2003 Biology

Intermediate 2

Finalised Marking Instructions

GENERAL MARKING ADVICE: BIOLOGY

The marking schemes are written to assist in determining the 'minimal acceptable answer' rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates' evidence, and apply to marking both end of unit assessments and course assessments.

1. There are no **half marks**. Where three answers are needed for two marks, normally one or two correct answers gain one mark.

2. In the mark scheme, if a word is **<u>underlined</u>** then it is essential; if a word is (**bracketed**) then it is not essential.

3. In the mark scheme, words separated by / are **alternatives**.

4. There are occasions where the second answer negates the first and no marks are given. There is no hard and fast rule here, and professional judgement must be applied. Good marking schemes should cover these eventualities.

5. Where questions on data are in two parts, if the second part of the question is correct in relation to an incorrect answer given in the first part, then the mark can often be given. The general rule is that candidates should not be penalised repeatedly.

6. If a numerical answer is required and units are not given in the stem of the question or in the answer space, candidates must supply the units to gain the mark. If units are required on more than one occasion, candidates should not be penalised repeatedly.

7. Clear indication of understanding is what is required, so:

   - if a description or explanation is asked for, a one word answer is not acceptable
   - if the questions ask for **letters** and the candidate gives words and they are correct, then give the mark
   - if the question asks for a word to be **underlined** and the candidate circles the word, then give the mark
   - if the result of a calculation is in the space provided and not entered into a table and is clearly the answer, then give the mark
   - **chemical formulae** are acceptable eg CO_2, H_2O
   - contractions used in the Arrangements document eg DNA, ATP are acceptable
   - words not required in the syllabus can still be given credit if used appropriately eg metaphase of meiosis

8. Incorrect **spelling** is given. Sound out the word(s),

   - if the correct item is recognisable then give the mark
   - if the word can easily be confused with another biological term then **do not** give the mark eg ureter and urethra
   - if the word is a mixture of other biological words then **do not** give the mark, eg mellum, melebrum, amniosynthesis.

9. **Presentation of Data:**

- if a candidate provides two graphs or bar charts (eg one in the question and another at the end of the booklet), mark both and give the higher score
- if the question asks for a line graph and a histogram or bar chart is given, then do not give the mark(s). Credit can be given for labelling the axes correctly, plotting the points, joining the points either with straight lines or curves (best fit is rarely used)
- if the x and y data are transposed, then do not give the mark
- if the graph used less than 50% of the axes, then do not give the mark
- if 0 is plotted when no data is given, then do not give the mark (ie candidates should only plot the data given)
- no distinction is made between bar charts and histograms for marking purposes. (For information: bar charts should be used to show discontinuous features, have descriptions on the x axis and have separate columns; histograms should be used to show continuous features; have ranges of numbers on the x axis and have contiguous columns.)
- where data is read off a graph it is often good practice to allow for acceptable minor error. An answer may be given 7.3 ± 0.1.

10. **Extended response questions:** if a candidate gives two answers where there is a choice, mark both and give the higher score.

11. **Annotating scripts:**

- put a 0 is the box if no marks awarded – a mark is required in each box
- indicate on the scripts why marks were given for part of a question worth 3 or 2 marks. A $\sqrt{}$ or x near answers will do.

12. **Totalling scripts:** errors in totalling can be more significant than errors in marking:

- enter a correct and carefully checked total for each candidate
- do not use running totals as these have repeatedly been shown to lead to more errors.

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Marking scheme

Section A

1.	C	14.	B
2.	D	15.	B
3.	A	16.	D
4.	B	17.	C
5.	B	18.	B
6.	C	19.	D
7.	D	20.	D
8.	A	21.	A
9.	C	22.	C
10.	C	23.	C
11.	A	24.	D
12.	B	25.	C
13.	A		

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Section B

Question	Acceptable	Not acceptable	Not negating	Negating
1 (a) (i)	C (cytoplasm) and E (nucleus) **Both for 1 mark**			
(ii)	photosynthesis/carbon fixation/calvin cycle/dark reaction/temperature dependant **1mark**	photolysis		
(b)	DNA (deoxyribonucleic acid)/RNA/m RNA/nucleic acid **1mark**		chromosome gene	protein
2 (a)	Diffusion Moves from a high concentration to a low concentration/moves along a concentration gradient **1 mark** **1 mark**	gas exchange		
(b)	To prevent toxic build up/to prevent the cell from becoming acidic/to prevent the lowering of cell pH /to remove waste from the cell/carbon dioxide is a poison (in excess)/it is a waste product **1 mark**	because respiration is occurring harms/damages/ dangerous/kills cells		
(c)	(aerobic) respiration **1 mark**			anaerobic
3 (a) (i)	A B **Both for 1 mark**			
(ii)	osmosis **1 mark**	diffusion		
(iii)	turgid **1 mark**			plasmolysed
(b)	(cell) wall **1 mark**			
(c)	they shrink in size/crenated/crinkled edge/shrivel/wrinkled/smaller **1 mark**	collapsed	die	burst plasmolysed flaccid
(d)	phosphorylase **1 mark**			

