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TOTAL
MARKS

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INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
NOVEMBER 2024

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 17 pages and a Source Material Booklet of 15 pages (i–xv). 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 17) 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–iii of the Source Material Booklet. Use this information as well as your own knowledge to answer the questions that follow.

Since the domestication of plants started, crops have been used to feed people all around the world. Current food shortages demand that many crops such as maize, wheat, and rice are grown.

- 1.1 By referring to Figure 1 on page ii of the Source Material Booklet, provide only the numbers of the male and female reproductive parts of the pigeon pea flower below.

Flower part	Number/s
Male	
Female	

(2)

- 1.2 By referring to Figure 3 of the pigeon pea pod, as well as Figure 1 of the structure of the pigeon pea flower, state which number/s will develop from the flower into the following parts of the pod:

- 1.2.1 Outer covering or shell of the pea pod

(1)

- 1.2.2 Seeds

(1)

- 1.3 Provide ONE advantage and ONE disadvantage for each of the following pollination methods:

- 1.3.1 Self-pollination

(2)

1.3.2 Cross-pollination

(2)

1.4 Refer to Figure 2 of the pigeon pea plant on page ii of the Source Material Booklet.

Do you think the pencil drawings, accompanying the coloured drawing, can be considered as true biological drawings? Provide TWO reasons for your answer.

(2)

1.5 1.5.1 By looking at the three different pollinating agents below, decide which agent will most probably play the largest role in the pollination of the pigeon pea plant. **Circle the correct letter, A, B, or C, below the photographs.**



A



B



C

(1)

1.5.2 Using the information given in Source 1, provide TWO visible reasons for your choice in Question 1.5.1.

(4)

- 1.5.3 By using the information provided on page iii of the Source Material Booklet, decide if the following pollinator is either an r- or K-strategy animal:

Field mouse:

(1)

- 1.5.4 *'The honeybee is different from many other insects, as it is categorised as a K-strategist, rather than an r-strategist.'*

By using the information from the Source Material Booklet, as well as your own knowledge, use the table below to give TWO reasons why the honeybee is considered to be a K-strategist. Also provide TWO reasons why the honeybee could be mistaken as an r-strategist.

TWO reasons for honeybee as K-strategist	TWO reasons why the honeybee could be mistaken as an r-strategist

(4)

- 1.6 The field mouse is a viviparous mammal, and the honeybee is an oviparous insect.

Explain how each reproductive strategy contribute to the survival of the field mouse and honeybee as species.

Field mouse:

(2)

Honeybee:

(2)

- 1.7 According to the information on page iii of the Source Material Booklet, sexual and asexual reproduction have contributed to the domestication and development of crops suitable for mass production.

1.7.1 Would pigeon pea plants generally be grown by using sexual or asexual production methods?

(1)

1.7.2 Using the information from the Source Material Booklet, provide ONE reason for your answer in Question 1.7.1.

(1)

1.7.3 In the text on page iii of the Source Material Booklet, it is mentioned that processes like polyploidy and hybridisation have contributed to the success of asexual reproduction.

Provide ONE benefit of each of the following processes with regard to creating good plant crops.

Polyploidy:

(1)

Hybridisation:

(1)

- 1.7.4 Provide TWO ways in which asexually propagated crops will allow farmers to produce sufficient food to solve the global food crisis.

(2)

[30]

QUESTION 2

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

If a hormone is under or oversecreted, it can have serious consequences if not treated. This question looks at various endocrine disorders within the population of Ghana.

- 2.1 According to the information provided, which endocrine disorder affected the most patients treated in the five-year study in Ghana?

(1)

- 2.2 Refer to the information on page iv of the Source Material Booklet. Use the information below to complete the table that follows.

The four statements in the table below pertain to the passage mentioned above.

For each statement, decide if:

- A** the statement is supported by the information in the passage.
B the statement is contradicted by the information in the passage.
C the statement is neither supported nor contradicted by the information in the passage.

	STATEMENT	A, B OR C
2.2.1	More males than females were diagnosed with an endocrine disorder in Ghana between 2011 and 2015.	
2.2.2	Endocrine disorders are causing an increased burden in all developing countries worldwide.	
2.2.3	The total number of endocrine-related conditions ever recorded in Ghana amount to 2990 cases.	
2.2.4	Gonadal diseases are linked to pituitary diseases, because of the related reproductive hormones originating in the pituitary gland.	

(4)

