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TOTAL  
MARKS

INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION  
NOVEMBER 2023

**BIOLOGY: 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 16 pages and a Source Material Booklet of 16 pages (i–xvi). Please check that your question paper and Source Material Booklet are complete. Remove the Source Material Booklet from the middle of the question paper.
2. The question paper consists of three questions. Question 1 and 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. Refer to the mark allocation for each of the questions in Question 1 and 2 as an indication of the detail required.
7. It is in your own interest to write legibly and to present your work neatly.
8. ONE blank page (page 16) is included at the end of the paper. If you run out of space for a question, use this page. Clearly indicate the number of your answer should you use this extra space. Write this question number exactly as it appears on the question paper.

**FOR MARKERS' USE ONLY**

| Question  | 1  | 2  | 3  | Total |
|-----------|----|----|----|-------|
| Marks     | 30 | 30 | 40 | 100   |
| Marked    |    |    |    |       |
| Moderated |    |    |    |       |

**SECTION A****QUESTION 1**

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

1.1 Provide a word from the text that means the same as the following statements.

1.1.1 A change in the DNA of an organism.

\_\_\_\_\_ (1)

1.1.2 The mating of genetically closely related individuals.

\_\_\_\_\_ (1)

1.2 Refer to Figure 1.2 on page ii of the Source Material Booklet.

1.2.1 Answer the questions in the table below.

|     | Question                                                                                        | Answer |
|-----|-------------------------------------------------------------------------------------------------|--------|
| (a) | Approximately how long ago did the cheetahs and cougars diverge?                                |        |
| (b) | Which is the earliest and longest-living species amongst all the <i>Felidae</i> family members? |        |
| (c) | To which cat species is the domestic cat most closely related?                                  |        |

(3)

1.2.2 List TWO types of evidence scientists would have used to construct this phylogenetic tree.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2)

- 1.3 Provide evidence from Figure 1.2 and the text to show that the different members of the *Felidae* family show a pattern of divergent evolution.

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(2)

- 1.4 Explain how the golden-brown leopard and snow leopard evolved into different species by allopatric speciation.

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(4)

- 1.5 Explain why the fur colour of the golden-brown leopard and the black leopard are an example of microevolution.

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(2)

1.6 How would Lamarck have explained the evolution of the snow leopard's white fur?

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(3)

1.7 What is the impact of the human disturbance practice of deforestation on the survival of the black leopard?

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(2)

1.8 Refer to Figure 1.8 on page v of the Source Material Booklet.

There were approximately 7 000 cheetahs in the world in 2020.

Suggest a reason why the graph is not an accurate representation of the actual cheetah numbers in 2020.

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(1)

1.9 Provide TWO facts from the text that indicate that cheetahs have a low rate of reproductive success.

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(2)

- 1.10 Discuss the impact of low genetic variation on the future survival of the cheetah in a changing environment.

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(4)

- 1.11 The ancient Egyptians treated cats like royalty and bred cats for specific reasons.

1.11.1 State the correct term for this type of breeding.

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(1)

1.11.2 State TWO advantages of this type of breeding for the Egyptians.

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(2)  
[30]

**QUESTION 2**

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

2.1 Provide a suitable definition for the term 'hominid'.

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(2)

2.2 Refer to Figure 2.1 on page vi of the Source Material Booklet. Use this diagram and your own knowledge to answer the following questions.

2.2.1 Which hominid was the first to control fire?

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(1)

2.2.2 Name one other species of the *Australopithecus* genus that you have learned about that is **not** shown on the graph.

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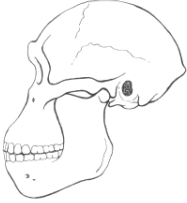
(1)

2.2.3 How long ago did *Australopithecus africanus* live?

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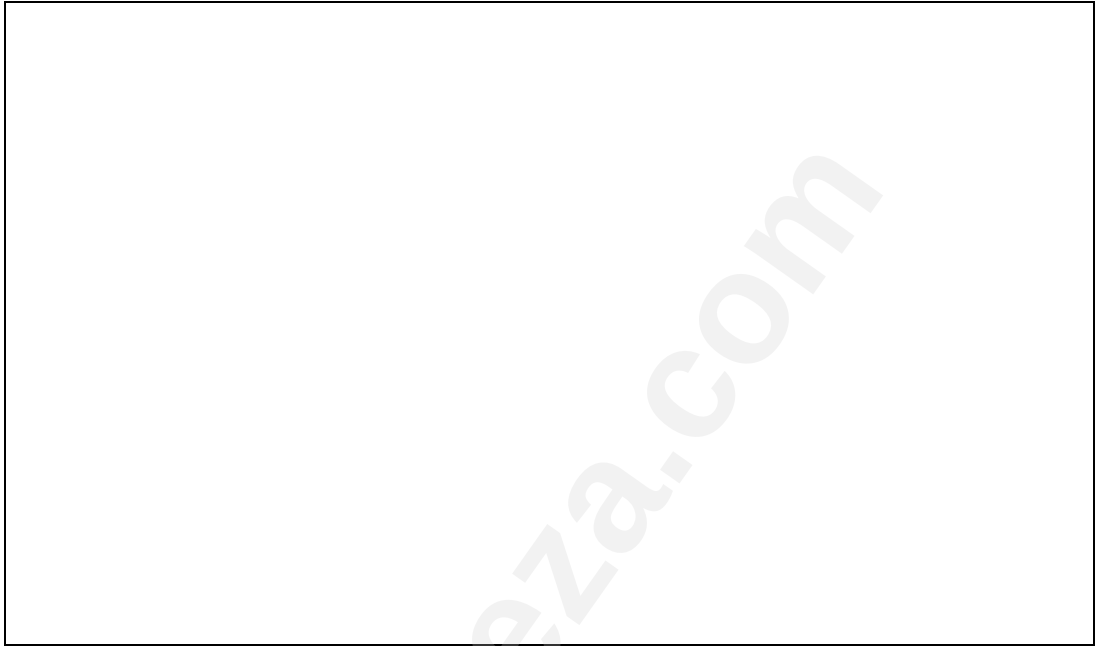
(1)

