



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2008

LIFE SCIENCES: PAPER II
MARKING GUIDELINES

Time: 2½ hours

150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

QUESTION 1

1.1

Question	1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6
Answer	C	B	C	D	A	A
	✓	✓	✓	✓	✓	✓

(6)

1.2

Question	1.2.1	1.2.2	1.2.3
Answer	A	A	C
	✓	✓	✓

(3)

1.3

1.3.1

Differences between	
Skull A	Skull B
1. Sloping face ✓	1. Flat face ✓
2. Smallish cranial volume ✓	2. Large cranial volume ✓
3. Large jaw size ✓	3. Small jaw size ✓
4. No chin present ✓	4. Chin present ✓
5. Has ridge at back of cranium ✓	5. Has no ridge at back of cranium ✓

NB:

- Same feature to be compared in each row
- Mark four features, no more

(8)

1.3.2 B. Skull B has a flat shape with lighter jaws, possibly for speech. ✓ The large cranium size allows for increased brain ✓ size, i.e. development of cognitive skills ✓ and increased intelligence.

Features to be quoted from the table in 1.3.1 (3)

1.4

1.4.1 Four times as many ✓ (1)

1.4.2 A high humidity ✓
 Drop in temperature (to below freezing) ✓
 No wind ✓
 Accumulation of smoke and sulphur dioxide ✓ (4)

1.4.3 The smoke and sulphur dioxide accumulated ✓ because the wind had dropped. ✓ (2)

1.4.4 Accumulation of smoke and sulphur dioxide affect the breathing system ✓ very badly. If anyone had asthma or emphysema ✓ (or name of relevant respiratory disease) their problem would be intensified, possibly resulting in death. ✓

Also, it was very cold and fires being burned at home ✓ would cause further ✓ breathing problems.

Effects on the body, e.g. asthma, bronchitis, do not disappear when causes are removed. ✓

Any three relevant ideas (3)

1.4.5 (a)

- The same number of plants ✓ – 4, ✓ has been used.
- The same type of plant ✓ – radish, ✓ has been used.
- Investigation was left for a two-week period ✓ before results were compared. ✓
- The same ✓ sized ✓ plant tray was used in both cases.
- Both plant trays ✓ were enclosed in clear plastic. ✓

Any other point relevant to illustration of fair testing. ✓ 3 points (6)

(b) Increase the number of plants. ✓

Measure the time taken for plants to die. ✓

Repeat the experiment several times to check accuracy of results. ✓

Repeat the experiment with different plants. ✓

Repeat the experiment with a range of sulphur dioxide concentrations. ✓

Etc.

4 points to be given (4)

40 marks

QUESTION 2

2.1

2.1.1 A group of organisms with similar features ✓ that can freely breed ✓ and give rise to fertile offspring. ✓ All members of the species have the same chromosome number. ✓ First three correct answers. (3)

Also accept:

- Organisms of the same species share the same ecological niche.
- Any species is reproductively isolated from other species.
- Members of the same species will have similar chromosomes.
- Species may be organisms of similar physical appearance.
- Species are genealogically unique.

2.1.2 They feed on the same kind of food. ✓
They have similar body length. ✓
They have similar body mass. ✓
They inter breed. ✓ (3)

2.1.3 Sympatric ✓, as they occupied same habitat, ✓ for many years. ✓ (3)

2.1.4 Bones ✓ teeth ✓ horns ✓ hooves ✓ (or any relevant hard body part) Any 2 (2)

2.1.5

- Fossils do not undergo any changes of body structure once they're formed. ✓
- It is known that the older the rocks the older the fossils. ✓
- It is possible to age fossils. ✓
- Comparison of fossils can be made with similar organisms alive today, therefore changes in development are evident. ✓ (3)

2.2

2.2.1 In Diagram 2 humans, chimpanzees and gorillas separated ✓ from an ancestor at the same time. ✓ In Diagram 4 chimpanzees separated from common ancestor earlier ✓ than humans and gorillas. (3)

