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TOTAL
MARKS

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INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
MAY 2025

BIOLOGY: PAPER II

EXAMINATION NUMBER

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Time: 2 hours

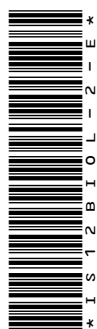
100 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 16 pages and a Source Material Booklet of 18 pages (i–xviii). 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 the question you are answering 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–vi of the Source Material Booklet. Use this information as well as your own knowledge to answer the questions that follow.

1.1 Provide the meaning of the term *fertility*.

(1)

1.2 1.2.1 In which organ in the body are each of the following produced?

(a) Sperm cells

(1)

(b) Ova/egg cells

(1)

1.2.2 According to the sources: '*temperature can negatively influence reproductive health by affecting sperm motility and menstruation cycles*'.

(a) Name the structure that protects the testes.

(1)

(b) Explain a reason why sperm production happens at a lower temperature than the production of the ova in the ovaries.

(2)

1.2.3 Refer to the graph in Figure 1.1 on page ii of the Source Material Booklet to answer the questions that follow:

- (a) The average birth rate per mother over the years can also be drawn as a histogram. What is the value in representing the average birth rate as a histogram?

(2)

- (b) In which year is the difference in average birth rate and temperature the highest?

(1)

- (c) According to information from the sources on page iii: 'As temperatures increase, external stress can influence hormone levels within mammals ...'

Explain the effect that a decrease in oestrogen and progesterone levels could have on a woman's body, which would influence fertility in women.

Oestrogen: _____

Progesterone: _____

(2)

- 1.2.4 (a) Provide TWO ways in which rising temperature results in infertility in men.

(2)

- (b) Using information from the text, state ONE piece of advice to men to prevent infertility problems.

(1)

- 1.3 Refer to the information on the effect of climate change on the reproduction of animals on page iii to match an effect with its outcome. Only write the letter of the outcome from column B in the space provided next to the effect in column A.

Column A – Effect		Column B – Outcome	
	Food availability	A	Some animals rely on reproductive times due to seasonal changes brought on by the changes in length of sun exposure during the day.
	Photoperiod changes	B	Changes in the environment can cause abnormalities in the development of sperm and ova/egg cells.
	Hormonal and gamete changes	C	Nutrition plays an important role in the production of hormones, so changes in diet can affect the reproductive cycles of animals.

(3)

- 1.4 1.4.1 (a) Provide the letter of the sperm cell from Figure 1.2 on page iv that in your opinion would have the most difficulty in fertilising an ovum.

_____ (1)

- (b) Provide a well-explained reason for your choice in Question 1.4.1 (a) above.

 _____ (2)

- 1.4.2 Use the space provided below to calculate the actual diameter of the normal sperm cell's head from X to Y. Use the scale bar provided and show all working. Give your answer in μm .

(3)

- 1.5 Refer to the information provided on page iv on 'Temperature change effects on female reproduction', to answer the questions below.

1.5.1 Provide the term for the mature follicle that develops just before ovulation.

_____ (1)

- 1.5.2 From the graph in Figure 1.3 on page vi name the TWO hormones referred to in the Source Material Booklet on page iv.

Hormone A: _____

Hormone B: _____ (2)

- 1.6 Compare the diagrams of the human menstrual cycle (Figure 1.3 on page vi) and the cow oestrous cycle (Figure 1.4 on page vi) and describe ONE similarity and ONE difference in their menstrual cycles.

Similarity: _____

Difference: _____

(4)

[30]

QUESTION 2

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

2.1 By referring to the information from the Source Material Booklet, provide a term that describes the following:

2.1.1 A structure in a plant that forms after sexual reproduction and grows into a new plant.

_____ (1)

2.1.2 An example of an asexual reproductive method in plants.

_____ (1)

2.2 Explain the significance of the following TWO reproductive processes in a plant.

Pollination: _____

Fertilisation: _____

_____ (2)

2.3 Figures 2.1 to 2.4 on page vii show the structure of the pincushion protea flower.

2.3.1 Refer to the names of the flower parts in Figure 2.3 and identify which parts are male and which are female reproductive structures.

(a) Male: _____

(b) Female: _____

(3)

2.3.2 Refer to the image labelled Figure 2.2 and identify which letter, X, Y or Z, identifies the position of the ovary of one floret.

_____ (1)

- 2.3.3 On page viii of the sources it states that grape cultivation can result in the loss of many protea species. Grapes are a fruit that can be used as a food source but are also extensively used for wine production.

Do you think cultivating grapes in the protea plants' natural environment is a wise decision by landowners in South Africa? Justify your answer.

(2)

- 2.4 2.4.1 Describe a feature of the pincushion flower that indicates it relies on cross pollination for fertilisation.

(1)

- 2.4.2 The seed of a protea is protected by a hard shell instead of a juicy fruit. Name the part of the flower from which each of the following structures develop.

Seed: _____

Hard shell: _____
(2)

- 2.4.3 (a) What is the purpose of a seed bank?

(1)

- (b) Do you think seeds of all protea species need to be stored in a seed bank? Justify your answer.

(2)

- 2.5 From the information provided, draw up a table comparing TWO differences between asexual and sexual reproductive methods of propagating protea plants.

(5)

- 2.6 Various methods have been used to induce polyploidy in plants, like the protea plant, to achieve more favourable traits for plant growers.

2.6.1 Explain what is meant by polyploidy.

(1)

2.6.2 Name TWO favourable features that could be achieved through polyploidy in protea plants.

(2)

- 2.7 2.7.1 (a) Which one of the two pollinating agents mentioned on page x of the Source Material Booklet, can be described as an r-strategist?

(1)

(b) Provide ONE piece of evidence from the sources that supports your answer in Question 2.7.1 (a).

(1)

- 2.7.2 (a) Provide the term used to describe a reproductive strategy in which animals lay eggs that develop and hatch outside the mother's body.

(1)

- (b) Discuss the importance of the amniotic egg as an important survival strategy for birds.

(3)
[30]

60 marks

SECTION B

Refer to pages xi–xviii of the Source Material Booklet.

QUESTION 3

The cultivation of Genetically Modified (GM) crops will provide a solution to Africa's food shortages.

Using the source material provided as well as your own knowledge, discuss whether you agree or disagree with 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 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 9 different facts from the sources.**

[40]

PLAN:

[illegible]

[illegible]

[illegible]

[illegible]

40 marks

Total: 100 marks

PLEASE TURN OVER

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]