



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P2

VERSION 1 (NEW CONTENT) FOR FULL-TIME CANDIDATES

FEBRUARY/MARCH 2012

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your 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. ALL drawings should be done in pencil and labelled 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 necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass.
11. Write neatly and legibly.

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 to D) next to the question number (1.1.1 to 1.1.9) in your ANSWER BOOK, for example 1.1.10 D.

1.1.1 All the organisms in a given area as well as the abiotic factors with which they interact are best described as a/an ...

- A community.
- B ecosystem.
- C habitat.
- D population.

1.1.2 Which of the following is an example of predation?

- A Bees visiting a flower
- B Ticks on a dog
- C A lion catching a zebra
- D A bird's nest in a tree

1.1.3 Which ONE of the following refers to development in some birds where the eggs hatch outside the body and the young are born immobile and totally dependent on its parents?

- A Vivipary and precocial development
- B Ovipary and altricial development
- C Vivipary and altricial development
- D Ovipary and precocial development

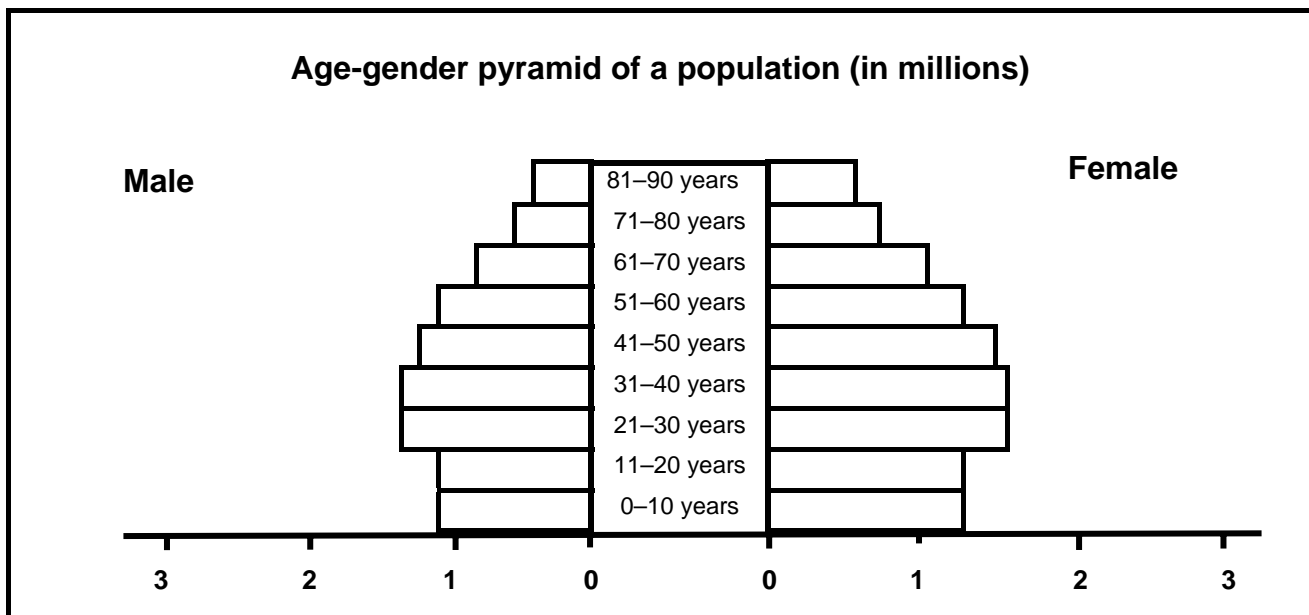
1.1.4 Which ONE of the following is TRUE about seeds?

- A Protect the gametes
- B Provide the embryo with food from cotyledons
- C Develop into a fruit
- D Develop from an ovary

1.1.5 Which ONE of the following increases the chances of survival of a species?

- A Living individually
- B Living in a colony with division of labour
- C Having random breeding pairs
- D Hunting for prey with different species

QUESTIONS 1.1.6 and 1.1.7 are based on the age-gender pyramid shown below.



