



## **Education and Sport Development**

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Departement van Onderwys en Sportontwikkeling  
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**NORTH WEST PROVINCE**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P1**

**SEPTEMBER 2019**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 15 pages.**

**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. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, flow charts or tables 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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

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

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

- 1.1.1 In altricial development, young hatchlings are ♂
- A able to feed themselves soon after hatching.
  - B unable to move around freely soon after hatching.
  - C completely independent of their parents after hatching.
  - D well-developed when they hatch.
- 1.1.2 Which of the following would be affected by a disease that damages the autonomic nervous system?
- A The ability to move the arms and legs
  - B The heart rate and breathing rate
  - C Hearing and sight
  - D Higher thought processes
- 1.1.3 After an accident a person can no longer interpret sensations such as smell and taste. Which part of their brain was most probably damaged in the accident?
- A Cerebellum
  - B Corpus callosum
  - C Medulla oblongata
  - D Cerebrum
- 1.1.4 Which ONE of the following is controlled by a negative feedback mechanism in the human body?
- A Changes in the speed and direction of the body
  - B Colour vision
  - C Water concentration
  - D The activities of the right side of the body being controlled by the left hemisphere
- 1.1.5 Which plant hormone is involved in bringing on flowering in plants?
- A Auxins
  - B Ethylene
  - C Gibberellins
  - D Absciscic acid

- 1.1.6 Which ONE of the following is a reproductive strategy that involves the hatching of eggs in the female reproductive system?
- A Ovipary
  - B Ovovivipary
  - C Vivipary
  - D Hatching
- 1.1.7 How many chromatids are found in a pair of homologous chromosomes?
- A One
  - B Two
  - C Four
  - D Eight

**QUESTIONS 1.1.8 AND 1.1.9 REFER TO AN INVESTIGATION WHICH WAS CONDUCTED TO DETERMINE THE EFFECT OF A DRUG ON REACTION TIME IN HUMANS**

- 1.1.8 What was the independent variable in the investigation?
- A The drug in the body
  - B Time after taking the drug
  - C Reaction time
  - D Number of volunteers
- 1.1.9 The following factors were considered during the investigation:
- (i) Number of volunteers
  - (ii) Time of day
  - (iii) Age of volunteers
  - (iv) Tools used to measure reaction time

Which ONE of the following combinations of factors will affect the validity of the investigation?

- A (i) and (ii) only
  - B (i), (iii) and (iv) only
  - C (i), (ii), (iii) and (iv)
  - D (ii), (iii) and (iv) only
- 1.1.10 Which part of the central nervous system protects the human body from serious injuries when a person steps barefoot on a thorn?
- A Medulla oblongata
  - B Cerebrum
  - C Spinal cord
  - D Cerebellum

(10 x 2) **(20)**

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 the ANSWER BOOK.

- 1.2.1 The hormone responsible for regulating the level of salt in the blood
- 1.2.2 The structural unit of the nervous system
- 1.2.3 A hormone that stimulates the maturation of sperm
- 1.2.4 The outermost extra-embryonic membrane surrounding the embryo
- 1.2.5 The hormone secreted by the pancreas, that increases blood glucose levels in humans
- 1.2.6 A disease characterised by a loss of the myelin sheaths of neurons, affecting their ability to transmit impulses to the central nervous system
- 1.2.7 The structure in the amniotic egg used for gaseous exchange and the storage of waste products
- 1.2.8 The transparent membrane that protects the cornea
- 1.2.9 The gland that secretes prolactin
- 1.2.10 The system in the human body that secretes hormones responsible for chemical co-ordination