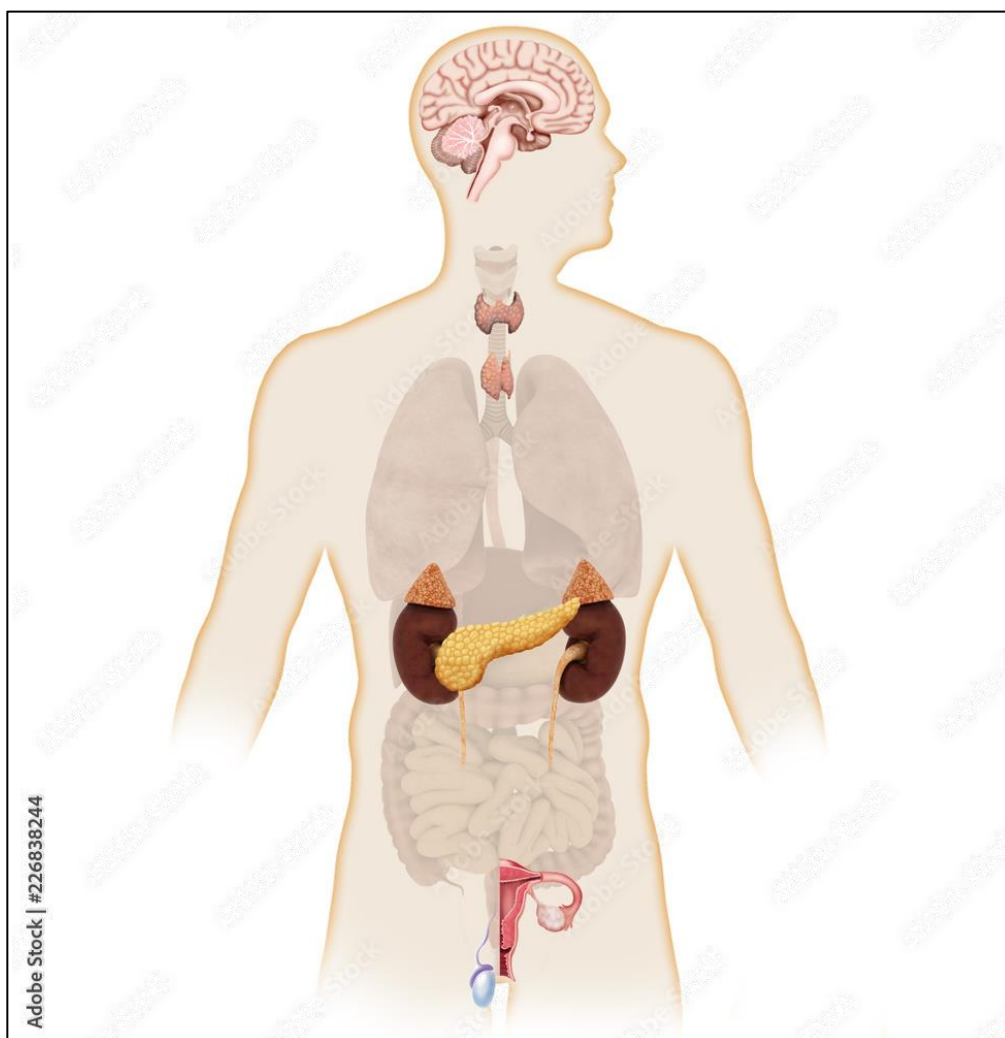
- 2.3 Label the different organs, where hormones A to D below are produced, on the diagram below. Only use the letter of the corresponding hormone (A to D) in your label.

A: Insulin

B: Adrenalin

C: Thyroxin

D: FSH



[Image adapted from: <<https://stock.adobe.com/>>]

(4)

- 2.4 Provide a term from the source '*The Rise of Diabetes in Ghana*' on page iv of the Source Material Booklet that describes an increase in blood sugar level.

(1)

- 2.5 In maintaining homeostasis, the endocrine system involves a system of negative feedback control. In the space below, draw a flow diagram to show how an increase in blood glucose level is corrected. The first statement is given. No heading is required.

Rise in glucose levels

(5)

- 2.6 Use information from the Source Material Booklet, as well as your own knowledge, to explain the difference between Diabetes Type 1 and Type 2.

(4)

- 2.7 Using the information on page v of the Source Material Booklet, as well as your own knowledge, explain how a deficiency in iodine is linked to thyroid disorders.

(1)

- 2.8 Do you think the decision to offer iodine supplementation to the people in Ghana was a good decision? Justify your answer.

(2)

- 2.9 Refer to Figure 4 on page v of the Source Material Booklet (Number of thyroid cases in Ghana) to answer the following questions.

- 2.9.1 Identify the dependent variable from this graph.

(1)

- 2.9.2 Calculate the percentage increase in thyroid cases between 1996 and 2014.

(2)

- 2.9.3 Examine the trend of the number of thyroid enlargement cases in Ghana between 1996 and 2014.

Provide a probable, estimated number of thyroid cases in the year 2000.

(2)

- 2.9.4 Provide an explanation for your answer in Question 2.9.3.

(1)

2.10 The following questions are linked to infertility in men in Ghana (from the information provided on page vi of the Source Material Booklet).

2.10.1 What is the link between testosterone levels, temperature change, and infertility among men?

(1)

2.10.2 A popular magazine made the following statement: '*The enlarged veins around the vas deferens will also inhibit sperm from being transported to the urethra, causing infertility in men with varicocele.*'

Use evidence from the source to reject the statement above.

(1)

[30]

60 marks

SECTION B

Refer to pages vii–xv of the Source Material Booklet.

QUESTION 3

Considering the various challenges people face in starting a family, including infertility, financial constraints, and demanding careers, do you think that Artificial Reproductive Technology (ART) will become the preferred method for having children in the future?

Using the source material provided as well as your own knowledge, discuss whether you agree or disagree with the question 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]

40 marks

Total: 100 marks

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]