basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

EXEMPLAR 2011

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT all drawn to scale.
9. You may NOT use graph paper.
10. You may use a non-programmable calculator, protractor and compass.
11. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question number (1.1.1–1.1.7) in the ANSWER BOOK, for example 1.1.8 D.

1.1.1 Which of the following is an exocrine gland?

A Thyroid
B Pancreas
C Adrenal
D Pituitary

1.1.2 The ability of the lens to change its curvature is known as …

A astigmatism.
B binocular vision.
C accommodation.
D pupillary mechanism.

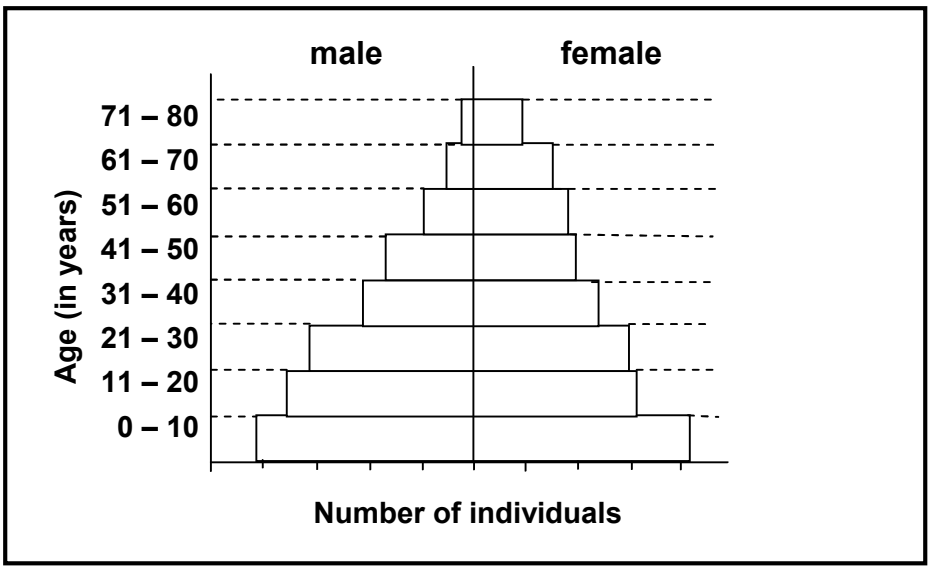
1.1.3 Diabetes is caused by an ...

A oversecretion of adrenalin.
B undersecretion of insulin.
C oversecretion of aldosterone.
D undersecretion of glucagon.

1.1.4 The net increase of a population can be determined by ...

A adding births and deaths and subtracting emigrations and immigrations.
B adding births and emigrations and subtracting deaths and immigrations.
C adding births and immigrations and subtracting deaths and emigrations.
D adding deaths and immigrations and subtracting births and emigrations.

1.1.5 Study the pyramid below.



Which of the following is a CORRECT interpretation of the population above?

A Rapidly growing population; characteristic of a developing country
B Declining population; characteristic of a developing country
C Stable population; characteristic of a developed country
D Declining population; characteristic of a developed country

1.1.6 Complete metamorphosis is characterised by the following stages in the life cycle of an organism:

A Egg, pupa and adult
B Egg, larva and adult
C Egg, larva, pupa and adult
D Egg and adult

1.1.7 The hatching of fertilised eggs in the body of the female, such that the young are born alive, is called …

A external fertilisation.
B oviparous.
C viviparous.
D ovoviviparous. (7 x 2) **(14)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