1.1.6 The age-gender pyramid shown above is for a developed country since ...

- A the number of newborn are high.
- B there are more young people than old people.
- C there are more females than males in each age group.
- D the life expectancy of the population is high.

1.1.7 Which ONE of the following can be correctly deduced from the age-gender pyramid shown above?

- A There are less than 2 million people between 0 and 10 years
- B There are more males than females in the age group 11 to 20 years
- C The birth and death rates are about the same
- D There are more females than males who are 50 years and older

1.1.8 The statements below refer to the action of different contraceptive methods.

1. Inhibits the secretion of FSH
2. Increases the level of the hormone progesterone
3. Stops the embryo from implanting in the uterus
4. Stops ovulation by inhibiting the development of the follicle

Which combination refers to the action of the oral contraceptive pill only?

- A 1, 2 and 3 only
- B 1, 2 and 4 only
- C 1, 2, 3 and 4
- D 2, 3 and 4 only

1.1.9 The statements below refer to adaptations of flowers for pollination.

1. Male and female flowers are found on different plants
2. Stigma below anthers
3. Male and female gametes mature at the same time

Which combination of adaptations refers to self-pollination?

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

(9 x 2) **(18)**

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 to 1.2.10) in your ANSWER BOOK.

- 1.2.1 A series of changes that take place during the life cycle of an insect
- 1.2.2 A fluid containing sperm cells
- 1.2.3 The maximum size of a population that can be supported by a habitat under the conditions prevailing at any particular time
- 1.2.4 The relationship between two species in which both benefit from the association
- 1.2.5 The use of resources in slightly different ways by different species in the same habitat, allowing them to co-exist
- 1.2.6 The variety of species of living organisms that exist on Earth
- 1.2.7 The elimination of one species by another in a habitat as a result of dependence on a common resource
- 1.2.8 The killing of surplus animals by humans to avoid the destruction of the natural environment
- 1.2.9 The periodic movement out of and return to a habitat by living organisms
- 1.2.10 A group of organisms, sharing similar characteristics, which are able to interbreed to produce fertile offspring

(10)

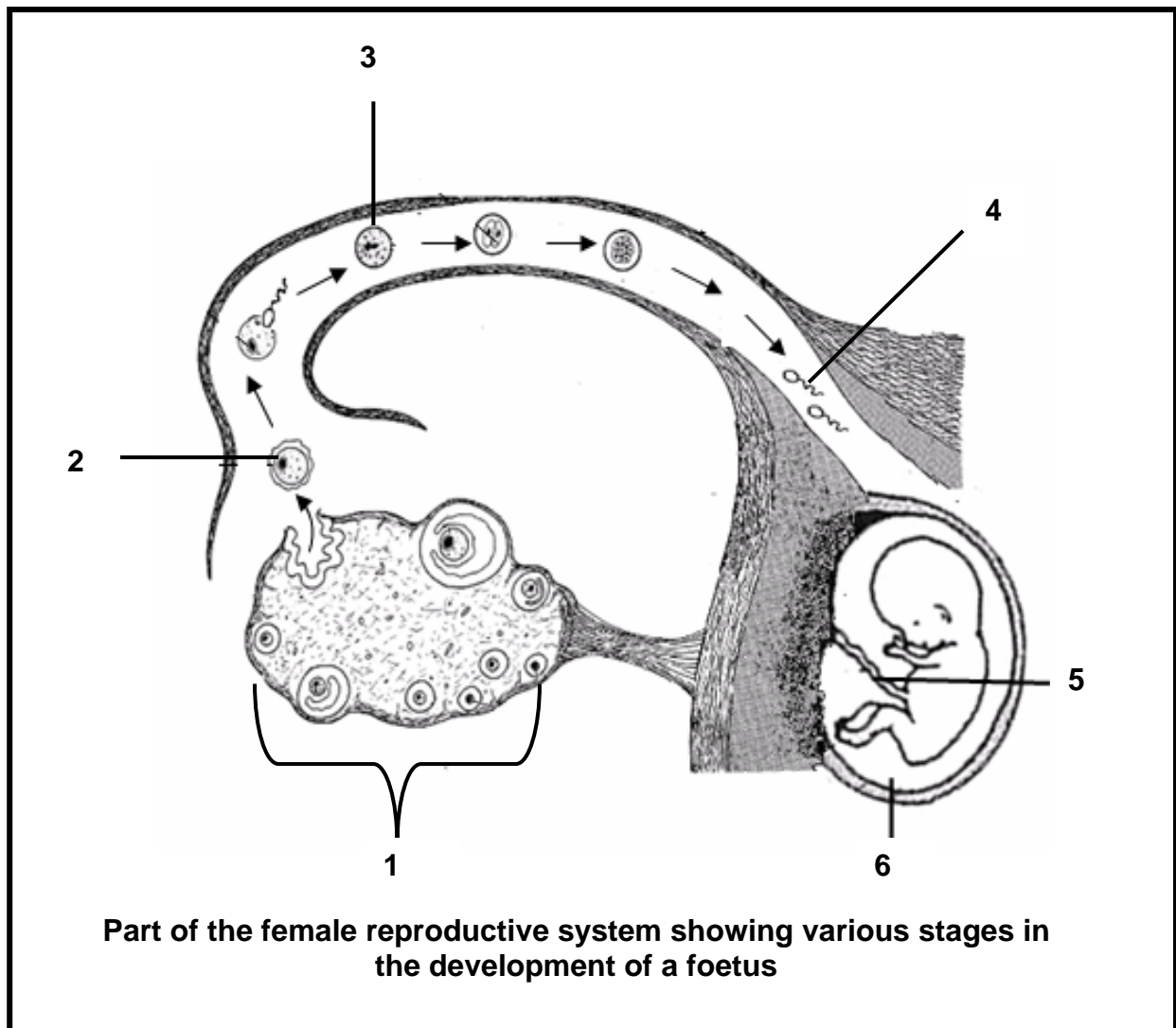
- 1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B**, or **none** next to the question number (1.3.1 to 1.3.8) in the ANSWER BOOK.

