NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2024

LIFE SCIENCES: PAPER II

MARKING GUIDELINES

Time: 2 hours 100 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.

SECTION A

QUESTION 1

1.1 1.1.1 B
1.1.2 E
1.1.3 F
1.1.4 D

1.2 1.2.1 Any new named example of viral/bacterial evolution resulting in new variants due to exposure to vaccination or antibiotics.

1.2.2 Mutations are only passed on when reproduction occurs, variations are evident in offspring therefore have to wait for reproduction to happen for variation to be seen in new generations, therefore only seen in very fast-reproducing organisms /environments stay the same for long periods of time.

1.3 Inbreeding results in organisms having a high degree of similarity in genetic composition and therefore a high degree of homozygosity. if environment changes, there is less chance many will be able to survive/less chance of gene pool having adaptable trait. Also results in low sperm quality and therefore less ability to reproduce.

1.4 1.4.1 Big Birds cannot form offspring with other birds on the island / cannot mate with other birds from the island. mechanisms exist to prevent interbreeding.

1.4.2 Bigger beaks different song patterns larger size

1.4.3 The beaks produce different calls which the females use to select mates.
Big Birds make different calls and will not attract normal Cactus Finch females and only Big Bird females. This means that the two groups will not mate with one another and therefore gene flow is prevented.
Bigger beaks enabled them to eat both large and small seeds they had access to a larger variety of food this would allow them to survive more effectively if seeds became scarce they would mate with surviving Big Bird females and produce offspring with Big Bird genotype.

1.5 1.5.1 Allopatric speciation

1.5.2 Check to see if they recognise one another as mates/actually do mate – if they don't, then they are probably different species.
Check to see whether they can produce fertile offspring/interbreed with cactus finches – if they don't then they are different species.

1.6 A

1.7 $\frac{45}{23}$ (method) = 2 times bigger (for both measurements correct) (values to be checked on printed version)

1.8 They have contributed to the knowledge of how natural selection occurs. (accept any important aspect of natural selection e.g., favourable traits passed on to offspring; environmental changes result in changes in frequency of alleles etc.)
They have contributed to understanding of speciation, in particular different ways in which sympatric speciation can occur.
They have described another example of sympatric speciation.
They have shown that evolution can proceed much quicker than previously thought.
They are showing the effects of a reduced degree of genetic variation on the survival of a species.

QUESTION 2

2.1 2.1.1 The evolution of new characteristics/decrease in variation in a populationdue to its establishment by a small number of individualsfrom a larger population.

2.1.2 Presence of Tay-Sachs diseasein Ashkenazi Jewish population in South Africa/presence of hypercholesterolemiain Afrikaans population. (Accept others)

2.1.3 A small population is established, therefore the proportion of each allele present is different to the source population /some alleles are more common in this population than in the originalTherefore the new population is genetically differentand therefore phenotypically different. /a new population is started by a few members of the original populationThis small population size means that the colony may have reduced genetic variationfrom the original population.

2.2 The populations are separated from one another by a geographic barrierwhich prevents gene flow. Sympatric speciation occurs when gene flow is disrupted without any geographic barrier.

2.3 2.3.1 Mutations
Genetic recombination from meiosisrandom assortment of alleles in meiosis.

2.3.2 Only genetic variation can be passed on to next generation/ environmental variation cannot be passed onto next generation.

2.4 2.4.1 The two species (*heteroneura* and *silvestris)* evolved on Hawaii around 0,4 million years agotherefore island must be at least 0,5 million years old.

2.4.2 The two species (*heteroneura* and *silvestris)* evolved relatively recentlyfrom a common ancestorwhereas *plantibia* evolved from a more distant common ancestor.

2.5 D
L
LD
LD

2.6 2.6.1 Birds can fly better (*Drosophila* are poor fliers), therefore they are not isolated in the kīpukas, therefore less chance of speciation.

2.6.2 They prevent gene flowand therefore isolate populations from one anotherno interbreeding occurs and therefore allows allopatric speciation to occur.

2.7 Decrease the number of species– due to fewer forested areasas less rainfall for forests to growtherefore less habitatand more competition between species.
OR:
Increase the number of species – more breaking up of forested areasinto isolated pocketstherefore more isolationand more speciation.

