



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2010

LIFE SCIENCES: PAPER II

MARKING GUIDELINES

Time: 2½ hours

150 marks

These marking guidelines were used as the basis for the official IEB marking session. They were prepared for use by examiners and sub-examiners, all of whom were required to attend a rigorous standardisation meeting to ensure that the guidelines were consistently and fairly interpreted and applied in the marking of candidates' scripts.

At standardisation meetings, decisions are taken regarding the allocation of marks in the interests of fairness to all candidates in the context of an entirely summative assessment.

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, and different interpretations of the application thereof. Hence, the specific mark allocations have been omitted.

QUESTION 1

Answer this question in the spaces provided. Place the Answer Booklet inside the Answer Book in which you answer the rest of the examination paper.

- 1.1 Select the term in Column B that best matches a description in the Column A. Write the letter of the matching term in the corresponding space provided between the brackets. Each letter may only be used once.

Column A		Column B	
[E]	Possibly first early human population who stood totally upright	A	bipedal
[C]	World Heritage Site of fossil remains	B	Neanderthal
[H]	'Handy man' making early stone tools	C	Cradle of Humankind
[G]	Species to which the Taung Child fossil is believed to belong	D	'Eurocentric' model
[F]	Caused changes in vegetation and so human populations migrated	E	<i>Homo erectus</i>
[A]	To walk upright on two limbs	F	Ice Age climate
[I]	The most widely acceptable model of the origin of humankind	G	<i>Australopithecus africanus</i>
[J]	Study the physical remains of past human groups	H	<i>Homo habilis</i>
[K]	Collective term for fossilised human ancestors	I	'Out of Africa' model
[L]	Study of human cultural development	J	archaeology
		K	hominids
		L	anthropology
		M	Vredefort dome

(10)

- 1.2 Five multiple choice questions are given below. Choose the most correct alternative in each question and write the letter in the space provided in the table.

Question	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5
Answer	B	C	B	D	C

(9)

1.3 Give the correct biological term for each of the following descriptions.
Write the term on the line provided.

- (a) Linked food chains showing the energy flow in an ecosystem. Food Web
- (b) A measure of the variety of different animal and plant species in an area. Biodiversity
- (c) Extremely high levels of nutrients in a river leading to increased algal growth Eutrophication/nutrification
- (d) The rise in the average temperature of the earth. Global warming
- (e) The removal of many trees from forested areas to plant crops. Deforestation/slash and burn
- (f) A large area consisting of many ecosystems. Biome

(6)

1.4 Study the following table which consists of two items (numbered 1 and 2) in the first column and a statement in the second column.

Decide which item/s relate to the statement.

Write down your choice, in the space provided, making use of the following codes:

- A only item 1 is related to the statement
 B only item 2 is related to the statement
 C both item 1 and 2 relate to the statement
 D neither item 1 or 2 relate to the statement

Item	Statement	Answer
1. Harms the organism. 2. Has no measurable effect on the fitness of the individual.	Neutral mutation	B
1. Occurs during meiosis. 2. Occurs during fertilisation.	Genetic recombination	C/A
1. A theory of evolution based on inheritance of acquired structures. 2. Evolution produces new structures within a generation to meet the organism's new needs.	Darwin	D
1. Individuals best adapted will survive. 2. A species produces more offspring than those needed to replace their parents.	Natural Selection	C
1. Evolution that can occur by means of slow, steady genotypic changes. 2. Breeding of domestic dogs to increase their variety and use to humans.	Macro-evolution	A

(5)

- 1.5 An investigation was carried out into the effects of thermal pollution on the growth of sandhoppers. Sandhoppers are small animals living in river mouths. Two regions (A and B) in the area were sampled over 16 months. One area received hot waste water from a nearby power station whilst the other region was unaffected.