1.2.1 Type of vision made possible by two eyes with different, but overlapping, visual fields

1.2.2 The permanent movement of individuals of a population out of a defined area

1.2.3 The layer of the eyeball which is pigmented and which prevents internal reflection

1.2.4 Development of a community over time where species in one stage are replaced by other species

1.2.5 The total count of all individuals in a population

1.2.6 The role of a species within the structure and functioning of an ecosystem

1.2.7 Fluid that protects the embryo against injury and temperature changes

1.2.8 The tube leading from the testis to the urethra in males

1.2.9 Part of the nervous system consisting of a sympathetic and parasympathetic section

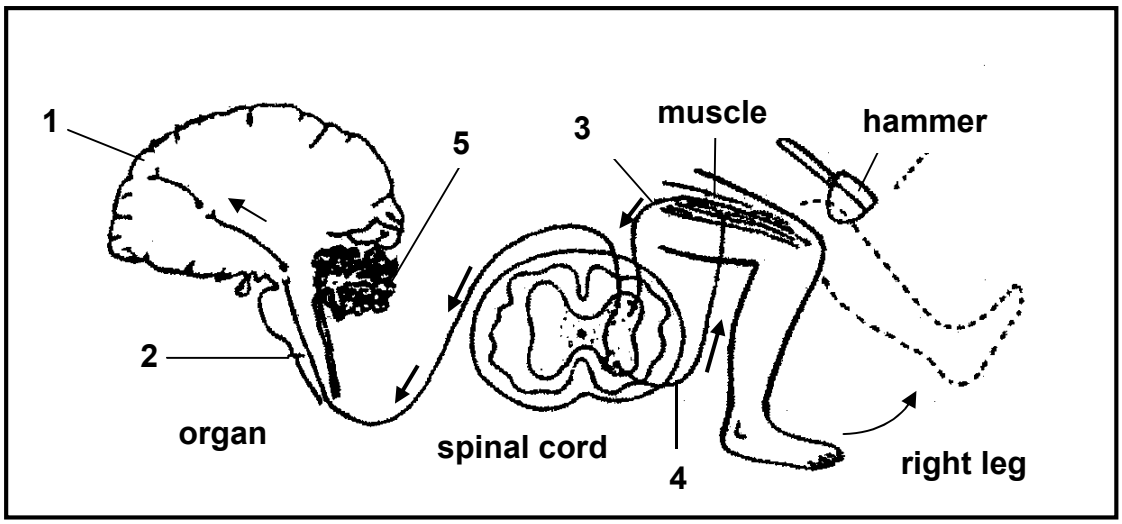
1.2.10 The type of development whereby offspring are incapable of moving around soon after hatching (10 x 1) **(10)**

1.3 Indicate whether each of the statements in COLUMN I applies to **A only**, **B only**, **both A and B** or **none** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	No photoreceptors	A: Blind spot B: Yellow spot
1.3.2	Process that reduces the chances of fertilisation	A: Contraception B: Conception
1.3.3	Lens of the eye is too convex	A: Hypermetropia B: Astigmatism
1.3.4	Used by plants as protection from being eaten by animals	A: Chemicals B: Thorns
1.3.5	Example of social organisation that increases the chances of survival	A: Division of labour in bees B: A herd of zebras

(5 x 2) **(10)**

1.4 The diagram below shows the human brain (longitudinal section), spinal cord (transverse section) and the right leg.



Four options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.4.1–1.4.5) in the ANSWER BOOK, for example 1.4.6 D.

1.4.1 Which part of the brain is indicated by 1?

A Cerebrum
B Medulla
C Cerebellum
D Hypothalamus

1.4.2 Which ONE of the following is a function of the part of the brain numbered 2?

A Perception of sensations
B Centre for control of breathing
C Maintenance of equilibrium and balance
D Centre for regulation of body temperature