SECTION B

QUESTION 3

***Homo naledi* was using the area as a burial site**	***Homo naledi* was not using the area as a burial site**
Difficulty transporting bones	**Difficulty transporting bones** Caves are dark (A) Tunnels very narrow (A) Long way to carry bodies (A) Existed before any proof of burials appeared (A) No evidence of other entrances to chambers (D)
Characteristics of fossils Many age groups present (A) Berger found an actual grave (F) Stone tools have been found in the general landscape outside the caves (F) Brain of *H. naledi* looked very different to *Australopithecus* (G) Structure of *Homo naledi*'s frontal lobe was similar to that of other hominid species (G) Areas of the brain implicated in the evolution of tool use, language and social behaviour and learning (G) Frontal lobe development – strongly associated with the ability to produce speech (G)	**Characteristics of fossil** Bones scattered throughout the floor of the cave in no particular pattern (A) Short and smaller than modern-day humans (A) No stone tools in caves associated with making fires (F) How did they put up with smoke if they made fires (F) Brain size 1/3 human (G)
Features making burial likely	**Features making burial not likely** No evidence of 'grave goods' characteristic of humans (B)
What is burial? Other animals 'bury' e.g. elephants and seem to show some sort of 'grief' (B) Dolphins show some sort of 'emotion' around death (B) Unexpected discoveries have been made such as tool use in chimpanzees (B) Parts of brain controlling symbolic activity could have evolved up to 100 000 years or more ago (C) Neanderthals also shown to have buried – therefore not only humans buried dead (C) 200 000 year old burials in Spain (E)	**What is burial?** Most animals just 'bury' to get rid of dead due to scavengers (B) Dolphins may show some sort of 'emotion' but don't bury (B) Humans bury dead in specific sites (C) Parts of the brain that control symbolic activity emerged around 40 000 years ago (C) Bodies may have been buried by other species of *Homo* (E) 200 000-year-old burial in Spain not a burial – more likely disposal site (E)
Other openings No evidence of other entrances to chambers (D) No evidence that other entrances were present (D) Lack of presence of other animals in cave (D) No other debris in caves indicates no other entrance (D) Bodies reached chamber complete (D) No evidence of water transport (D) No scavenger marking on the bones (D) No damage to bones that would have been evident from being dropped into caves (E) Bodies weren't 'dumped' in caves – no damage (E)	**Other openings** Evidence of lichen on bones indicates another entrance was likely (D) Brain volume of *H. naledi* is small
Hiding/living/navigating caves Evidence of fire use in caves – cooking (F) And for navigating caves (F) *H. erectus* used fire 1,5 million years ago (F) Evidence of controlling and making fires 780 000 years ago (F)	**Hiding/living/navigating caves** Could have hidden in caves and not able to get out (D) Explain why accumulation over time (D) Control and making fires on? Shows was another entry into caves

Predators No sign of predator bodies (E) No predator only eats homnids (E)	**Predators** Absence of heads of long bones indicates predators (E) Sites have been found in the past where only baboon carcasses have been deposited by predators (E) There is evidence of damage done by beetles, beetle larvae, and snails (E) No evidence of the bodies of these organisms therefore decomposition had to happen ouside of cave (E) Leopards often concentrate their hunting efforts on a single prey species (E) They may do so without leaving any scratches or punctures on the bones (E) Most carnivores take the soft parts first, so in many cases there are no marks at all (E)
Water transport Body reached chambers intact (E) No sign of water transporting skeletons into caves (E) No evidence of sediment from water in caves (E)	**Water transport**
Science	**Science** Cannot have disproven all alternatives (H) Incorrect scientifically to accept an alternative as other explanations could exist (H)
OWN *Homo naledi* is member of genus *Homo* – therefore expect it to be similar to humans	**OWN** No evidence of afterlife belief – reason for human burial

Total: 100 marks

Note: Essay should be 2½ to 3 pages long.
Suggested allocation of time: Reading sources 10 min.; Planning 10 min.; Writing essay 40 min.

	1 mark	2 marks	3 marks	4 marks	Possible mark (40)
Planning **× 2**	• Decision given • Key points present for and against the argument	• Decision given • Key points developed for and against the argument	• Decision given • Key points developed for and against the argument • Source references identified (e.g., Source A/own information)		6
Decision	• Vague • Changed position within essay	• Clear decision made			2
Use of knowledge from sources **× 2**	• Up to ¼ of potential detail in sources used to support argument	• Up to ½ of potential detail in sources used to support argument	• Up to ¾ of potential detail in sources used to support argument	• Source detail – very close to full potential used to support argument	8
Use of own knowledge	• Some facts beyond the source given to support argument	• Many facts beyond the source given to support argument	• Some facts beyond the source given to support argument • Facts integrated into the argument	• Many facts beyond the source given to support argument • Facts integrated into the argument	4
Content relevance	• Repetition mostly avoided • Some minor digression • Supporting argument relevant	• Repetition mostly avoided • Some minor digression • Supporting argument relevant • Quality of source extracts acknowledged			2

	1 mark	2 marks	3 marks	4 marks	Possible mark (40)
Quality of argument supporting decision × 2	• Writing consists of facts with little linkage or reasoning • Reasoning incorrect	• **Maximum if no clear decision in support** • Reasoning correct, but hard to follow • Ordinary; some linkage evident	• Supports the position • Reasoning is clear • Minor errors in flow • Linkage sometimes missed	• Strongly supports a clear position • Reasoning is very clear and succinct • Flow is logical • Compelling with regular linkage • Well-integrated argument	8
Fairness – counter opinions to decision	• One to two counter opinions from the sources given	• Three to four counter opinions from the sources given	• Integration of one to two counter opinions from the sources into argument	• Integration of three to four counter opinions from the sources into argument	4
Presentation	• Writing is almost unintelligible • Tone, language, terminology unscientific and very weak • Introduction **and/or** conclusion **not** present	• Tone, language, terminology weak • Introduction **and** conclusion present	• Tone is consistent and suited to scientific language • Good and appropriate language and terminology • Mostly appropriate paragraphing • Introduction and conclusion have merit	• Tone is mature and suited to scientific language • Excellent and appropriate language and terminology • Correct paragraphing with good transitions • Interesting introduction, satisfying conclusion	4
Scientific merit	Essay shows academic rigour, accurate reasoning, insight and cohesiveness.				2