



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

# January 2003

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## GCE

## Biology B

## Unit BYB8

## Section A

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Kathleen Tattersall: *Director General*

## Unit 8: Behaviour and Population

### Question 1

- |   |   |
|---|---|
| (a) (i) (Smell/sight of) food;  | 1 |
| (ii) Bell / flashing light / sound of footsteps;  | 1 |
| (iii) Salivation;   | 1 |
| (b) Meat is (mainly) protein / fat / has no starch;<br>saliva has no protease or lipase /only amylase;  | 2 |
| (c) Operant based on trial & error or random behaviour (whereas<br>classical is association between natural and non-natural stimulus);<br>Operant based on reinforcement of behaviour by reward (whereas<br>in classical non-natural stimulus replaces natural stimulus); | 2 |
| Total   | 7 |
- 

### Question 2

- |   |       |
|---|-------|
| (a) (high concentration of) oestrogen inhibits FSH production;<br>follicles / oocytes do not develop (in ovary);<br>no ovulation / no egg to fertilise;   | 3     |
| (b) Pheromone(s) (in sweat);<br>hormone from hypothalamus stimulates/passes to <u>pituitary</u> ;<br><u>increased</u> FSH production by pituitary;<br>(FSH) stimulates oestrogen production by ovary; | 3 max |
| Total   | 6     |
- 

### Question 3

- |  |       |
|--|-------|
| (a) Diagram shows:<br>narrower base;<br>increase in numbers of older age groups/ straighter sides;   | 2     |
| (b) (i) High fertility rate;<br>higher than replacement rate of 2.0;<br>not balanced by under-5 mortality;<br>ref. to life expectancy greater than reproductive life;  | 2 max |
| (ii) Disease/AIDS - affecting people of reproductive age /<br>increasing child mortality;<br>shortage of resources/starvation - increasing as population rises;<br>improved standard of living / contraception, so fewer children born;<br>effects of war, reducing number of parents, or causing<br>starvation/shortage of resources;<br>(Allow 1 mark for 2 factors, without explanations) | 2 max |
| Total  | 6     |
-

**Question 4**

- |        |  |       |
|--------|--|-------|
| (a)(i) | Lungs less elastic / less able to expand;<br>more connective tissue / thickening of alveolar walls;<br>reduced ability of diaphragm/intercostal muscles to contract;<br>inflammation caused by over-production of interleukin;<br><i>(not: loss of alveolar walls)</i> | 1 max |
| (ii)   | Reduced surface area for diffusion of oxygen/gas exchange;<br>less oxygen carried in blood;<br>less oxygen supplied to muscles / more anaerobic respiration in muscles;<br>less energy/ lower rate of respiration for muscle contraction;                              | 3 max |
| (b)    | Aorta does not expand as heart beats / walls become stiff;<br>recoil does not smooth out pressure / more fluctuation in arteries;<br>increased (systolic) pressure due to vessels staying narrower;  | 2 max |
|        | Total  | 6     |
- 

**Question 5**

- |     |   |       |
|-----|---|-------|
| (a) | DNA strand has complementary bases/nucleotides;<br>joining of matching pairs, i.e. C to G / A to T;<br>hydrogen bonding;  | 3     |
| (b) | Availability of treatment/cure if cancer detected;<br>reliability of detection -e.g. number of false positive/negatives;<br>cost effectiveness - related to (e.g.) frequency of cancer <i>(not just cost)</i> ;<br>ethical issue explained, e.g screening of whole population, or by patient choice;<br><i>(not: safety, since urine is tested)</i> | max 2 |
|     | Total   | 5     |
- 

**Question 6**

- |        |   |       |
|--------|---|-------|
| (a)(i) | Acrosome;   | 1     |
| (ii)   | Digest zona pellucida / (granulosa) cells surrounding oocyte/egg;<br>break down hyaluronic acid;<br>allow sperm to penetrate oocyte membrane / fusion of sperm with oocyte;       | 2 max |
| (b)(i) | Removal of (protein) coating round sperm;<br>exposure of acrosome / change in membrane potential of sperm tip;<br>by enzymes produced by female/in uterus;                        | 2 max |
| (ii)   | $1.47 \times 10^8$ , or equivalent = 2 marks;<br><i>Allow 1 mark for correct working in principle (<math>70 \times 70\% \times 3</math>)</i>                                      | 2     |
| (c)    | (Fructose) used as respiratory substrate / for respiration / in glycolysis;<br>by mitochondria;<br>production of ATP;<br>ATP /energy used for contraction/movement of sperm tail; | 3 max |
|        | Total   | 10    |
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**Question 7**

- (a) Has cell wall / capsule / no glycoprotein spikes;  
Has organelles / ribosomes / plasmids;  
may have flagellum; 2 max
- (b) In droplets;  
expelled during cough / sneeze / breathing out;  
carried in aerosol by air currents / breathed in by other person; 2 max
- (c) Mutation (of genes / genetic material);  
change in nucleic acid base sequence;  
change in amino acid sequence of (glyco)protein;  
change in tertiary structure, or in shape of protein;  
existing antibodies do not match / new ones have to be produced;  
immunological memory ineffective / takes time to develop immunity;  
most people not immune, so rapid spread/epidemic;  
previous vaccines ineffective; 6 max
- Total 10
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