2.2.4 Complete the table by filling in TWO differences visible in the skull diagrams of *Australopithecus africanus* and *Homo erectus* seen below.

| <i>Australopithecus africanus</i>                                                   | <i>Homo erectus</i>                                                                   |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |
|                                                                                     |                                                                                       |
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(2)

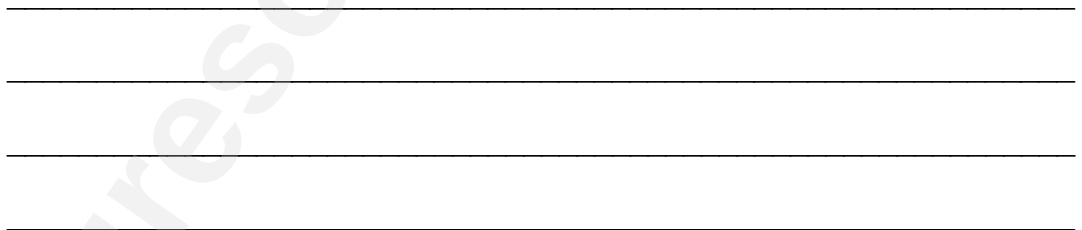
- 2.2.5 In the human brain,  $5 \text{ cm}^3$  of brain tissue contains 250 million neurons. How many million neurons are found in a brain with a volume of  $1\,400 \text{ cm}^3$  of brain tissue? Show your calculations in the space below.



(3)

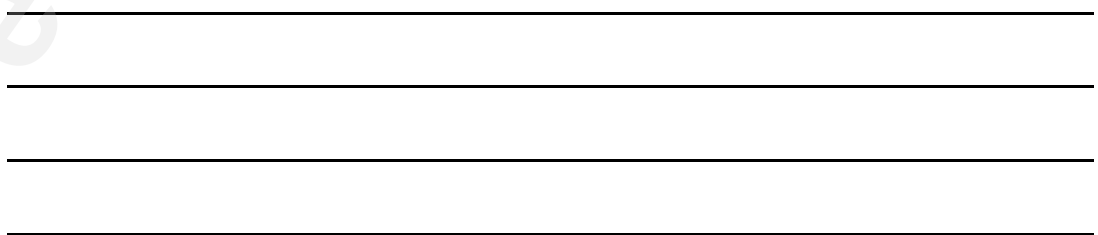
- 2.3 Describe how features of a skull would indicate the following important evolutionary developments:

2.3.1 Bipedalism



(2)

2.3.2 Speech



(2)

- 2.4 *Homo habilis* made Oldowan stone tools and *Homo erectus* made Acheulian stone tools.

Refer to the information in the source and draw a table in the space below to provide the following information:

- TWO differences in the tools made by *Homo habilis* and *Homo erectus*.
- The skills required by each hominid to have made these tools.

(5)

- 2.5 Refer to Figure 2.5, the map of Africa, on page viii of the Source Material Booklet.

- 2.5.1 The fossil Mrs Ples was discovered in an important heritage site in South Africa. This area is marked with an X on the map.

Name area X.

(1)

- 2.5.2 Is it likely that Mrs Ples made simple stone tools? Explain your answer.

(2)

2.6 Refer to Figure 2.6 on page viii of the Source Material Booklet.

By referring to the brain images, provide evidence that supports the conclusion that Acheulian tool production stimulated the development of speech.

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(4)

2.7 Refer to Figures 2.7 and 2.8 on page ix of the Source Material Booklet.

Do the results shown in the two graphs support the earlier social-brain hypothesis? Explain your answer.

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(2)

2.8 Provide evidence from the text to explain why the human brain size has decreased over the last 3 000 years.

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(2)  
[30]

**60 marks**

**SECTION B**

Refer to pages x – xvi of the Source Material Booklet.

**QUESTION 3**

Consider the following statement:

**'Evolution has had a positive impact on the control of disease in humans.'**

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.

**To answer this question, you are expected to:**

- Read the source material carefully.
- Take a definite stand on the statement and arrange the information to best develop your argument.
- Select relevant information from the sources in the Source Material Booklet.
- It is important to integrate your own relevant knowledge of Biology to support your point of view.
- Write in a way that is scientifically appropriate and communicates your point of view clearly.
- **Provide** a clear **plan** of your essay before you start writing. Note that the plan will be marked as part of the assessment of this question.
- **In your essay, ensure that you have discussed at least nine different facts from the sources.**

[40]

**PLAN:**

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[illegible]





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

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