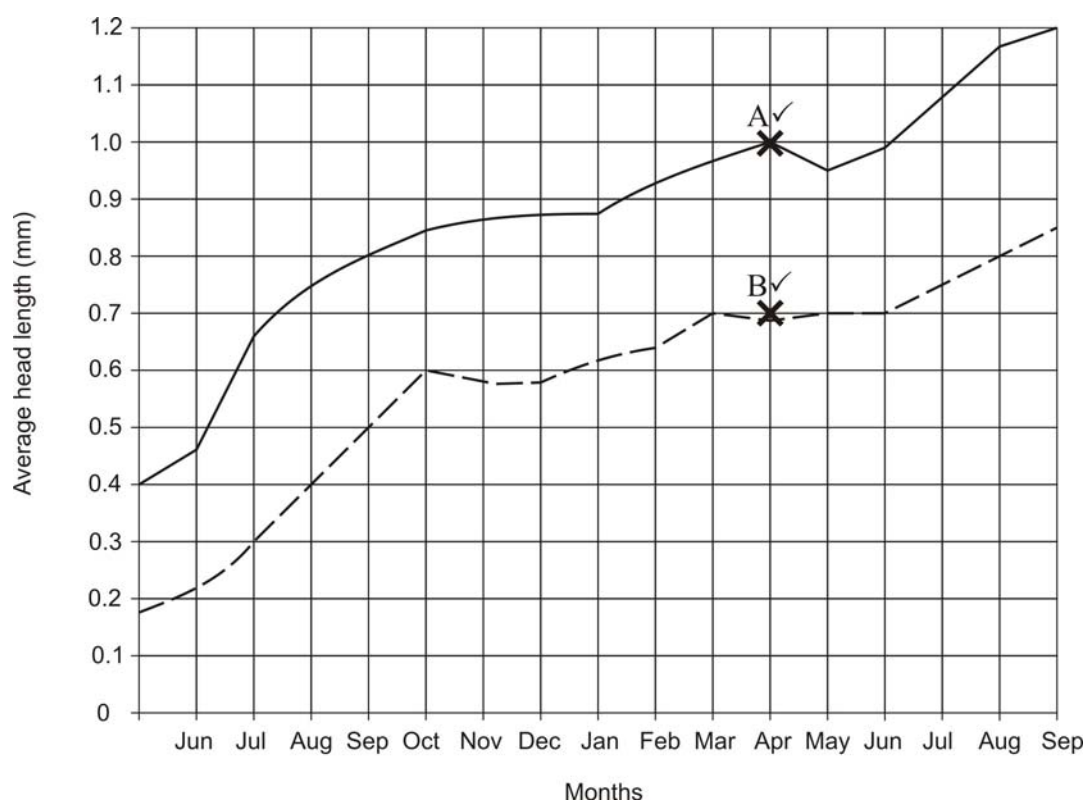
- 1.5.1 Measure the length of the head of sandhopper A and B. Use this to calculate the **actual** length of each head.

Actual length of head Sandhopper A 0.8. to 1.2 mm

Sandhopper B 0.6 to 0.9 mm

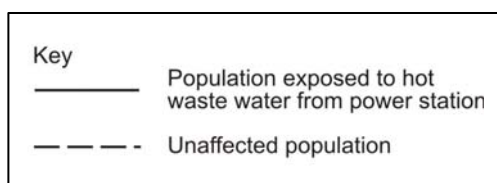
(2)

- 1.5.2 Below is the graph of the sandhopper investigation results over 16 months.



Graph of sandhopper head sizes from two regions in a river.

[Alan Clamp; 2001]



- (a) Plot your measurements for sandhopper A and B, collected in April, on the graph. Label the points on the graph. NOTE Candidates' measurements to be marked according to their measurements. Only 1 mark if points not in the April column. If no x then 1 mark or if no A/B then 1 mark.

(2)

- (b) Do your specimens' measurements fit directly onto the lines of the graph? Explain the fit or misfit of these points to the drawn graphs.

Specimen A fits and B does not/ comment on fit of plotted result B is a single specimen that is above

the average /of the original bigger sample / concept of single vs average sample

(2)

- (c) What is the only thing you can conclude about the impact of the power station on life in this environment?

Thermal pollution/hot water is causing an increase (but candidate must understand relationship) in head length/size/body/mass of

(sandhoppers) living things.

(2)

- 1.5.3 The diagram below shows the habitat in which the sandhoppers lived. Place the letter A and the letter B on the diagram to show the region from which each animal was possibly collected.

