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TOTAL
MARKS

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NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2023

LIFE SCIENCES: PAPER II

EXAMINATION NUMBER

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Time: 2 hours

100 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 20 pages and a Source Material Booklet of 20 pages (i–xx). Please check that your question paper is complete. Remove the Source Material Booklet from the middle of the question paper.
2. The question paper consists of three questions. Question 1 and Question 2 are case studies and Question 3 is an essay.
3. Read the sources provided in the Source Material Booklet and use this information and your own knowledge to answer all the questions.
4. Read the questions carefully.
5. **Answer ALL the questions on the question paper and hand it in at the end of the examination. Remember to write your examination number in the blocks above.**
6. Use the total marks that can be awarded for each question and the space provided as an indication of the detail required.
7. It is in your own interest to write legibly and to present your work neatly.
8. FOUR blank pages (pages 17–20) are included at the end of the paper. If you run out of space for a question, use these pages. Clearly indicate the number of your answer should you use this extra space.

FOR MARKERS TO ENTER MARKS

QUESTION 1	QUESTION 2	QUESTION 3	TOTAL
30	30	40	100

SECTION A**QUESTION 1**

Refer to pages ii–vii of the Source Material Booklet. Use this information as well as your own knowledge to answer the questions that follow.

1.1 Describe the meaning of the following terms:

1.1.1 Hominid

(2)

1.1.2 Evolution

(2)

1.2 'Lucy' is a famous example of an extinct hominid species.

1.2.1 What is the scientific name of the fossil known as 'Lucy'?

(1)

1.2.2 Use the information in the text on page v to calculate how long ago Lucy had been alive. Show all working.

(2)

- 1.3 Although there were two hypotheses to explain how Little Foot ended up in the cave, only one has scientific support.

1.3.1 What is a hypothesis?

(2)

1.3.2 (a) Which one of the two hypotheses has the most support?

(1)

(b) Use information in the text to justify your choice.

(2)

- 1.4 Study the following table that consists of rows with two items/statements (numbered 1 and 2) in Column 2 and a name in Column 1. These names are taken from the text in the sources. Use your own knowledge and information from the sources and **decide which item relates to each name**. Write your answer in the final column.

Write '1' if only the first item / statement relates to the name.
 Write '2' if only the second item / statement relates to the name.
 Write 'none' If NEITHER item / statement relates to the name.

Question number	Column 1	Column 2	Answer
1.4.1	Raymond Dart	1. Mrs Ples 2. Taung Child	
1.4.2	<i>Homo habilis</i>	1. 'Handy man' 2. Quadrupedal	
1.4.3	<i>Homo erectus</i>	1. Brain is bigger than <i>H. sapiens</i> 's 2. Foramen magnum at back of skull	

(3)

1.5 *Australopithecus prometheus* appears to be a bipedal hominid but still shows many quadrupedal characteristics. Study the skeleton of Little Foot in Figure 1.6.

1.5.1 Discuss ONE environmental factor that would have made bipedalism an advantage for *Australopithecus prometheus*.

(2)

1.5.2 Suggest ONE feature that Prof. Clarke would have used to conclude that *Australopithecus prometheus* was most likely bipedal.

(1)

1.5.3 (a) Provide ONE quadrupedal feature present in Little Foot.

(1)

(b) Explain why the feature you mentioned in Question 1.5.3 (a) indicates quadrupedal behaviour.

(2)

1.6 Philip Tobias stated that 'it is a deeply important political fact that life began in Africa'. What did he mean by this statement?

(3)

1.7 Consider the cladogram in Figure 1.8.

1.7.1 Which hominid is still living?

(1)

1.7.2 How long ago did *Homo erectus* and *Australopithecus africanus* share a common ancestor?

(1)

1.7.3 At which position on the cladogram (point A, B or C) would *Australopithecus prometheus* most likely be placed?

(1)

1.8 Explain why scientists need to work carefully during the excavation of fossils from the Sterkfontein Caves.

(3)
[30]

QUESTION 2

Refer to pages viii–xii of the Source Material Booklet. Use this information as well as your own knowledge to answer the questions that follow.

2.1 Study Figure 2.4.

2.1.1 Describe what is meant by the caption '*different species of stick insect*'.

(2)

2.1.2 Calculate the actual length of the New Caledonia stick insect by using the line AB next to the photo. Show all working and give your answer in mm.

(3)

2.2 One of the hypotheses for the evolution of the specific features of the Lord Howe stick insect was that it occurred by convergent evolution.