| COLUMN I | | COLUMN II |
|----------|---|--|
| 1.3.1 | This would have no effect on the population size | A: Emigration B: Immigration |
| 1.3.2 | A small portion of the population is counted and then used to work out the size of the whole population | A: Census B: Simple sampling |
| 1.3.3 | Competition between cows and goats for grass | A: Inter-specific B: Intra-specific |
| 1.3.4 | A tube that stores sperm cells until maturation | A: Vas deferens B: Seminiferous tubules |
| 1.3.5 | The cell division that takes place in the gametophyte generation to form gametes | A: Meiosis B: Mitosis |
| 1.3.6 | Relationship between two different species where one species benefits and the other is harmed | A: Parasitism B: Commensalism |
| 1.3.7 | A change in the composition of species in a habitat that has never been inhabited by organisms before | A: Primary succession B: Secondary succession |
| 1.3.8 | The mature community of plants that remains relatively stable with few, if any, changes over time | A: Pioneer B: Climax |

(8 x 2)

(16)

1.4 The diagram below represents the events leading to the development of the foetus in the human uterus.



Identify the following:

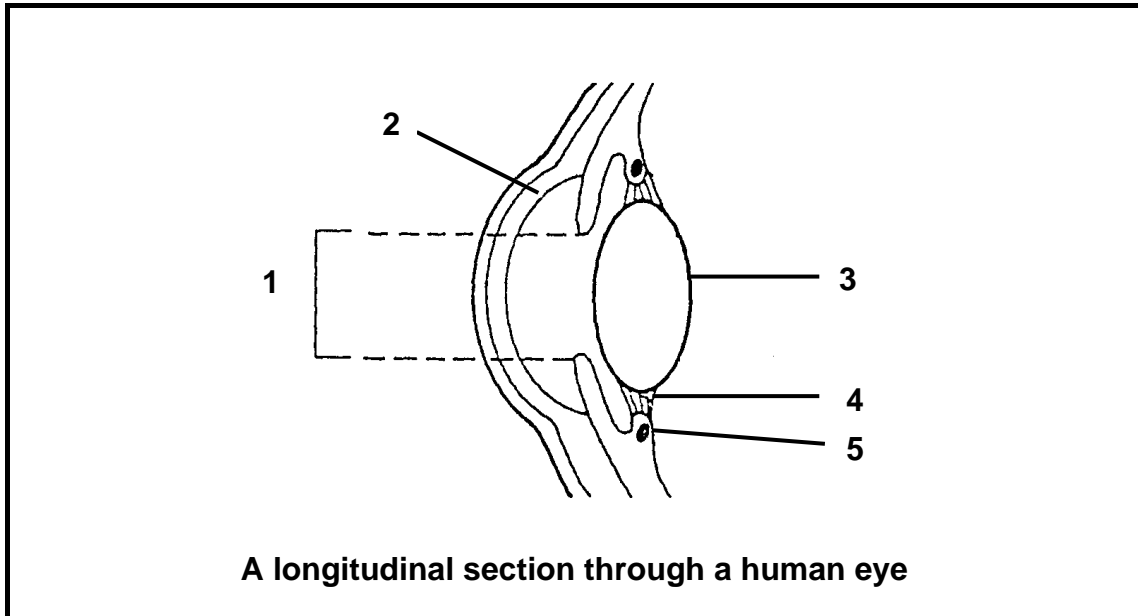
- 1.4.1 Part labelled 1
- 1.4.2 Cell labelled 2
- 1.4.3 Cell labelled 3
- 1.4.4 Structure labelled 4
- 1.4.5 Part labelled 5
- 1.4.6 Fluid labelled 6

(6)