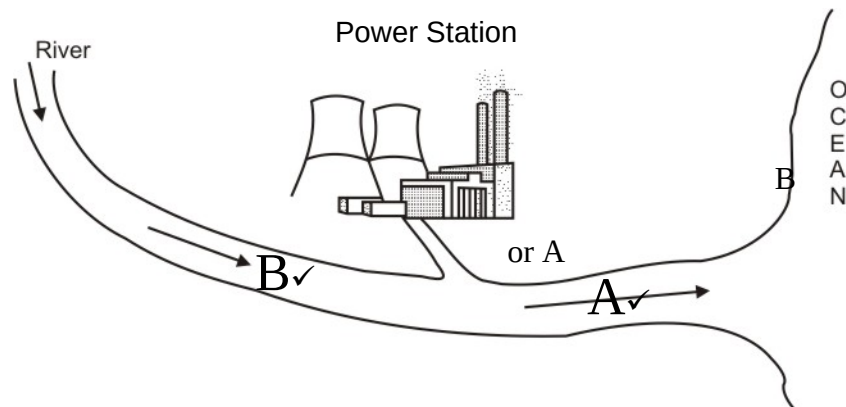


Diagram of area in which sandhoppers were sampled.

(2)

[40]

QUESTION 2

- 2.1 2.1.1 Pollution is contamination/ ruining or other term, of the environment by man-made/ human things/release of harmful substances into the environment. (2)

- 2.1.2 Two marks are allocated to correct information per subheading. Information needs to relate to the issue given. (10)

For example:

- (a) Pollution issue: landfill overloaded with waste/ OR name of type of issue OR specific area where pollution occurs
- (b) Cause of the problem: population in city is increasing; so they produce more waste/lack of recycling of waste/ no moral consciousness/ lack of funding/ lack of funding
- (c) Effect on health: can cause tetanus/hookworm in those exposed to waste; houseflies/rats/mice in landfills spread many diseases (polio/cholera, etc.).
- (d) Corrective action: reduce amount of waste produced; reuse products for other purposes; recycle paper/glass, etc; immunisation against tetanus coverage of waste so flies don't lay eggs improve waste disposal methods./ education about effect of pollution and how to rectify
- (e) Support required: each household needs to separate waste; local municipality to set up recycle bin points/education.

For (b), (c) (d) and (e) 2 brief points or 1 well explained point.

- 2.2 2.2.1 Indiscriminate (seasonal) crop-spraying with chemicals/pesticides on farms that affect water/air. (2)

- 2.2.2 (a) headache/nausea/muscle cramp (1)

- (b) cancer/ early puberty/miscarriages/depression/asthma/ severe headaches (1)

- 2.2.3 (a) residents; farmers; reps. of pesticide industry; government agent/Dept of Agriculture (4)

- (b) understanding of the problem is encouraged by participation; reduce/correct application of pesticides/pressurise pesticide companies to develop safer substances/farmers under pressure economically or other/need to compromise/ everyone has something to lose/can't blame crop spraying only Any 3 (3)

- 2.3 2.3.1 Diarrhoea (cholera would be considered if candidate elaborated on 'disease' as a confusion) (1)

- 2.3.2 good sanitation/hygienic waste disposal; have a clean source of drinking water/ boil water/ jik added/cook food properly/wash hands (after going to the toilet). Any 2 (2)

- 2.3.3 local government to implement government environmental laws (white paper 2 000) ; educates people about these health issues; institute new laws or other reasonable suggestion/management and control of problem are the keys to a strategy/ water monitoring/ flush toilets/ planning of settlements away from river.2 marks for each point

(4)

[30]