1.4.3 Under normal circumstances, which numbered part coordinates the movements of the legs?

A 2
B 3
C 4
D 5

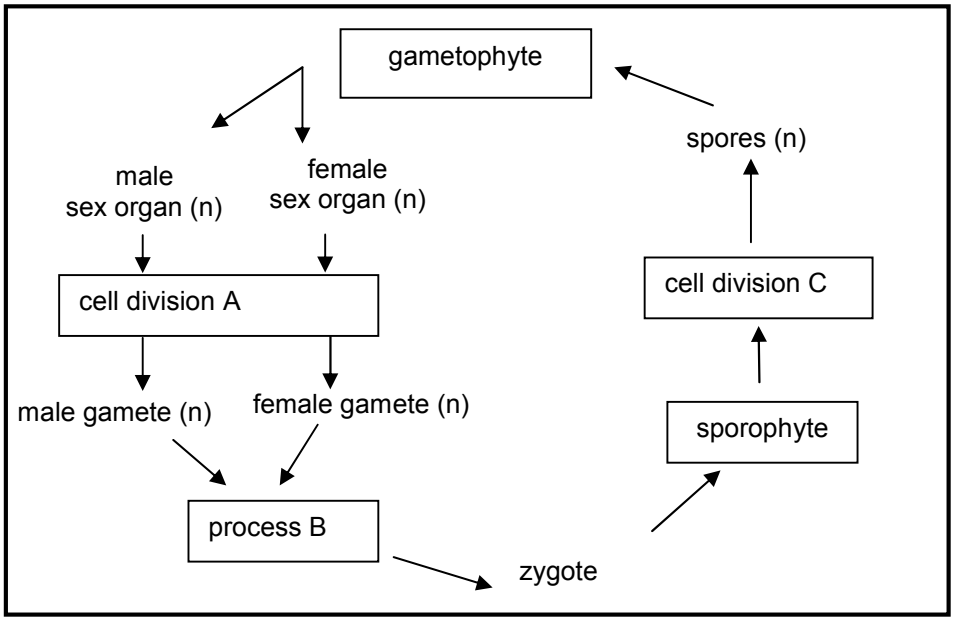
1.4.4 Which ONE of the following comparisons between 3 and 4 is FALSE?

A 3 is a sensory neuron, while 4 is a motor neuron.
B 3 leads from the receptor, while 4 leads to the effector.
C 3 enters the dorsal root, while 4 leaves through the ventral root.
D The cell body of 3 is located in the spinal cord, while that of 4 is found outside the spinal cord.

1.4.5 Which ONE of the following is FALSE about the role of the brain and spinal cord involved in the action in the diagram?

A The brain is aware of the tap on the knee with the hammer.
B An effector is stimulated to bring about a response.
C The spinal cord receives sensory impulses from the knee.
D The brain receives sensory impulses from the spinal cord and sends motor impulses to the leg muscles. (5 x 2) **(10)**

1.5 Study the diagram below of the life cycle of a plant in which the gametophyte generation is dominant.



1.5.1 Is the life cycle represented that of moss or a flowering plant? (1)

1.5.2 Name the following:

(a) Cell division A (1)

(b) Process B (1)

(c) Cell division C (1)

1.5.3 Is the gametophyte haploid or diploid? (1)

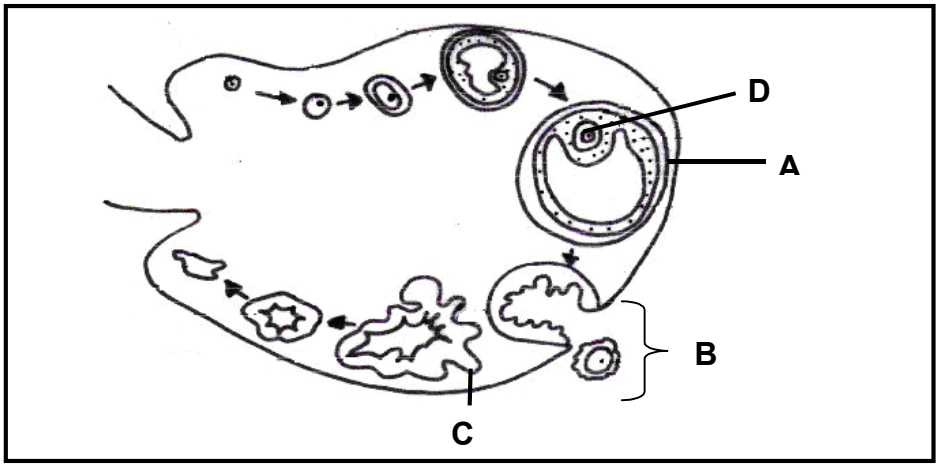
1.5.4 Are seeds produced during the life cycle of this plant? (1)
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the diagram below showing the sequence of events of the development of an ovum in a 28-day cycle.