TOTAL SECTION A: 50

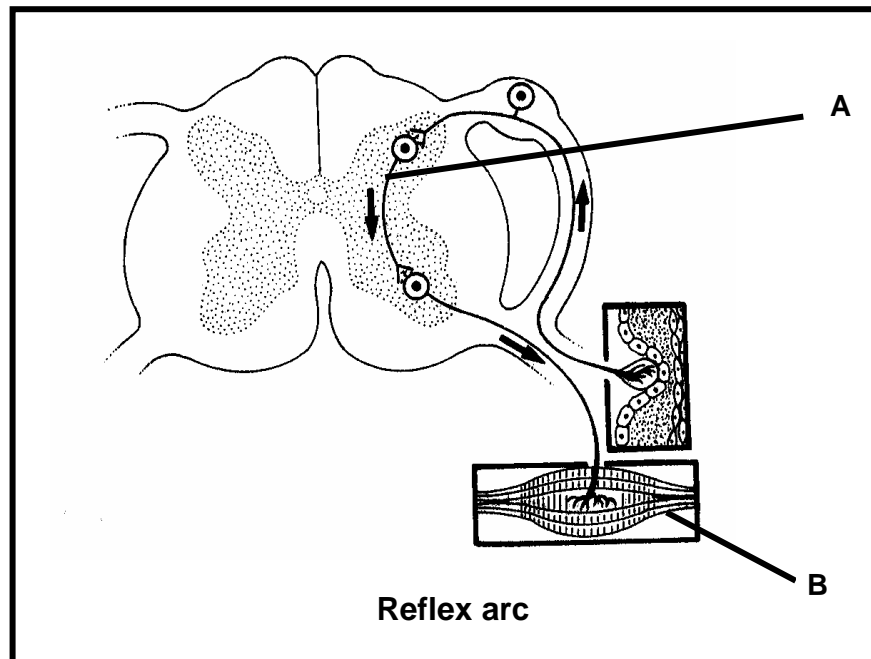
SECTION B**QUESTION 2**

2.1 Study the diagram below showing a longitudinal section through an eye.



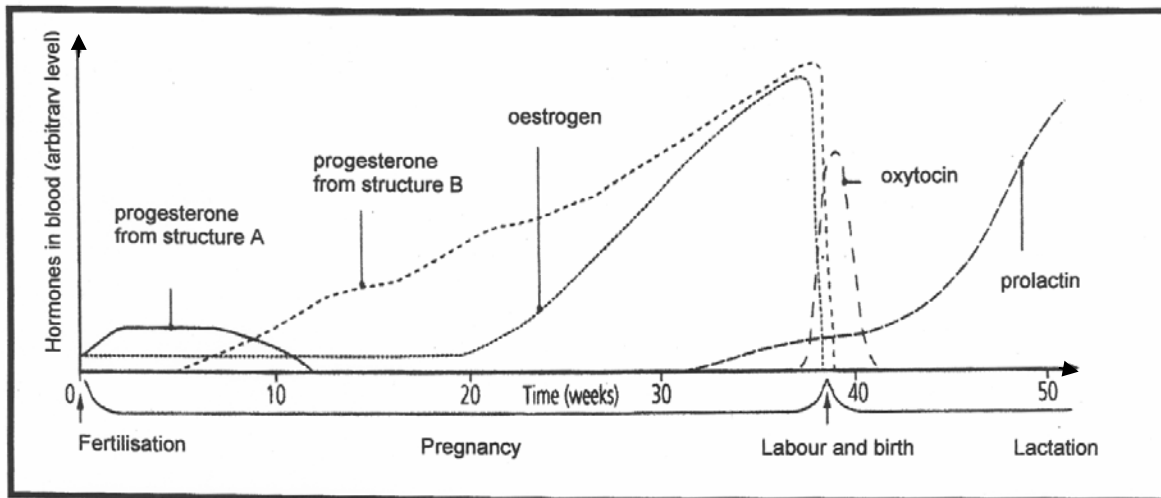
- 2.1.1 Label parts **2**, **3**, **4** and **5** respectively. (4)
- 2.1.2 Name and describe the process that causes part **1** to dilate. (6)
- 2.1.3 State how the following defects can be treated to improve vision:
- (a) Long-sightedness
 - (b) Astigmatism
 - (c) Cataract
 - (d) Short-sightedness
- (4)
(14)

2.2 Study the diagram below showing a reflex arc.



- 2.2.1 Identify the neuron labelled **A**. (1)
- 2.2.2 Name the type of neuron that is connected to structure **B**. (1)
- 2.2.3 Explain the effect on the body if the neuron mentioned in QUESTION 2.2.2, is damaged. (3)
- 2.2.4 Explain the significance of reflex actions in humans. (2)
- (7)**

2.3 Study the graph below showing the hormonal changes during pregnancy.



2.3.1 Identify the following structures:

(a) A

(b) B

(2)

2.3.2 State the following:

(a) Where prolactin is produced

(b) The function of prolactin

(2)

2.3.3 Explain the significance of the levels of oestrogen and progesterone dropping towards the end of pregnancy.

(2)

2.3.4 Explain what will happen if structure **A** breaks down at the end of the first week of pregnancy.

(2)

2.3.5 Suggest the role of oxytocin around week 40 of pregnancy.

(1)

(9)

[30]

QUESTION 3

- 3.1 The table below shows the changes in population size of a culture of bacteria, grown in a petri dish in a laboratory at 20 °C.

| Time (hours) | Number of bacteria in population |
|--------------|----------------------------------|
| 0 | 10 |
| 2 | 75 |
| 4 | 160 |
| 6 | 280 |
| 8 | 450 |
| 10 | 725 |
| 12 | 900 |
| 14 | 975 |
| 16 | 1 050 |
| 18 | 1 050 |

- 3.1.1 Use these results to plot a line graph. (9)
- 3.1.2 Explain the shape of the graph between:
- (a) 6–12 hours (2)
- (b) 16–18 hours (2)
- 3.1.3 Describe how the growth may change if the population of bacteria is kept at 30 °C instead of 20 °C. (3)
- (16)**

- 3.2 A researcher wanted to know how many fish were in a dam. He caught 20 fish and marked them by clipping out a small section of their tail fins. He then released them back into the dam. A few days later he caught 25 fish and found that 8 had been marked.