OR

In Diagram 4, humans and gorillas share a common ancestor different to ancestor shared with chimpanzees. ✓

2.2.2 Diagram 3 ✓ Humans (with chromosome number = 46) separated from common ancestor earlier ✓ than gorillas and chimpanzees (with chromosome number = 48). ✓ (3)

2.3

2.3.1 Crash in the diversity/ type ✓ of organisms, ✓ i.e. dying out ✓ of many species or organisms. ✓ (2)

- 2.3.2
- Increased climate change/ global warming ✓ due to man's activities, produce more pollutants ✓ such as methane, carbon dioxide, etc. resulting in species ✓ death.
 - Deforestation ✓ has effects such as loss ✓ of food and habitat ✓ resulting in species death.
 - Climate change ✓ brings about death of ✓ organisms unable to adapt to change. ✓ (3)

2.4

Darwin and Wallace (Evolution by natural selection)	As climate became drier ✓ on some islands, tortoises with long necks would have been 'selected for' as ✓ they could reach the tall shrubs and bushes. Short-necked tortoises would have died out. ✓
Lamarck (Inheritance of acquired characteristics)	As climate changed and became drier, all tortoises would have gradually ✓ grown longer necks to reach the tall shrubs and bushes. Short-necked tortoises would have died out. ✓

(5)

30 marks

QUESTION 3

3.1

- 3.1.1
- Farming area has developed into a mixture of farming and industry. ✓
 - Village has developed into a town, ✓ with a larger population.
 - Area is supported by a motorway to transport manufactured goods and farm products. ✓
 - Type of farming has changed from mixed farming to ✓ cultivation only. ✓
 - There are fewer farms in 1965 than in 1949. ✓ (4)

- 3.1.2 Manure could not be used ✓ as there were no more sheep or cattle. ✓ (2)
Accept: There was greater pressure ✓ to rapidly increase productivity. ✓

- 3.1.3 When it rained ✓ soil and fertilisers could have run off into the river, if there were no grass verges ✓ between fields and river. (2)

- 3.2 No. ✓ He collected measurements in the one pool only. ✓ He measured clarity once a year only; ✓ measurements should be taken more often , ✓ e.g. weekly. He has data on clarity only ✓ but no other measurements such as water temperature, oxygen content, nitrate content, faecal bacterial content, flow rate, pH, types of indicator species, etc. ✓✓✓✓ (at least four other types of data need to be mentioned). He needed to have collected data at many points along the river, ✓ e.g. next to villages, next to the farms, the roadway, bridges, etc. ✓✓ (at least two of these need to be mentioned)
Any 9 relevant points (10)

3.3

- 3.3.1 Increase in nitrates and phosphates/ mineral content ✓ has led to increased growth ✓ of green water plant.
Increase in gill size indicates decreased oxygen levels in the water, ✓ possibly due to raised water temperatures ✓ of effluent water from industries, e.g. brickworks alongside the river or increase in bacteria. (4)

- 3.3.2 Farms: Need to prevent any flow of fertilisers, soil, etc. ✓ into the river system by having verges between farming areas and river. ✓
Brickworks: Need to ensure no effluent goes into the river/ effluent entering the river is treated ✓ so that it is not warm; contains no toxic chemicals; contains no minerals, etc. ✓

Engineering works: Need to ensure no effluent goes into the river/ effluent entering the river is treated ✓ so that it is not warm; contains no toxic chemicals; contains no minerals, etc. ✓

- Power station: To ensure that water entering the river is treated so that it is not warm; ✓ so that oxygen content of the river water is not lowered. ✓ (8)

30 marks

QUESTION 4

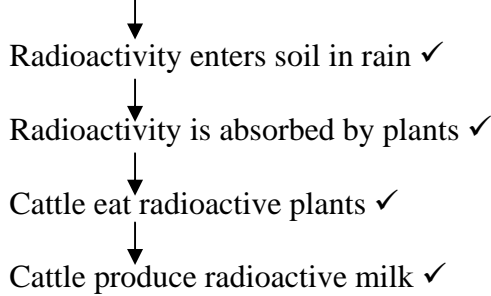
4.1

4.1.1 3 400 units per kg dry mass ✓ (1)