Question	Acceptable	Not acceptable	Not negating	Negating
4 (a) (i)	**scale mark** – correct scale + label on X axis **1 mark** **plot mark** – 7 points plotted correctly + all joined by a line **1 mark** • ignore upright sticks in addition to points and line • incorrect scale – check the points against incorrect scale • a bar graph has been drawn but the scale could be used to plot a line graph – give the scale mark • indicate with a tick or a cross the label and scale • check each point and tick or cross	Graph uses less than 50% of axes – no scale mark Bar graph drawn – no plot mark Line extended through origin – no plot mark Line extended beyond 2001 – no plot mark Scale which goes from '96 to '99 (instead of '96 to '98) – no scale mark Position of years given on X axis are not clearly marked – no scale mark Label of Time (Years)		
(ii)	(population) increased/number of adult males increased/grew **1 mark**			initial decrease before 92
(b)	Activity: pollution/over hunting/over fishing/deforestation/any example of habitat destruction/setting up SSSI or conservation areas. **1 mark** Effect on biodiversity: decrease or increase + must relate to an increase of decrease in species numbers/or relate to extinction/dies out **1 mark**	Effect does not match the activity		
(c)	B **1 mark**			
(d)	Structural adaptations: description of roots/reduced surface area/presence of thick waxy cuticle/spines/spikes (not leaves)/succulent tissue **1 mark** appropriate explanation for adaptation **1 mark**	Adaptation: absorbs water, thick leaves, thick stems, big roots, stores water, thorns Explanation does not match the adaptation.		

Question	Acceptable	Not acceptable	Not negating	Negating
5 (a)	temperature/concentration of salt water/pH/size of petri dish/light (intensity) **1 mark**	any given variable eg volume of salt water	any given variable	
(b)	To acclimatise to (new) conditions/to get used to (new) conditions/dish. To adjust/adapt to (new) conditions/surroundings/dish **1 mark**	to settle/get comfortable		prefer/decide etc
(c) (i)	They move towards the light **1 mark**	prefer the light/found in light/react to light/rate of movement/more in light/attracted to		prefer/decide etc
(c) (ii)	They feed on plants (which are found in the light) **1 mark**	this is where their food is/more food present		
(d)	Repeat/use more/different brine shrimps **1 mark**			
6 (a) (i)	Parent 1 = NN Parent 2 = FF. must use letters N and F **both for 1 mark**	f in parent 2		
(ii)	first row of punnet square N and F – **1 mark**. second row NN and NF. third row NF and FF. However if gametes are incorrect, but grid is worked out correctly for gametes give – award mark **1 mark**	f instead of F		
(iii)	1 : 2 : 1. other ratios from candidate grid **1 mark**	any ratio derived from recessive genes (n/f)		
(b)	heterozygous **1 mark**. recessive **1 mark**. monohybrid **1 mark**			
(c)	polygenic **1 mark**			

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Question	Acceptable	Not acceptable	Not negating	Negating
7 (a)	**For both** increase/decrease/stays the same/only if the reason follows through **1 mark for each part**	**periwinkle** – stays the same because there is no link between the periwinkle and mussels		
(b)	A lot of algae are required to feed one limpet/not all the energy is passed on at each stage/energy is lost **1 mark**	Size on its own		
(c) (i)	An example of how energy is lost eg heat/movement/undigested material/respiration/uneaten material (bones etc) **1 mark**	Not all energy is passed on/waste material/feeding		
(ii)	Table 17000 producer plant plankton 1700 secondary consumer **5/4 = 2 marks** **3/2 = 1 marks**	Algae and seaweed		
8 (a)	decrease in height of stem/increase/increase in grain yield Stem height is shorter - less chance of being blown over/easier to harvest – greater grain yield – better financially/more food available/less land needed **Improvement - 1 mark** **Explanation – 1 mark**	average length of grain there is more grain better harvest		
(b)	Takes a long time/improved characteristics are not guaranteed/some characteristics may be lost/enhances bad characteristics **1 mark**			
(c) (i)	Insulin (human) growth hormone/somatotrophin **1 mark**	ADH		
(ii)	Step 2 Piece of a chromosome/Gene cut out/removed Plasmid extracted/cut open Step 3 Piece of a chromosome/Gene inserted/sealed into plasmid Step 4 Gene/Plasmid inserted into bacterial cell/host cell Do not penalise if more than one step is in boxes 3 or 4 **4 boxes = 3 marks 3/2 boxes = 2 marks 1 box = 1 mark**			

