more rapidly/likely.  
 (*reject often/frequently*) 2
- Total 5
-

**Question 5**

- (a) signal/shape/colour/action that leads to a specific response/behaviour/action;  
plus appropriate example e.g.  
swollen belly (female) leading to zig-zag dance (male)/  
pointing of male/ nest causes female to follow/enter nest/  
female in nest causes male to tremble/  
eggs in nest causes male to enter/fertilise eggs; 2
- (b) male more likely to mate/attract mate/ drive away males;  
produce more offspring;  
greater chance of offspring surviving; 2 max
- (c) reduces competition for mates /increases chance of mating;

OR

- behaviour is an innate /reflex action; 1
- (d) supply of oxygen;  
increased respiration (so faster growth); 2
- (c) (ii) variation/some male sticklebacks fanned eggs others did not;  
as a result of mutation;  
eggs which are fanned more likely to survive to reproduce/  
develop quicker/at an advantage;  
more likely to pass on genes/alleles;  
increase in number of relevant genes/gene frequency; 3 max

Total 10

**Question 6**

- (a) large number of blood vessels/villi which increases surface area for exchange;  
large maternal blood supply / regular flow of blood (*allow countercurrent idea*)  
maintains diffusion gradient;  
closeness of / short distance between maternal and fetal blood gives shorter  
diffusion pathway; 2 max
- (b) (i) mother removes phenylalanine;  
so it does not accumulate (to a harmful level);  
OR  
mother provides tyrosine;  
so no shortage; 2
- (ii) recessive (*no mark*)  
both parents heterozygous/carriers;  
baby has condition but parents do not;  
baby receives recessive allele from each parent/ is homozygous recessive.  
  
(*allow annotated genetic diagram*) 3
- (iii) changes tertiary structure / 3D shape of enzyme;  
alters active site;  
enzyme unable to bind with substrate/phenylalanine/ form enzyme-  
substrate complex; 3
- Total 10
- 

**Question 7**

- (a) (i) C 1
- (ii) FSH stimulates development of follicles / ovaries which release oestrogen;  
(build up of) oestrogen inhibits FSH; 2
- (b) antibodies are specific to antigens;  
shape of antibody complementary to/fits with shape of hCG;  
clumping a result of this complex / combination/fitting of hCG and antibody;  
antibody combines with two hCG molecules/has two binding sites. 3 max
- (c) (i) small molecule;  
blood pressure/ultrafiltration forces hCG from blood capillaries; 2
- (ii) suitable suggestion with explanation e.g.  
reabsorption requires carriers/proteins/is selective;  
no carriers for hCG;  
OR  
hCG small enough to pass out of glomerulus;  
but too large to be reabsorbed; 2
- Total 10
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