



## General Certificate of Education

# Biology 6416

## *Specification B*

*BYB8/A Behaviour and Population*

# Mark Scheme

*2006 examination – June series*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

## General Guidance for the Mark Scheme

The following conventions are used in the mark scheme:

- A semicolon (;) separates each mark point
- An oblique stroke (/) separates alternatives within a mark point
- Underlining of a word or phrase means that the term must be used by candidates
- Brackets are used to indicate contexts for which a mark point is valid, but which may just be implied by a candidate's answer
- 'Accept' and 'reject' show answers which should be allowed or not allowed.
- Additional instructions may be shown in *italics*

The scheme shows the minimum acceptable answer(s) for each mark point - better, more detailed, or more advanced answers are always accepted, provided that they cover the same key ideas. Occasionally, a candidate will give a biologically correct answer that has not come up at standardising. If it is equivalent in standard to the mark scheme answers, it may be credited.

In some cases a mark may be awarded for understanding of a general principle, even though the detailed mark points on the scheme have not been made. This will be indicated on the mark scheme.

All mark points are awarded independently, unless a link between points is specified in the scheme.

Converse answers are normally acceptable, unless the wording of the question rules this out.

### Disqualifiers

A correct point is disqualified when the candidate contradicts it in the same answer.

### The list rule

When a question asks for a specific number of points, and the candidate gives more, any wrong answer cancels a correct answer. For example, if a question asks for two points and three answers are given, two correct and one clearly wrong, the mark awarded is one, whatever the order of the answers.

Valid points from **diagrams** are credited, if they are not duplicated in the text.

Where a question asks for **differences** between X and Y, the mark may be awarded for a feature of X without the converse for Y, if it is absolutely clear which is being referred to.

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## BYB8/A Behaviour and Populations

### Question 1

- (a) oestrogen / progesterone;  
suppress FSH / suppress LH (P) / thicken cervical mucus / prevent egg ripening /  
prevent follicle development / sperm reaching egg; 2
- (b) *method and explanation*;;
- examples:*
- increases activity of growth / epiphyseal plates (of bones) / increased cell division;  
increasing growth/length/size/of long/limb bones;
- OR*
- increasing protein synthesis;  
so more structural proteins and enzymes;
- OR*
- increasing (rate of) respiration;  
so more energy / ATP for growth;
- OR*
- increasing metabolism;  
so more raw materials / named examples available for growth;
- OR*
- increasing IGF by liver;  
increasing glucose uptake; 2
- (c) suggestion and explanation;  
more time for parental care;  
allowing time for learning / gaining knowledge;  
allowing time development of social skills / behaviour / named example; 2 max

**Total 6**

**Question 2**

(a) *suggestion and explanation;;*

*examples:*

no capacitation (of sperm);  
so unable to bind to egg;

*OR*

tail / flagellum not working / not present;  
so unable to swim / move / travel to egg;

*OR*

acrosome not developed / does not contain enzymes;  
unable to digest path to egg / egg coating / zona pellucida;

*OR*

lack of / fewer mitochondria;  
so not enough energy / ATP for movement;

(b) cut up / homogenise (testis tissue);  
in cold / isotonic / buffer solution;  
centrifuge at different speeds / low speed;  
(remove pellet and) spin supernatant at higher speed;

3 max

**Total 5**

**Question 3**

(a) (i) *suitable reason for birth rate increase;*  
*examples,*  
more people survive to reproductive age;  
better pre-natal care / health care of mother;  
better nutrition of mother;

1 max

(ii) *suitable reason for death rate fall;*  
*examples,*  
better nutrition;  
better sanitation;  
(widespread) introduction of health care;  
better post-natal care (mother or child);  
vaccination programmes;

1 max

(b) (i) birth rate decreasing;  
as the death rate constant but births minus deaths is falling;

2

(ii) reduces population growth until 1989/90 (as more (net) emigration);  
increases population growth from 1989/90 (as more (net) immigration);

