

Mark Scheme (Results)

January 2007

GCE

GCE Biology (Human) (8042/9042)

General Principles

Symbols used in the mark scheme

Symbol	Meaning of symbol
; semi colon	Indicates the end of a marking point.
eq	Indicates that credit should be given for other correct alternatives to a word or statement, as discussed in the Standardisation meeting. It is used because it is not always possible to list every alternative answer that a candidate may write that is worthy of credit.
/ oblique	Words or phrases separated by an oblique are alternatives to each other.
{ } curly brackets	Indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion.
() round brackets	Words inside round brackets are to aid understanding of the marking point but are not required to award the point.
[] square brackets	Words inside square brackets are instructions or guidance for examiners.

Crossed out work

If a candidate has crossed out an answer and written new text, the crossed out work can be ignored. If the candidate has crossed out work but written no new text, the crossed out work for that question or part question should be marked, as far as it is possible to do so.

Spelling and clarity

In general, an error made in an early part of a question is penalised when it occurs but not subsequently. The candidate is penalised once only and can gain credit in later parts of the question by correct reasoning from the earlier incorrect answer.

No marks are awarded specifically for quality of language in the written papers, except for the essays in the synoptic paper. Use of English is however taken into account as follows:

- the spelling of technical terms must be sufficiently correct for the answer to be unambiguous
e.g. for amylase, 'ammalase' is acceptable whereas 'amylose' is not
e.g. for glycogen, 'glicojen' is acceptable whereas 'glucagen' is not
e.g. for ileum, 'illeum' is acceptable whereas 'ilium' is not
e.g. for mitosis, 'mytosis' is acceptable whereas 'meitosis' is not
- candidates must make their meaning clear to the examiner to gain the mark.
- a correct statement that is contradicted by an incorrect statement in the same part of an answer gains no mark - irrelevant material should be ignored.

Question 1

Maximum marks

sinoatrial node / sinuatrial node / SAN / pacemaker ;

ventricles ; **IGNORE** left / right

coronary arteries ;

capillaries ;

4 marks

Question 2

Maximum Marks

- (a) A villus ;
B crypt (of Lieberkuhn) / intestinal gland ;
C muscularis (externa) / eq ;

3 marks

- (b) 1 ref. to large surface area ;
2 ref. to thin epithelium / single layer of cells ; NOT thin membrane
3 {increased / eq} diffusion / ref. to decreased diffusion distance ;
4 ref. to presence of {transport / carrier} proteins ;
5 ref. to capillaries ;
6 (which) maintain the {diffusion / concentration} gradient ;

3 marks

Total 6 marks

Question 3

Maximum Marks

- (a)
- 1 ref. to pick up and release of oxygen / reversible idea ;
 - 2 picks up oxygen at {high partial pressure / eq} of oxygen ;
 - 3 (and) releases oxygen at {low partial pressure / eq} of oxygen ;
 - 4 can carry {four oxygen molecules / eight oxygen atoms};
 - 5 ref. to cooperative bonding / allosteric ;
 - 6 can carry carbon dioxide / eq ;

3 marks

- (b) (i) 3.5 to 3.6 ;

1 mark

- (ii)
- 1 ref. to greater affinity for oxygen (than adult haemoglobin) ;
 - 2 more highly saturated with oxygen than adult haemoglobin at the same {partial pressure / eq} of oxygen ;
 - 3 idea that oxygen is transferred from adult { haemoglobin / r.b.c. / blood} to fetal { haemoglobin / r.b.c. / blood} (in placenta) ;

2 marks

Total 6 marks

Question 4

Maximum Marks

- (a) (i)
- 1 responsible for the repair of the endometrium ;
 - 2 (further) {vascularisation / thickening} of the endometrium ;
 - 3 low concentrations inhibit LH secretion ;
 - 4 high concentrations stimulate LH secretion ;
 - 5 responsible for development of (female) secondary sexual characteristics ;