QUESTION 3

- 3.1 3.1.1 Multi-region hypothesis – *Homo sapiens* spread out from Africa (2 mya); and *Homo sapiens* evolved from regional *Homo erectus*; in many different parts of the world/ Europe/ Asia around the same time. Some independently evolved.
- Out-of-Africa hypothesis – *Homo sapiens* evolved in Africa/ Sudan/Ethiopia; and emigrated to different regions; and they replaced *Homo erectus*. *H. erectus* also moved out at different times (6)
- 3.1.2 Man changed from scavenger to a hunter-gatherer; and so followed the herds/ searched for new habitats/ as they searched for food; change in climate in Africa; and with drought man would migrate/to temperate regions for more food; local competition.
Any 2 short points or one elaborated. (2)
- 3.1.3 Personal view stated (For example, Creationism/Intelligent design/traditional belief/African cultural belief/evolutionists). Explanation – evidence focused on the belief; logical thought, good reasoning. (4)
- 3.2 3.2.1 Allopatric speciation is the development of a new species due to geographic, (elaboration of geographic) isolation of populations of a species/ group / leads to reproductive isolation. (3)
- 3.2.2 (Group A) – The blesbok group has a higher rate of speciation and extinction than the impalas (B). (4)
- 3.2.3 (a) Since the blesbok group are specialised feeders; they will eat only select food in a particular habitat. (The area where preferred food is scarce/absent functions as a geographic barrier.) This means they will not establish populations in all habitats so populations become isolated in area (geographic isolation) and inbreeding will eventually separate one group from another and each group will develop its own variations different from other groups. Diet speciality has caused more macroevolution in the blesbok group. Less competition therefore more ecological niches Any 4 points (4)
- (b) Since all the buck have different preferences for food, each type can occupy a lot of different habitats/or the same habitat; and competition for food/habitat (cannot just mention survival) is reduced. (2)
- (c) The ancestral finch/ tortoise species reached one of the Galapagos Islands where the population adapted to the local environment. Some finches flew to a neighbouring island. The different populations of finch all have evolved different beaks in association with different diet on the islands and living in different niches. With time, the island populations became so different from each other that 13 species arose. The geographic/sea barrier/ separated because on different islands/ between the populations assist this process. Any 5 points (5)

Other examples acceptable

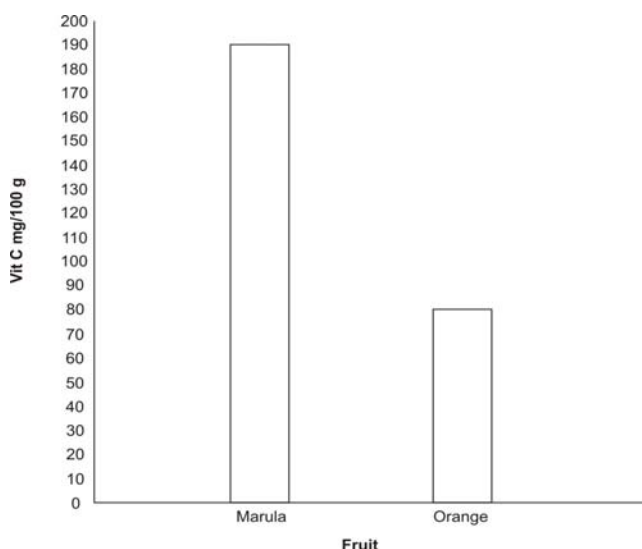
[30]

QUESTION 4

- 4.1 Indigenous plants are native/ grow naturally/ to an area/country/grow naturally and are not introduced by humans Definition of endemic (2)
- 4.2 Phalaborwa people (1)
- 4.3 (a tea from) the roots (for fever); fruit (for Vit C to combat influenza). Not seed (2)
- 4.4 YES – manufacturers are using large amounts of fruit for financial gain with little conservation in mind; it is being used for too many things (food/medicine/household items) without 'farming' plans being mentioned/ as community increases so use increases/if wood used whole tree is destroyed/.
NO – only male trees are cut down preserving the fruit producing female trees; requires the permission of the chief to cut down a tree so there is a traditional conservation method in place/ renewable parts of the tree use/ specific harvest times, trad healers use tree in sustainable way/ manufacturers will grow more trees. Must have 2 reasons explained (4)
- 4.5 NO – because some plants they use may have ingredients that could be used in medicine; to save many people's lives; they can be produced in large quantities by science/entrepreneurial spirit
YES – traditional health practitioners' knowledge is a traditional privilege/ system; that should only be handed on to chosen people; and we need to respect their viewpoint/factories move in and degrade the area/prevent over-exploitation/ traditional healers will lose income/ standing in community lost/. (3)
- 4.6 4.6.1 Example: Marula fruit has more Vit C than oranges. Statement only 1 mark if too long (3)
- 4.6.2 Volume/ amount/ mass/ weight of fruit used/cut fruits to same size; both fruits pulped;/only the juice of both fruits used/ do not use skin or pips/same harvest time/ fruit of same degree of ripeness. One environmental factor eg about soil conditions will be accepted (4)