- 3.2.1 Estimate the total number of fish in the dam by using the following formula:

$$P = \frac{F \times S}{M}$$

P = Estimated total number of fish in the population

F = Number caught and marked in the first catch

S = Number caught in the second catch

M = Number marked in the second catch

- Show ALL working. (3)

- 3.2.2 Give ONE reason why the method used by the researcher to mark the fish could have resulted in an inaccurate estimate of the fish population in the dam. (2)
- 3.2.3 Explain ONE way in which the researcher could have increased the reliability of his estimate of the fish population in the dam. (2)

- 3.3 The birth rate is the number of births per 1 000 people in the population whilst the death rate is the number of deaths per 1 000 people in the population. (7)

The table below shows the birth and death rates in three countries, A, B and C, between 1960 and 2000.

| Country | | Year | | |
|---------|------------|------|------|------|
| | | 1960 | 1988 | 2000 |
| A | Birth rate | 15,8 | 16,2 | 14,3 |
| | Death rate | 12,3 | 11,5 | 10,9 |
| B | Birth rate | 34,0 | 35,4 | 39,6 |
| | Death rate | 22,7 | 21,5 | 19,4 |
| C | Birth rate | 32,9 | 17,5 | 15,2 |
| | Death rate | 17,7 | 7,4 | 6,6 |

- 3.3.1 Which country (A, B or C) had a decreasing birth rate from 1960 to 2000? (1)
- 3.3.2 Which country (A, B or C) is **most likely** a developing one? (1)
- 3.3.3 Give a reason for your answer to QUESTION 3.3.2. (1)
- 3.3.4 Explain TWO reasons why the death rate in all three countries had decreased from 1960 to 2000. (4)