2.1.1 Identify the following:

(a) Follicle labelled A (1)

(b) Structure labelled C (1)

(c) Process shown at B (1)

(d) Hormone responsible for the formation of part A (1)

(e) Hormone responsible for the formation of part C (1)

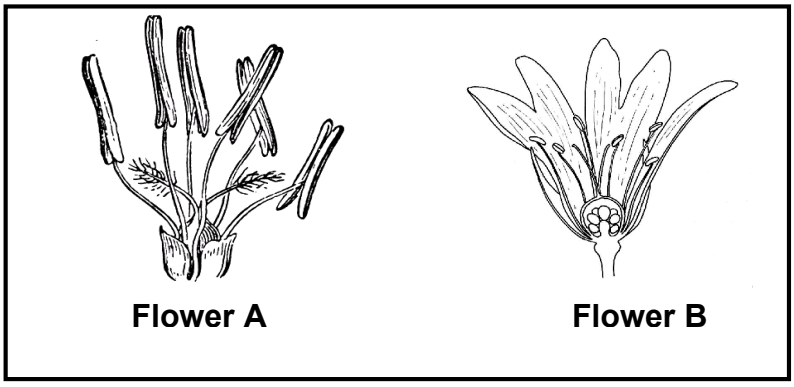
2.1.2 What type of cell division resulted in the formation of part D? (1)

2.1.3 If the events shown above took place in a 28-day cycle, state whether fertilisation took place during this period. (1)

2.1.4 Explain your answer to QUESTION 2.1.3. (3)

2.1.5 Explain HOW and WHY the production of FSH is inhibited when fertilisation takes place. (4)
(14)

2.2 Study the diagrams below showing the structures of two flowers.



2.2.1 Define *pollination*. (2)

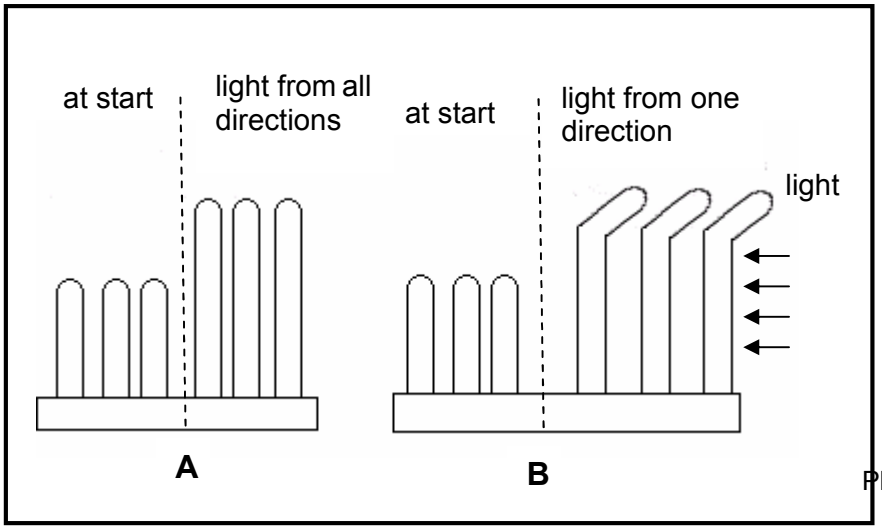
2.2.2 Which flower (A or B) is wind-pollinated? (2)

2.2.3 Give TWO visible reasons for your answer to QUESTION 2.2.2. (2)
(6)

2.3 A group of Grade 12 learners wanted to investigate the effect of light coming from one direction on the growth of shoots. They planted some wheat seeds in two seed trays and allowed it to germinate. When young shoots appeared above the soil level, the shoots were exposed to light from all directions for three days. After three days, the trays received different treatments as follows:

Tray A: The shoots were exposed to light from all directions.
Tray B: The shoots were exposed to light from one direction only.