4.1.2 9 ✓ (1)

4.1.3 The radioactivity went into the atmosphere ✓ and winds moved it around. ✓ (2)

4.1.4 Radioactivity released from Chernobyl



-1 if no flow chart shown
-1 if order of stages incorrect (4)

4.1.5 (a) No. ✓ Evidence shows that there are physical illnesses such as cancers but that radioactivity causes deaths ✓ and also illnesses of the mind such as anxiety, high stress levels ✓ that cause physical symptoms which cannot be explained. ✓ (4)

(b) Comparisons were made of USA soldiers exposed to unclear radiation testing in Nevada ✓ with USA soldiers serving in areas where there was no radiation ✓ at the same time. ✓ (3)

4.1.6 4 arguments for nuclear power stations:

- Nuclear power stations do not use fossil fuels. ✓
- Nuclear power does not produce greenhouse gases. ✓
- Nuclear power has no effect on the ozone layer. ✓
- Source of fossil fuels is decreasing, ✓ etc.

OR

4 arguments against nuclear power stations/ arguments for coal power stations:

- The potential for release of radioactivity is high. ✓
- Radioactivity, in large doses, causes death. ✓
- Radioactivity, caused by 137-Caesium, lasts a long time in the atmosphere. ✓
- Radioactivity stays in the food chain a long time. ✓
- High cost of building nuclear power stations, ✓ etc. (4)

4.2 Candidates must argue one way.

4.2.1 Pentadactyl ✓ (1)

4.2.2 This similar arrangement of bones is found in the forelimb of all vertebrates, ✓ i.e. they are related because of a common ancestor. ✓
The limbs are homologous, i.e. have same structure ✓ but do not have the same function. ✓ For example a whale uses forelimb for swimming, ✓ bird uses it for flight. ✓
Any 5 points (6)

4.3 Yes, ✓ if isolation persisted ✓ and the population stayed small ✓ condition could then become more prevalent and in the long run everyone may have the condition if interbreeding persisted. ✓

OR

No, ✓ isolation of the tribe is very unlikely to persist. ✓ Increasing the population/ gene pool ✓ will result in the condition/ gene still being present but not with everyone having it. ✓ (4)

30 marks

QUESTION 5 GRID TO ASSESS RESPONSE TO QUESTION 5

Criteria/ Marks	4	3	2	1	0
Making a decision (2)			Clear decision made about whether remains stay in environment or are taken to museum	Undecided	No decision made
Substantiation: Fairness (Acknowledgements of other view points) (3)		Evidence that the alternate point of view can be taken, with merit given	Evidence that the alternate point of view exists but only shortcomings given	No/ little reference to alternate point of view being possible	No reference to alternate point of view
Substantiation: Thoroughness (Extent of source material cited) (4)	Sufficient sources are referred to depending on decision made. There is evidence of reasoning beyond the sources, that is integrated into the whole	Several sources quoted	Some source material quoted, (about half)	Very little evidence from the sources is cited in support of opinion	Response is entirely opinion with no supporting evidence from the sources given
Substantiation: Relevance (Selection of source material) (4)	Source material appropriate to decision is referred to in the answer, with no loss of relevance	Slight loss of relevance, (a sentence or two)	Some loss of relevance	A lot of digression where question largely appears to be ignored	Source material is unprocessed
Argument, depending on accuracy (4)	Arguments are logical, reasoning clear and generally persuasive	Some unclear/ incorrect reasoning that detracts from the quality of the response	Arguments and reasons are clear on average (50%)	Writing is mostly directly from sources with little reasoning or linkage	Argument where given, is directly from the sources, and is unprocessed
Ability to paragraph (3)		Paragraph divided clearly on unified theme rather than just physically	Physical but inappropriate breaks	No paragraph breaks apart from scene setting and wrap-up	

20 marks**Total: 150 marks**