2.2.1 What is meant by the term 'convergent evolution'?

(3)

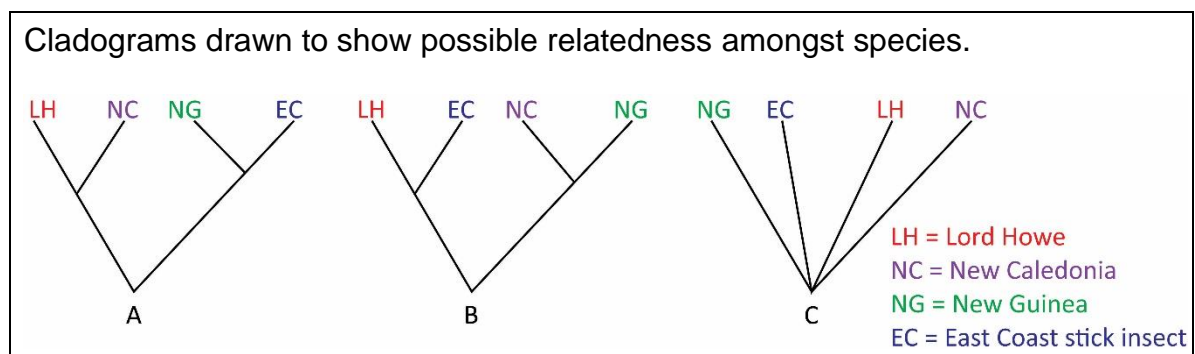
2.2.2 Describe the selection pressure that resulted in the convergent evolution in these stick insects.

(2)

2.3 Explain why DNA evidence is more accurate than fossil evidence for establishing relatedness amongst organisms.

(3)

2.4 Study the cladograms below and the table of results on page x of the Source Material Booklet.



2.4.1 Based on the results of the experiment, which cladogram, A, B or C, is the most accurate representation of the relationship amongst the four species?

(2)

- 2.4.2 Study the images of the sequence of fossils and information about environmental changes in New Caledonia as seen in Figure 2.5 on page xi. Can the evolution of stick insects in New Caledonia be regarded as an example of punctuated equilibrium or as an example of gradualism? Justify your answer.

(3)

- 2.5 The Lord Howe stick insect evolved from a *small* population of stick insects that arrived on Lord Howe Island.

- 2.5.1 (a) Explain how the small size of the founding population contributed to the genetic differences seen in the Lord Howe population.

(3)

- (b) Study the six points listed below. *Some* of them correctly describe the evolution of the Lord Howe stick insect from an original population. Write down the letters of the *correct* statements in the *correct* order in which evolution occurred.

- A Acquired characteristics are passed on to the next generation.
- B Over time characteristics diverged between the population on Lord Howe Island and the original population.
- C Individuals acquired adaptations over their lifetime.
- D Individuals with characteristics that were favourable on Lord Howe Island survived and reproduced.
- E The original population mated with another species on the island.
- F Individuals from the two new populations did not recognise one another as potential mates.

(3)

- 2.5.2 Explain why this type of speciation can be regarded as allopatric speciation and not sympatric speciation.

(3)

2.6 A plan has been put forward to remove the exotic species from Lord Howe Island.

2.6.1 Suggest ONE reason why exotic species pose a threat to indigenous species.

(1)

2.6.2 Why is it important to establish World Heritage Sites such as the one on Lord Howe Island?

(2)
[30]

60 marks

SECTION B

Refer to pages xiii–xx of the Source Material Booklet.

QUESTION 3

Consider the following statement:

'Natural and artificial selection will preserve species biodiversity despite the effects of climate change'

Using the source material provided as well as your own knowledge, discuss your opinion on this statement in the form of an essay of 2½–3 pages.

In your response you are expected to:

- Read the source material carefully.
- Take a definite stand on the statement.
- Plan your essay before you start writing. Your planning will be marked.
- Present a debated argument. Use relevant information from sources A–H as well as your own knowledge of Life Sciences to support your point of view.
- Arrange the information to best develop your argument.
- Write in a scientifically appropriate way.
- **In your essay, ensure that you have discussed at least nine different facts from the sources.**

40 marks

Total: 100 marks

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

ADDITIONAL SPACE (ALL QUESTIONS)

REMEMBER TO CLEARLY INDICATE AT THE QUESTION THAT YOU USED THE ADDITIONAL SPACE TO ENSURE THAT ALL ANSWERS ARE MARKED.

[illegible]

[illegible]

[illegible]

This image shows a single page of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook or legal paper. There are no margins, text, or other markings on the page.