The diagrams below show the effects of these treatments. Study it and answer the questions that follow.

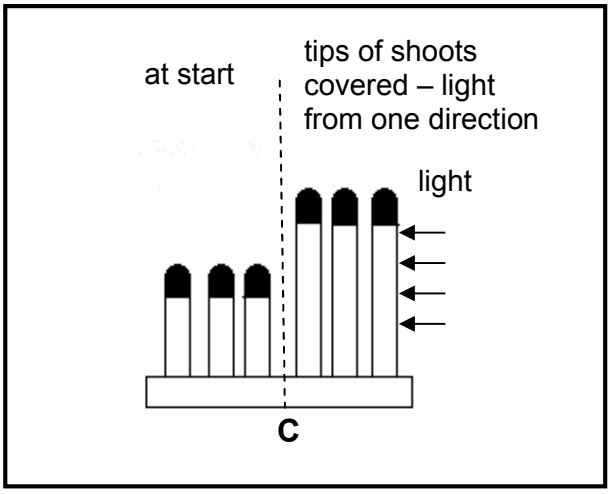


2.3.1 Formulate a hypothesis for the investigation above. (2)

2.3.2 Explain why it was important to include tray A as part of this investigation. (2)

2.3.3 State ONE conclusion that may be drawn from this investigation. (2)

2.3.4 A third tray (C) was set up in a similar way as tray A and tray B. The tips of the shoots were covered with aluminium foil. The diagram below shows the appearance of the shoots at the start and after being exposed to light from one direction only.



What conclusion can you draw from the results obtained in tray C? (2)

2.3.5 Name ONE use in agriculture of the following:

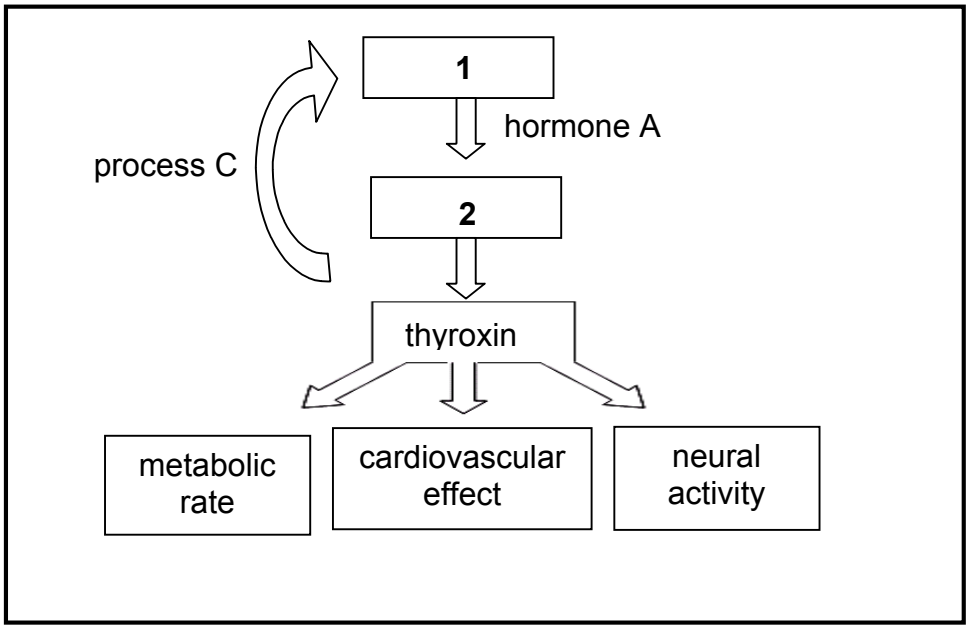
(a) Auxins (1)