Question	Acceptable	Not acceptable	Not negating	Negating
9 (a) (i)	To standardise results/as different numbers were released/so a fair/valid comparison can be made/to compare results **1 mark**	reliability accuracy		
(ii)	Light coloured are better camouflaged/less predation/fewer eaten **1 mark**	any answer involving dark only/less pollution/not seen		
(b)	Natural selection **1 mark**	survival of the fittest		
10 (a) (i)	75 75 – 130 130 - 82 (+/- 1 all values) **all 3 correct for 1 mark**			
(ii)	To deliver more oxygen to the muscles/heart/for movement **1 mark** To produce more energy/more O_2 is required by muscles **1 mark**	body needs oxygen for energy using up more energy		
(b)	Lactic acid **1 mark**			
(c) (i)	Alveoli/air sacs **1 mark**			
(c) (ii)	In the red blood cells/as carboxy-haemoglobin/by haemoglobin (Dissolved in) the plasma/as carbonic acid/bicarbonate **2 marks**	veins/arteries/capillaries/in the blood		
(d)	Combines with high **both for 1 mark**			

Question	Acceptable		Not acceptable	Not negating	Negating
11 (a) (i)	Medulla	R S controls balance (muscular) coordination controls heart rate/controls breathing rate **5/4 = 2 marks** **3/2 = 1 mark**			any incorrect addition
(b)	Spinal cord	**1 mark**	spine/spinal nerves	spinal nerves	
(c)	Sensory	**1 mark**		fibres/nerves	
(d)	True False False	hypothalamus dilate **1 for each row = 3 marks**	open/widen/relax/expand		

Section C

Ignore irrelevant information (correct or incorrect) which does not cancel out a correct point.

If there is additional incorrect information which 'matches' correct information for which a mark has been given, carry out the following:-

(1) write code for point (2) cross this out (3) put x by incorrect information.

Diagrams must be annotated with the same information as detailed in the mark scheme.

1.   A.   **Photosynthesis**

      P1   photolysis/light reaction/stage/Hill reaction
      P2   splitting of water
      P3   to produce hydrogen, oxygen
      P4   oxygen given off/as a by product
      P5   hydrogen combines with a hydrogen acceptor
      P6   ATP produced/ADP + Pi = ATP
      P7   in the presence of chloroplasts and light/chlorophyll used to absorb
            light energy

                                          maximum of 3 marks

      C1   carbon fixation/dark stage/Calvin's cycle/temperature dependant stage
      C2   hydrogen from photolysis/1st stage
      C3   combined with CO_2/CO_2 used by plant
      C4   using ATP from photolysis/1st stage
      C5   to form glucose/carbohydrate/starch/cellulose/sugar
      C6   controlled by enzymes

                                            maximum of 3 marks

      <u>**Markers**</u> Beware no more than 3 marks from each group [Both essays]

TOTAL 5 MARKS

2.   B   **Anaerobic respiration**

      G1   enzymes needed/enzyme controlled
      G2   yeast contains enzymes
      G3   grape juice contains sugar*/sugar* is added
      G4   sugar* converted to pyruvic acid
      G5   glycolysis (in correct context)
      G6   2 ATP produced <u>per glucose molecule</u>

                                          maximum of 3 marks

      F1   Fermentation (in correct context: pyruvic acid $\rightarrow$ ethanol + CO_2)
      F2   pyruvic acid is broken down
      F3   in the absence of oxygen
      F4   carbon dioxide (gas) given off/produced
      F5   alcohol produced
      F6   irreversible reaction

                                          maximum of 3 marks

     *NB Any named sugar acceptable at Int 2/except lactose

     <u>**Markers**</u> Beware no more than 3 marks from each group [Both essays]

TOTAL 5 MARKS

Section C

2. **A.** S = Structure
F = Function

Arteries

SA1 <u>thick muscular</u> wall
FA2 (they carry blood) at high pressure
SA3 they have a narrow (central) cavity
FA4 they carry blood away from the heart/deliver blood to the organs/carry
oxygenated blood except the pulmonary artery

maximum 2 marks one S and one F

Veins

SV1 have a <u>thin muscular</u> wall
FV2 they carry blood at low pressure
SV3 they have a wide (central) cavity
FV4 they carry blood back to the heart/carry blood away from the organs/
carry deoxygenated blood except pulmonary vein
SV5 they contain valves
FV6 (valves) prevent backflow of blood

maximum 2 marks one S and one F

Capillaries

SC1 have <u>very thin</u> walls/<u>walls</u> are 1 cell thick
SC2 have a very narrow diameter
FC3 allow for the exchange of materials/diffusion of materials/named examples
FC4 <u>link</u> arteries to veins

maximum 1 mark one S and one F

<u>Markers</u> Beware no more than 2 marks for each blood vessel

TOTAL 5 MARKS

B. **Problem**

P1 (the tissues of) the fish are hypertonic (or equivalence) to its
surroundings/the environment is hypotonic (to the fish tissues)
P2 water passes from a high concentration (in the environment) to a low water
concentration (in the body cells)
P3 water passes into the fish
P4 water passes in by osmosis
P5 the fish needs to remove excess water   **maximum 3 marks**

Mechanisms

M1 osmoregulation takes place
M2 water is removed in the urine/by the kidney/large glomeruli/
high filtration rate
M3 large volume of urine produced
M4 urine is dilute   **maximum 3 marks**

<u>Markers</u> Beware no more than 3 marks from each group

TOTAL 5 MARKS

[END OF MARKING INSTRUCTIONS]