**(10)**

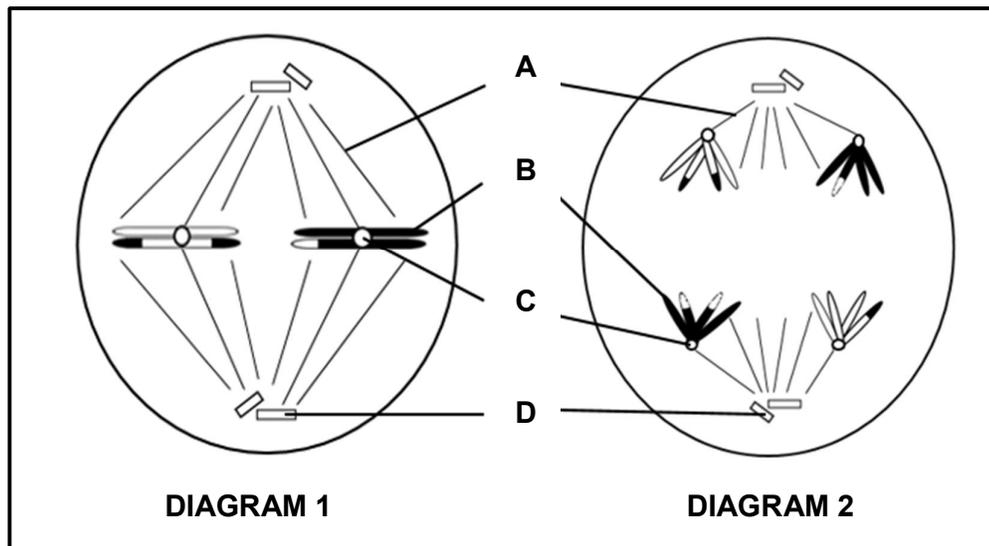
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	A part of the ear where sound stimuli are converted to nerve impulses	A:	Semi-circular canals
		B:	Oval window
1.3.2	Planting the same crop type each year on the same piece of land	A:	Crop rotation
		B:	Monoculture
1.3.3	Receptors for hearing	A:	Rods
		B:	Cones

(3 x 2)

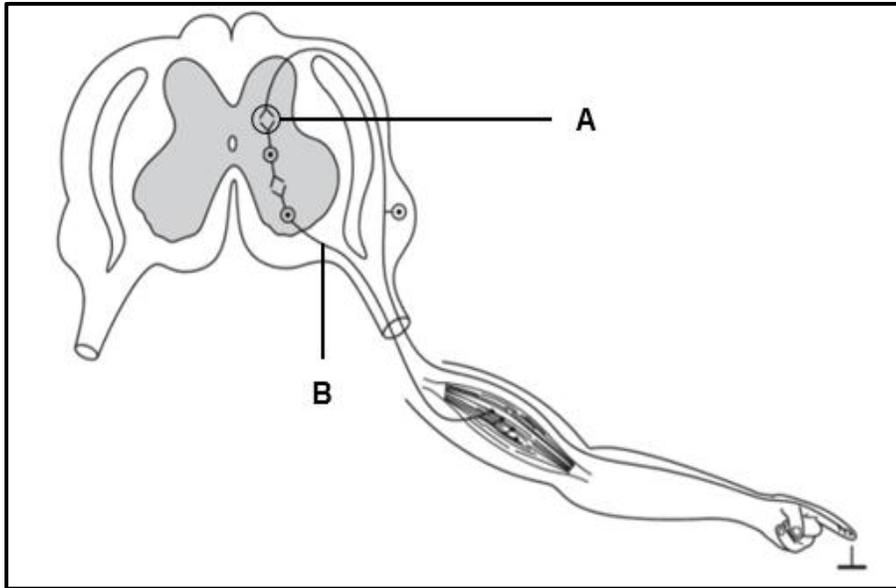
**(6)**

1.4 The diagrams below represent phases of meiosis in a cell.



- 1.4.1 Name the parts labelled **B**, **C** and **D** respectively. (3)
- 1.4.2 Identify the phase represented in:
- (a) **DIAGRAM 1** (1)
- (b) **DIAGRAM 2** (1)
- 1.4.3 Give ONE visible reason for your answer in QUESTION 1.4.2 (b). (1)
- 1.4.4 What evidence suggests that crossing over has occurred in this cell? (1)
- 1.4.5 How many chromosomes will be present in the gametes formed from the cell in **DIAGRAM 2**? (1)
- 1.4.6 Write the **LETTER** only of the structure that pulls each chromosome towards opposite ends of the dividing cell. (1)
- (9)**

- 1.5 The diagram below represents a reaction that takes place in the human body when touching an inch nail.