(b) Gibberellins (1)

(10)
[30]

QUESTION 3

3.1 Study the diagram below and answer the questions that follow.

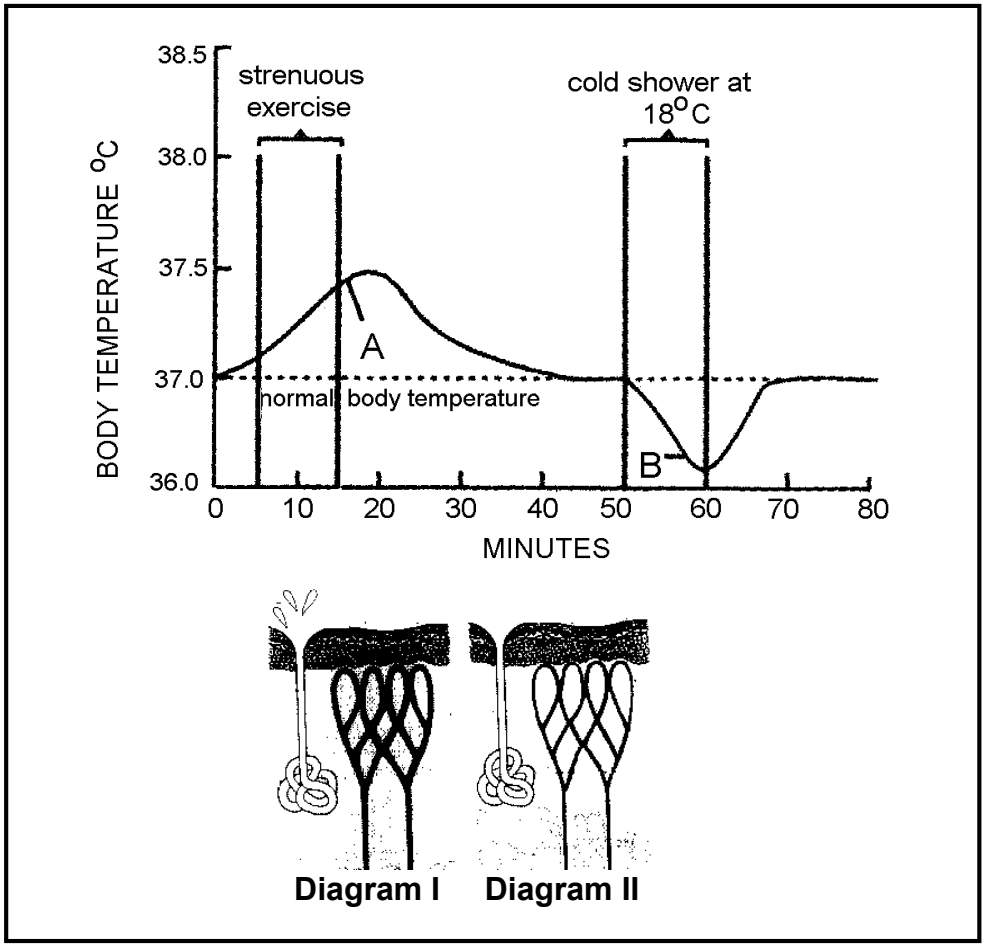


3.1.1 Give labels for the glands numbered 1 and 2. (2)

3.1.2 Name hormone A. (1)

3.1.3 Describe the negative feedback mechanism that operates when the thyroxin level in the blood is too high, as indicated by process C. (4)
(7)

3.2 The graph below shows the effect of strenuous exercise, followed by a cold shower, on the body temperature of an athlete.