TOTAL SECTION B: 60

SECTION C

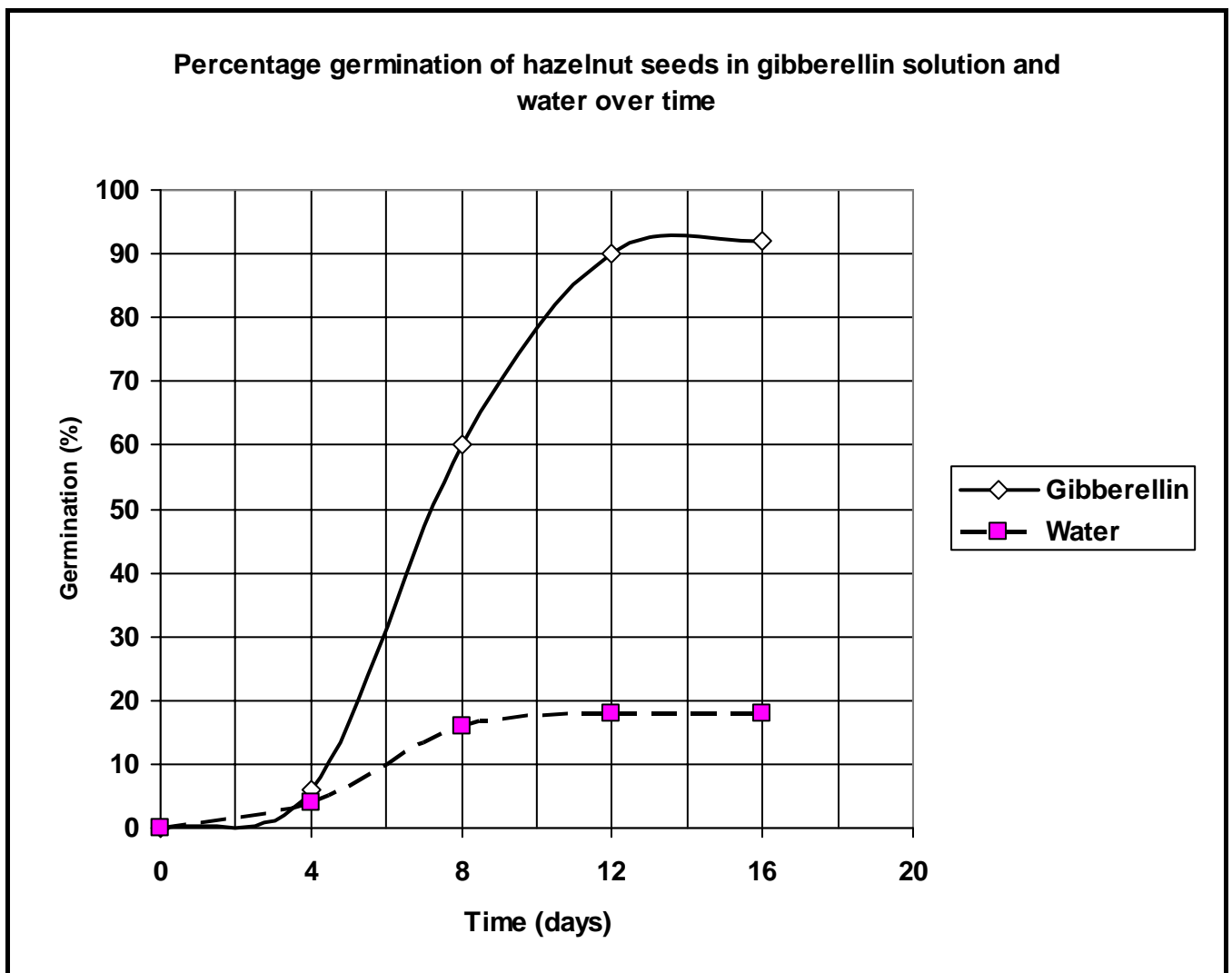
QUESTION 4

4.1 A group of Grade 12 learners carried out an investigation to determine the effect of gibberellin on the germination of seeds.

The following procedure was followed:

- A sample of hazelnut seeds was divided into two groups, A and B.
- A gibberellin solution was added to the seeds in group A.
- Water was added to the seeds in group B.
- Both groups of seeds were allowed to germinate for 16 days.
- The percentage (%) of seeds germinating in the two groups was recorded.

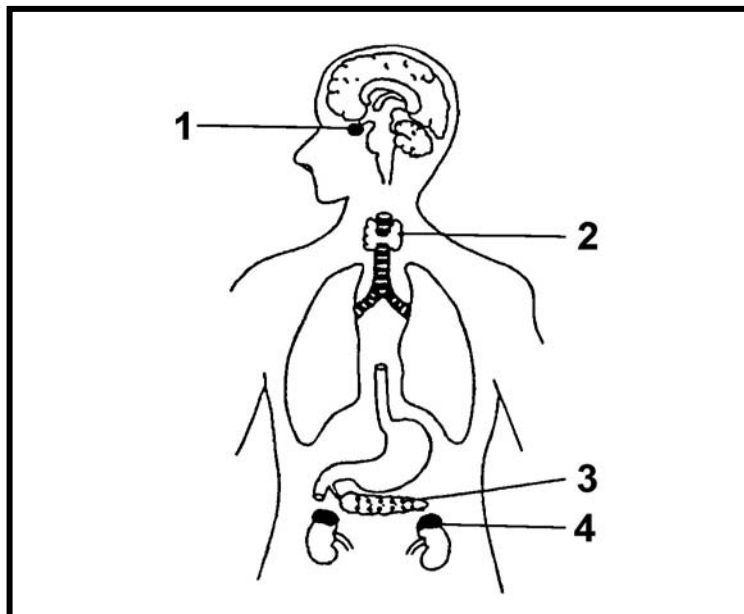
The results of the investigation are shown in the graph below.



4.1.1 Formulate a possible hypothesis for this investigation.

(3)

- 4.1.2 Using the information from the graph, determine the percentage germination of hazelnut seeds on the 10th day with the gibberellin treatment. (1)
- 4.1.3 Explain the purpose of group B. (2)
- 4.1.4 State TWO ways in which the validity of this investigation could have been improved. (2)
- 4.1.5 Give ONE possible reason why seeds of desert plants germinate only after heavy rains. (2)
- (10)**
- 4.2 Study the diagram below and answer the questions that follow.



- 4.2.1 Label the parts numbered 1 and 4. (2)
- 4.2.2 Write down only the NUMBER of the gland that:
- Produces the hormone glucagon
 - Produces a hormone that controls the growth of long bones
 - Produces an iodine-containing hormone
 - Produces a hormone that is involved in the re-absorption of some salts by the kidneys
- (4)
- 4.2.3 State TWO similarities between hormones and nerves with regard to their functions. (2)
- 4.2.4 State ONE functional difference between hormones and motor nerves. (2)
- (10)**

- 4.3 Describe the role of the hypothalamus and the adrenal glands in bringing about changes to the blood vessels of the human skin and explain why these changes take place.
- | | |
|-----------|-------------|
| 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