2

**Total 6**

**Question 4**

- (a) (i) increased rate of beating / heart rate;  
increased volume; 2
- (ii) taking X-rays involves (ionising) radiation / ultrasound does not;  
so mutation / cancer risk increase / damages DNA;
- OR*
- increased detail / improved visualisation of soft tissue (with ultrasound);  
allows more accurate measurement; 2
- (b) (vena cava) to right atrium;  
right ventricle to (pulmonary) artery to lungs;  
(pulmonary) vein from lungs to left atrium; 3  
(disqualify incorrect vessels)

**Total 7****Question 5**

- (a) **ONE** effect, explained;;
- rickets / softening / bending of limb bones / softening of teeth;  
reduced calcification of bone / bones less dense;
- OR*
- muscle spasms;  
calcium needed to activate contractile system;
- OR*
- effect on synapse / neuromuscular junction;  
neurotransmitter not released / vesicles do not fuse with presynaptic membrane; 2
- (b) (i) less / no calbindin protein;  
(*reject carrier protein*)  
calcium not transported / moved (across the cytoplasm);  
so diffusion gradient reduced at small intestine interface; 2
- (ii) **A** is channel / pore protein (for calcium ions);  
passage by facilitated diffusion;  
down diffusion / concentration gradient;
- B** is carrier protein (for calcium ions);  
passage by active transport;  
against concentration gradient / requires energy / ATP; 2 max

**Total 8**

**Question 6**

(a) **two** references to genetic and environmental factors:

aggression is polygenic/many genes/shows continuous variation;  
more aggressive inherit more alleles / genes for aggression;

OR

mutation;  
produces new gene / allele for aggression;

OR

independent assortment / crossing over / random fertilisation;  
so new allele / gene combinations (for increased aggression);

OR

males can learn;  
from (previous fights with) other males;

OR

seasonal / variations in light levels;  
produces hormonal changes / increased “male” hormones;

OR

increased population density of males / decreased food supply / fewer females;  
(*reject territory size*)  
causes increased aggression to secure resources;

4 max

(b) **Figure 1** - the more aggressive the male, the larger his territory;  
(*accept correct use of data from figures*)

**Figure 2** - the larger the territory, the more females mated with;  
(*accept correct use of data from figures*)  
so, greater number of offspring likely / increased or more reproductive success;  
(*principle – more aggressive males have more partners gains one mark*)

3

**Total 7**

**Question 7**

- (a) conditional stimulus / flash of light (supplied by experimenter);  
produces an unconditional response / blink; 2  
("puff of air" as stimulus negates "blinking" mark)
- (b) name and explanation;  
sensory / visual cortex (area);  
that processes impulses / information from receptors;  
  
coordination (area) / association area;  
(receives impulses from sensory area and) formulates response / sends impulses to motor area;  
  
motor area;  
sends nerve impulses to (eye-lid) muscles / effectors; 4 max
- (c) (i) at a given number of trials / all trial numbers, young adults are conditioned /  
learn more than elderly adults;  
  
*OR*  
  
as number of trials increases, young adults conditioning / learning increases  
more than the elderly adults; 1 max
- (ii) *one reason and explanation;*  
  
*example,*  
loss of neurones / fewer neuronal interactions (in elderly);  
(anywhere in nerve pathway)  
so unable to learn; 2
- (d) *suggestion and explanation;*  
  
lack of glucose results in reduced respiration;  
linked explanation of effect on nervous tissue;  
  
*examples:*  
  
reduced respiration by nervous tissue / neurones;  
so reduced impulse transmission at synapse / less impulses;  
  
*OR*  
  
less nervous tissue / neurones;  
so less (glucose needed for) respiration;  
  
*OR*  
  
reduced blood flow (so less glucose transported);  
reduced respiration of nervous tissue / neurones; 2

**Total 11****QWC 1**