3.2.1 Which part of the brain responds to the temperature changes that occur at A and B on the graph? (1)

3.2.2 What was the maximum temperature reached? (1)

3.2.3 For what period of time did the person engage in strenuous exercise? (1)

3.2.4 Why should body temperature not be allowed to fluctuate too much? (1)

3.2.5 Which diagram (I or II) would represent the condition of the skin after 15 minutes? (1)

3.2.6 Explain your answer to QUESTION 3.2.5. (2)
(7)

3.3 Study the diagram below and answer the questions that follow.

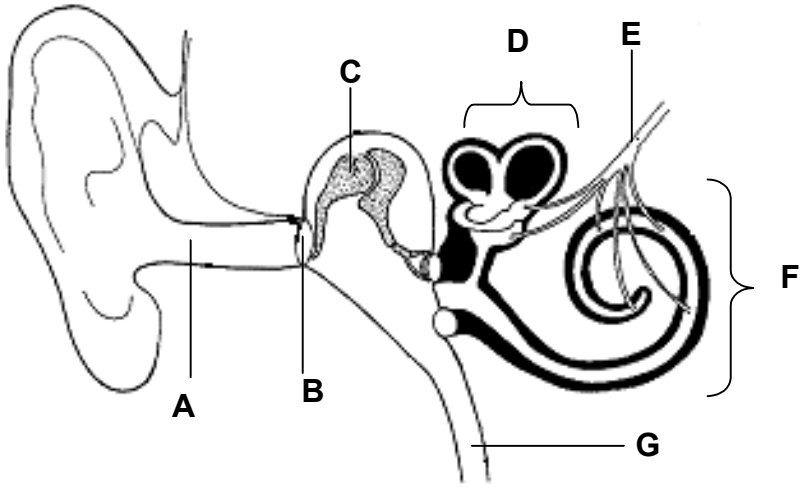


Diagram of the human ear

3.3.1 Identify the parts labelled B, C and F. (3)

3.3.2 Explain how the pinna of the ear is suited for its function. (2)

3.3.3 Write the **letter** of the part which:

(a) Contains receptors for balance (1)

(b) Equalises pressure on either side of part B (1)

(c) Transmits impulses to the brain (1)
(8)

3.4 In an investigation to find the number of African potato plants in a field of area 6 000 m^2, three plots were selected, each with an area of 10 m^2. Plot 1 contained three and the other plots contained seven and two African potato plants, respectively.