4.6.3

Bar Chart/graph of the amount of Vitamin C in Marula and Orange fruit (relates to 4.6.1 answer)



(7)

One mark for gap between bars

Marula column must to considerably longer than orange column

Lose a mark if values are inserted on x axis

Could put 100g on x axis

Any reasonable heading

- 4.7 Cultivate more plants; store seeds in seedbank/ tissue culture; preserve plants in a nature reserve/ nursery; license/ permits/quotas to collect plant material; educate people about sustainable use/ for protection of resource; replace cut down trees, policing of laws, use other sources of building materials,don't cut down whole trees.Only one mark relating to permit. Any 4 points (4)
[30]

QUESTION 5

The IEB standard rubric will be used to assess the responses to the question – which is open ended.

The following are guidelines to the content and sources relevant to either argument.

Rubric reference	I DO think scientists are justified ...	I DO NOT think scientists are justified ...
Content: thoroughness Facts were extracted into table format for easy recognition by markers	Source A – Pionar is not afraid of new ideas and since he made the statement the Japanese have 'worked out the details'. Source C – emphasis on success of project and ecotourism payback	Source A – cloning a frozen mouse is very different to a huge mammoth – wasted money and time Source C – whilst breeding is a success these animals are brought into ecosystems that have changed in past 130 years – they could be having a negative effect on the present biodiversity Source E – German team leader comment
Supporting argument	Source B – Ann Creedy – positive public opinion aids in raising funds for projects Source E – USA team cloning Neanderthal DNA	Source B – Leslie White – use resources to save what we have on earth now Source D – Cleaning up environment now and species recover so extinction stopped Source E – German team comment Other – introducing a mammoth into post Ice Age ecosystems is unrealistic and animals would not survive – wasted money + time
Argument against noted	Source B – Leslie White – do good now Source D – Clean up environment now and rescue species thought to be extinct Other – introducing a mammoth into post Ice Age ecosystems is unrealistic and animals would not survive – but there are still permafrost areas close to arctic circles	Source A – Spielberg is a fantasy moviemaker and Jurassic park is not a reality so whilst Pionar supports the idea it is of the movie world. Source B – Ann Creedy – 'man-god' concept not acceptable

[20]

QUESTION 5 Rubric

	1	2	3	4
Content: Thoroughness T	4 facts/pieces of information from sources	6 ‘facts’ or 5 and an extra from own knowledge	- All main topics covered 8 ‘facts’ or 7 and an extra from own knowledge	- All main topics covered. - Source detail very close to full potential 12 ‘facts’ - At least (1) significant instances of information beyond the sources then only 11 needed or 10 + 2 extra.
Content: Relevance =R	Mostly digression and/or repetition.	- Around half is digression and/or repetition. - Cap here if very short essay	- Repetition mostly avoided. - Some minor digression in thought or processing of information - Cap here if inaccuracies.	- Isolated incidences of minor repetition. - No digression.
Supporting Argument, i.e. for =A	- Writing consists of facts with little linkage or reasoning. - Reasoning incorrect.	- Maximum if no decision to support. - Reasoning correct, hard to follow and lengthy. - One paragraph placed illogically. - Ordinary; some linkage is evident.	- Supports the position. - Reasoning is clear but a bit lengthy. - Minor errors in flow. - Solid but not compelling; linkage sometimes missed.	- Strongly supports a clear position. - Reasoning is very clear and succinct. - Flow is logical, showing evidence of clear planning no after-thoughts. - Compelling with regular use of linking language. - No new info in conclusion. - Comment on quality of sources
Fairness, i.e. Argument against =F	Few counter opinions given.(1)	Counter opinions often given (2).	Counter opinions regularly given (3).	
Position =D ND=undecided	Clear decision made.			
Presentation =P	1 of 4 points present	2 of 3 points present	3 of 4 points present	- Introduction and conclusion present - Appropriate paragraphing - Intelligible language - Presentation legible