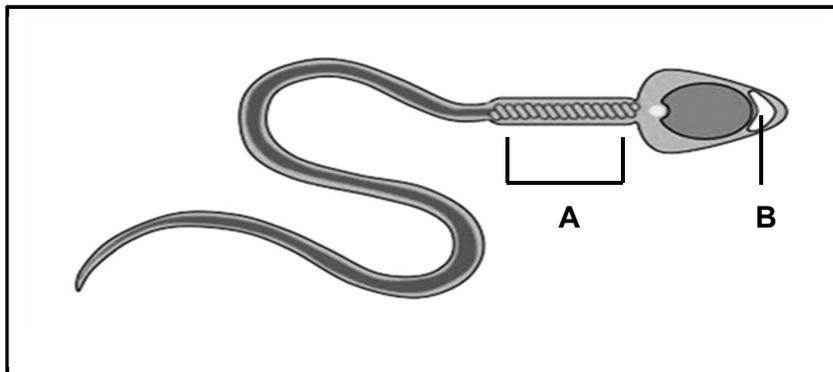


- 1.5.1 What process is represented by the diagram? (1)
- 1.5.2 Identify neuron **B**. (1)
- 1.5.3 Name the:
- (a) Microscopic gap encircled and marked as **A** (1)
- (b) TWO types of neurons present at **A** (2)
- (5)**

**TOTAL SECTION A: 50**

**SECTION B****QUESTION 2**

2.1 The diagram below represents a sperm.



- 2.1.1 Give a label for part **A**. (1)
- 2.1.2 Explain TWO ways in which the sperm is adapted to ensure effective movement towards the Fallopian tubes. (4)
- 2.1.3 Name part **B** and explain the consequences for reproduction if a sperm does not have it. (4)  
**(9)**
- 2.2 Thyroid disorders are caused by the abnormal secretion of thyroxin.
- 2.2.1 Which hormone controls the level of thyroxin secretion in the human body? (1)
- 2.2.2 Describe the interaction between thyroxin and the hormone mentioned in QUESTION 2.2.1 if the concentration of thyroxin rises above the normal level. (4)
- 2.2.3 Explain ONE way in which the body mass of a person will be influenced if too much thyroxin is secreted without changing his/her diet. (2)  
**(7)**
- 2.3 Explain:
- 2.3.1 TWO ways in which the secretion of adrenalin in a dangerous situation will benefit a person. (4)
- 2.3.2 Why a person sweats more on a hot day. (4)  
**(8)**

2.4 Read the extract below.

**DIABETES – TREATMENT AND MANAGEMENT**

Two forms of diabetes are found in humans, namely Type I and Type II.

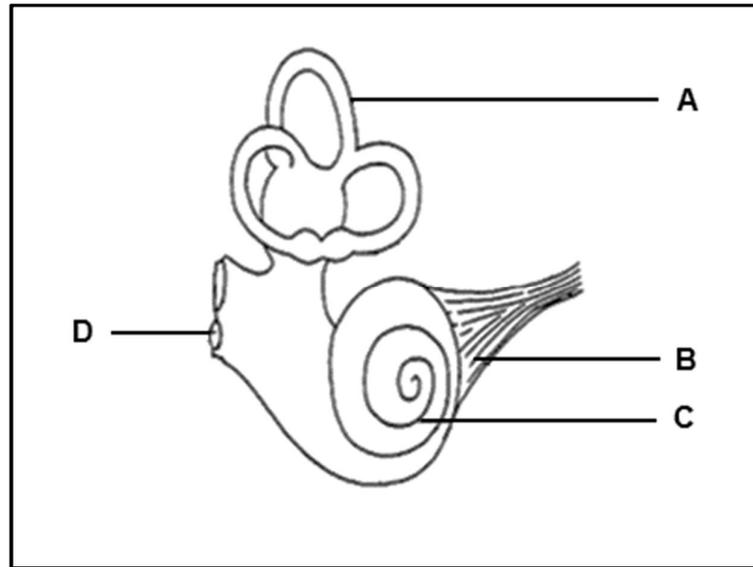
With Type 1 diabetes, the body's immune system mistakenly sees the insulin-producing cells in the pancreas as foreign, and destroys them.