3.4.1 What indirect method was used to estimate the population size? (1)

3.4.2 How should the plots be selected to obtain a reliable estimate? (1)

3.4.3 Estimate the total number of African potato plants in the field. Show all your workings. (3)

3.4.4 Name ONE other indirect method that will be more appropriate to estimate the number of buck in a game reserve. (1)

3.4.5 Name TWO advantages of projecting the future size of the human

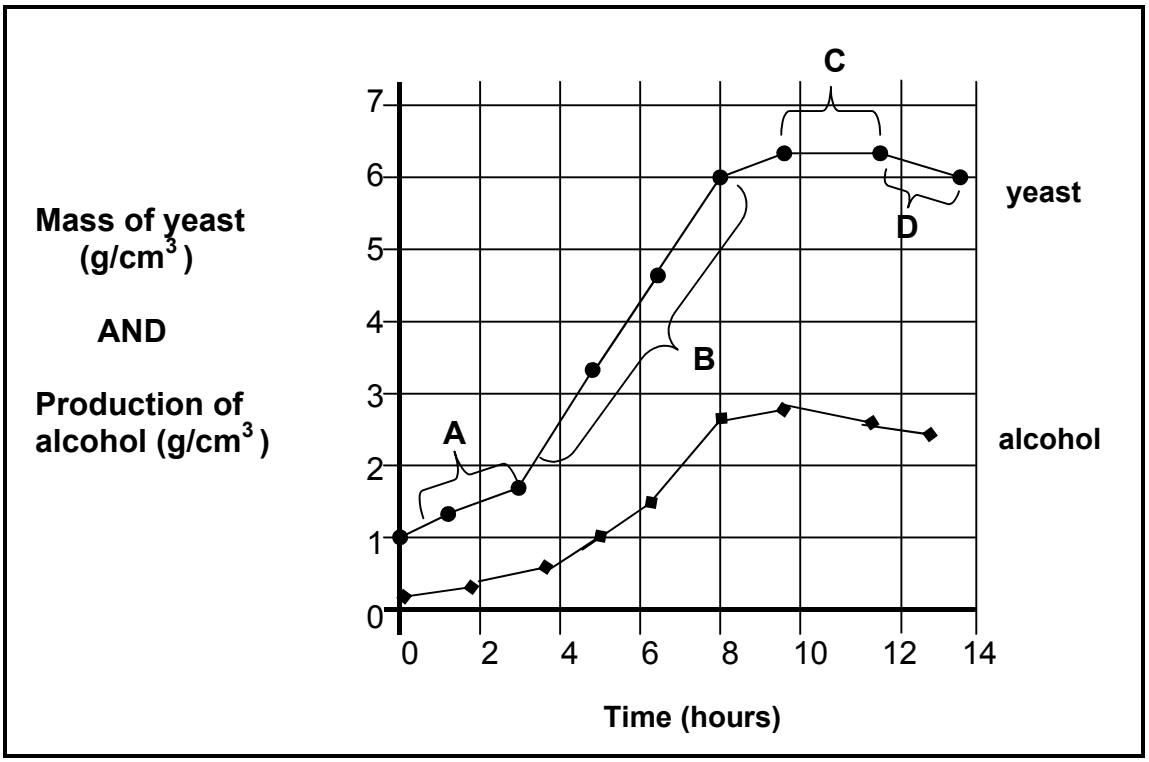
population. (2)
(8)
[30]

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 The graph below illustrates the growth of yeast (*Saccharomyces* sp.) and the amount of alcohol it produces. The quantity of yeast was not measured by the number of yeast cells present, but by the mass of the yeast cells (g) per cm^3.



4.1.1 Identify the phase of growth at C. (1)

4.1.2 Explain the shape of the graph at:

(a) A (2)

(b) B (2)

4.1.3 Using the graph, state the carrying capacity for yeast in this environment. (2)

4.1.4 State the general relationship between the growth of yeast and the production of alcohol. (2)

4.1.5 Explain the decrease in the yeast population in the last two hours. Give TWO reasons. (2)

(11)

4.2 Read the article below on elephant culling.

**TOO HUNGRY, TOO DESTRUCTIVE, TOO MANY:
SOUTH AFRICA TO BEGIN ELEPHANT CULL**

An elephant herd at the Kruger National Park has 20 000 elephants, 5 000 more than is sustainable. Ecologists say the animals' huge appetites and fondness for 'habitat re-engineering' – reducing forests to flatland by uprooting trees and trampling plants – is the main problem.

Culling of the excess elephants is seen as an advantage in that it generates revenue for the communities from the sale of ivory and other elephant products. It will also provide meat to the local communities. Alternatives to culling include contraception and relocation of entire elephant families. The removal of fences between the Kruger National Park and parks in neighbouring Mozambique will eventually help with migration into less congested areas.

The 1998 figure of 8 000 elephant increased to 20 000 in 2008 and it is expected to reach 34 000 by 2020.

[Adapted from *The Guardian*, 26 February 2008]

4.2.1 Give the main reason mentioned above in support of the culling of elephants. (1)

4.2.2 Name TWO alternatives to culling proposed above. (2)

4.2.3 Draw a bar graph to show the change in the elephant population from 1998 to 2020. (6)
(9)

4.3 Using examples, describe *predation*, *competition* and *symbiosis*, explaining how each interaction influences the population size of the organisms involved.
Content: (17)
Synthesis: (3)
(20)

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams.

TOTAL SECTION C: 40
GRAND TOTAL: 150

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