3 marks

- (ii)
- 1 contraction of {uterine muscle / uterus} ;
 - 2 during birth / eq ;
 - 3 ref. to delivery of placenta ;
 - 4 {release / eq} of milk ; **NOT** synthesis / production
 - 5 from {breasts / eq} / ref. to {suckling / lactation} ;

3 marks

- (b) (i)
- ref. to (overall) increase ;
- ref. to greater increase after 20 or 28 weeks / little change over first 20 weeks ;
- manipulated quantitative comment ;

2 marks

Question 4 continued

Maximum Marks

- (ii)
- 1 inhibits FSH / LH (secretion) ;
 - 2 {maintenance / eq} of the endometrium ;
 - 3 Inhibits ovulation ;
 - 4 inhibits uterine contractions ;
 - 5 inhibits oxytocin secretion ;
 - 6 thickens / eq cervical mucus ;

2 marks

Total 10 marks

Question 5

Maximum Marks

(a) (the partial pressure of oxygen) decreases / eq ; 1 mark

(b) (i) the partial pressure of oxygen in the air is low / eq ; 1 mark

(ii) residents have more red blood cells ;
residents have more haemoglobin ;
greater oxygen carrying capacity ; 2 marks

(c) increased {lung / tidal} volume / increased breathing rate ;
can breathe in more air ;
to obtain more oxygen / increased pulmonary diffusing capacity ;

OR

more body hair ;
to reduce heat loss / traps heat ;
as it is cold at high altitude / eq ;

OR

darker skin / more pigment ;
for protection / eq ;
against uv (radiation) ;

OR

increased metabolic rate ;
generates more heat ;
because it is cold at high altitudes / eq ;

3 marks

Total 7 marks

Question 6

Maximum Marks

- (a) 1 generates an impulse / eq ;
2 to make ventricles contract ;
3 (restores) {rhythmic / regular} contractions (of ventricles) / eq ;
4 when conducting system is damaged / eq ;

3 marks

- (b) (i) T wave correctly labelled ;

1 mark

- (ii) number of complete cardiac cycles = 5 ;
calculation (5×12) / eq ;
heart rate = 60 (beats per minute) ;

3 marks

Total 7 marks

Question 7

Maximum Marks

- (a) (i) {wear and tear / eq} of cartilage ;
in (synovial) joints ;
causes pain / swelling ;

2 marks

- (ii) 1 ref. to age / range (approx 40 - 60) ;
2 reduction in (secretion of) {oestrogen / progesterone} ;
3 {ovulation / menstrual cycle} {slow down / stop} / eq ;
4 higher levels of {FSH / LH} ;

2 marks

- (b) (i) increases from 40-60 years;
decreases from 60-70 years;
ref. to maximum at 60 years;

2 marks

- (ii) 1 (incidence is) higher in men at 40 ;
2 higher in women at {50 / 60 / 70} ;
3 ref. to decrease between 60 and 70 in men, not in women ;
4 both increase from 40 to 60 ;
5 credit a quantitative difference ;

2 marks

Total 8 marks

Question 8

Maximum Marks

- (a) A trachea ;
B bronchus ;

2 marks

- (b) 1 contraction of diaphragm ;
2 (and) external intercostal muscles ;
3 increased volume (inside thorax) ;
4 decreased pressure ;

3 marks

- (c) 1 inspired air has a higher percentage of oxygen than alveolar air (or converse) ;
2 ref. to diffusion of oxygen from alveolar air to blood / eq /
ref. to diffusion of carbon dioxide from blood into alveolus ;
3 ref. to mixing of alveolar air and inspired air ;

2 marks

- (d) 1 (alveoli) have a thin wall / squamous epithelium / eq ;
2 (and) have a large surface area ;
3 ref. to increased diffusion / decreased diffusion distance / eq ;
4 ref. to presence of surfactant ;
5 function of surfactant ;
6 ref. to capillaries ;
7 {transport of (respiratory) gases / movement of blood} maintains diffusion gradient ;

5 marks

Total 12 marks