People with Type II diabetes are able to produce some of their own insulin. Often, it's not enough. Overeating, especially of foods rich in sugar, causes repeated stimulation of the pancreas, which responds by secreting large amounts of insulin. The excess insulin decreases the target cells' ability to respond to insulin. Treatment focuses on diet and exercise.

[Source: [www.diabetesresearch.org](http://www.diabetesresearch.org)]

- 2.4.1 Name ONE body fluid that can be used to test for the presence of excess glucose in the body. (1)
- 2.4.2 Give TWO target cells in the human body that will be affected by an excess of insulin. (2)
- 2.4.3 Explain the consequence for Type I diabetics, when their immune systems destroy their insulin-producing cells. (2)
- (5)**

2.5 The diagram below represents a part of the human ear.



- 2.5.1 Identify the parts labelled **C** and **D** respectively. (2)
- 2.5.2 Name the receptors that are found in part **A**. (1)
- 2.5.3 Explain the consequences to the human body if:
- (a) Part **B** is damaged (2)
- (b) Part **D** becomes hardened (2)
- (7)**

2.6 Explain the function of EACH of the following parts of the human eye which assist to control the entry of light.

- 2.6.1 Lens (2)
- 2.6.2 Cornea (2)

**(4)**  
**[40]**

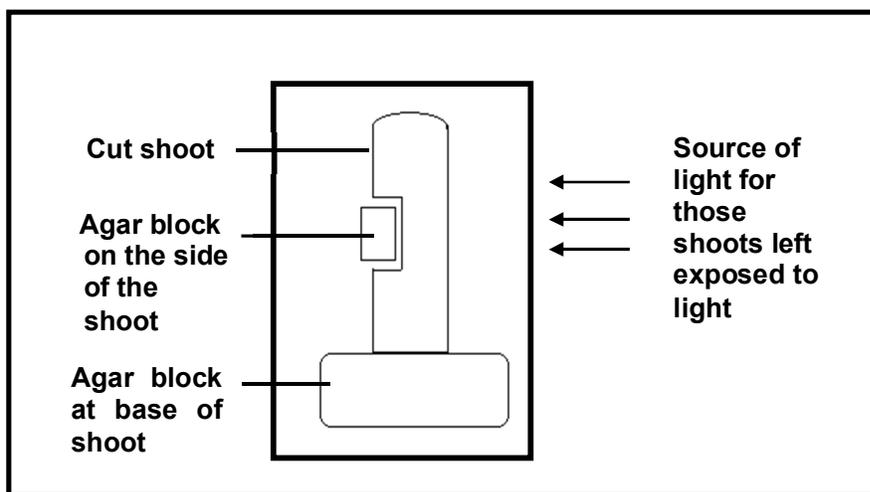
**QUESTION 3**

- 3.1 A group of Grade 12 learners investigated the effect of light on the amount of auxin distribution in shoots.

The diagram below shows how the investigation was carried out.

The following procedure was followed:

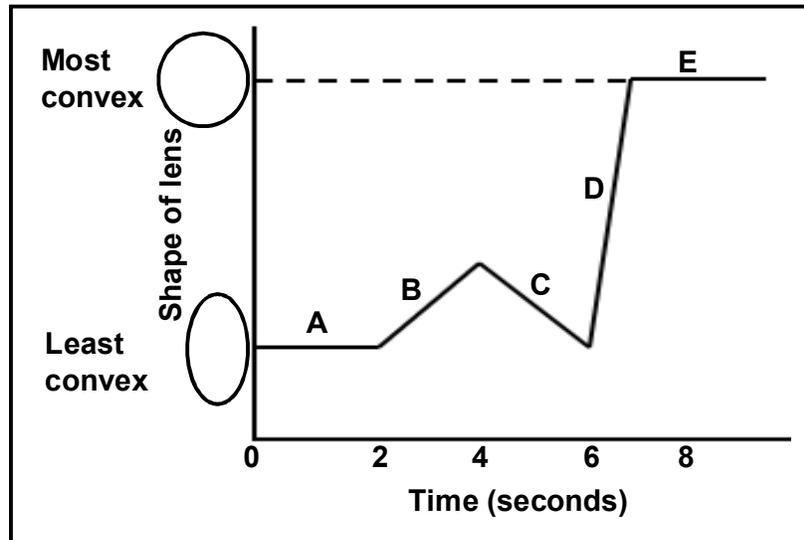
- 10 Shoots were removed from young plants and each was placed on a block of agar.
- A second block of agar was placed on the side of each shoot where a portion of the tissue had been cut away.
- Half of the shoots were left in darkness and half were exposed to a light source from one side.
- The samples of the shoots treated in this way were left for several hours.
- The concentration of auxin collected in the two blocks of agar from each shoot was measured and the averages calculated.



- 3.1.1 State the dependent variable for this investigation. (1)
- 3.1.2 Give a reason why some shoots were left in darkness and some were exposed to a light source. (2)
- 3.1.3 State:
- (a) TWO ways in which the reliability of the results could be ensured. (2)
- (b) THREE ways in which the validity of the results could be ensured. (3)
- (8)**

- 3.2 The graph below shows the results of the degree of convexity of a participant's lens measured over a period of time.

During the time indicated, the participant was asked to look at an object which could be moved closer to or further away from the participant.



- 3.2.1 Name the process that changed the shape of the lens. (1)
- 3.2.2 Give the LETTER on the graph that indicates the period of time during the investigation when the object was:
- (a) Closest to the participant (1)
- (b) Moving towards the participant (1)
- 3.2.3 Describe how a clear image of the object is maintained during period C on the graph. (4)
- (7)

3.3 The table below shows the gasses that contribute to the Greenhouse effect.

Greenhouse Gas	Contribution to the Greenhouse Effect
Carbon dioxide	53%
Methane(CH <sub>4</sub> )	<b>B</b>
Nitrous oxide (N <sub>2</sub> O)	5%
Ozone (O <sub>3</sub> )	13%
CFC's	12%

[Adapted from [www.globalwarming.org](http://www.globalwarming.org)]

3.3.1 Calculate the value of **B**. Show all calculations. (2)

3.3.2 Draw a pie chart to represent the gasses that contribute to the Green House effect. (6)  
(8)

3.4 Explain what is meant by each of the following:

3.4.1 *Food security* (2)

3.4.2 *Carbon footprint* (2)  
(4)

3.5 *Deforestation* is the permanent removal of trees in large numbers.

3.5.1 Suggest TWO reasons for deforestation. (2)

3.5.2 Explain TWO consequences of deforestation for an ecosystem. (4)  
(6)

3.6 Read the extract below on the water situation in South Africa.

The amount of water on earth is constant, but is unevenly distributed across the earth. South Africa receives an annual rainfall of 492 mm whereas the world annual rainfall is 1477mm.

Scientists predict that with global warming, South Africa will experience much wetter seasons and much drier seasons, resulting in more floods and droughts.

According to the Department of Water and Environmental Affairs, the demand of water will exceed the supply in South Africa by 2025. A further problem adding to this demand is the decreasing of water quality. One of the main causes for this is industries which produce waste that can affect the amount of nutrients like minerals that land in the water.

[www.dwaf.gov.za](http://www.dwaf.gov.za)

3.6.1 Define *global warming*. (2)

3.6.2 Describe the effect that an increase in nutrients can have on water as a result of runoff from fertilisers and pesticides. Also state the name of the effect. (5)

(7)  
[40]

**TOTAL SECTION B: 80**

**SECTION C****QUESTION 4**

Describe oogenesis and the role of hormones during the menstrual cycle if fertilisation took place.

Content: (17)  
Synthesis: (3)  
**(20)**

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

**TOTAL SECTION C: 20**  
**GRAND TOTAL: 150**