

**NORMAN HENSHILWOOD HIGH SCHOOL**  
**JUNE EXAMINATION**



<b>DATE</b>	<b>6 JUNE 2011</b>
<b>GRADE</b>	<b>Grade 12</b>
<b>SUBJECT AND PAPER</b>	<b>Life Sciences Paper 2</b>
<b>TIME</b>	<b>1½ Hours</b>
<b>MARKS</b>	<b>75</b>
<b>EXAMINER</b>	<b>Ms S Sirmon</b>
<b>MODERATOR</b>	<b>Ms S Bezuidenhout</b>

---

**INSTRUCTIONS AND INFORMATION**

Read the instructions that follow carefully before answering the questions.

1. Answer **all** the questions.
2. Start the answer to each question at the top of a **new** page.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Write neatly and legibly.
5. If answers are not presented according to the instructions of each question, candidates will lose marks.
6. **All** drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams or flow charts only when requested to do so.
8. The diagrams in this question paper may not necessarily be drawn to scale.
9. The use of graph paper is **not** permitted.
10. Non-programmable calculators, protractors and compasses may be used.

---

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

- 1.1 Various possible answers are provided for each question. Write **only the letter** of the correct answer next to the corresponding number.
- 1.1.1 Which one of the following factors could result in a person producing dilute urine?
- A A high level of ADH in the blood
  - B A low level of ADH in the blood
  - C A high level of adrenalin in the blood
  - D A low level of adrenalin in the blood
- 1.1.2 Which one of these would you **not** mention if you were tracing the path of sound vibrations?
- A Tympanic membrane
  - B Bony ossicles
  - C Semi-circular canals
  - D Cochlea
- 1.1.3 The functioning of which of the following structures enables a gymnast to balance on the beam bar?
- (i) Vestibular apparatus
  - (ii) Cerebellum
  - (iii) Proprioceptors
  - (iv) Hypothalamus
  - (v) Medulla oblongata
- A (i), (ii) and (iv)
  - B (i), (ii) and (v)
  - C (ii), (iii) and (v)
  - D (i), (ii) and (iii)
- 1.1.4 Which of the following is not a function of the autonomic nervous system?
- A Pupillary mechanism
  - B Peristalsis
  - C Sensation of pain
  - D Dilation of blood vessels
- 1.1.5 The fluid that fills the semi-circular canals is ...
- A middle-ear fluid.
  - B tissue fluid.
  - C endolymph.
  - D perilymph.

1.1.6 Proprioceptors are mainly ...

- A mechanoreceptors.
- B taste and smell receptors.
- C photoreceptors.
- D chemoreceptors.

1.1.7 The correct path of sound waves will be ...

- 1. perilymph
  - 2. ossicles
  - 3. oval window
  - 4. tympanic membrane
  - 5. organ of Corti
- 
- A 4 → 3 → 1 → 2 → 5
  - B 1 → 2 → 3 → 4 → 5
  - C 4 → 2 → 3 → 1 → 5
  - D 3 → 2 → 4 → 5 → 1

[7]

1.2 Give the correct **term** for each of the following. Write only the **term** next to the relevant question number.

1.2.1 A hormone that acts antagonistically to insulin.

1.2.2 A hormone that raises blood pressure.

1.2.3 The part of control systems when the reaction of the system cancels out the original stimulus.

1.2.4 The mass of white fibres that connects the right and left sides of the brain.

1.2.5 The branch of the spinal nerve containing sensory neurons.

1.2.6 Membranes that protect the central nervous system.

[6]

1.3 Each of the following questions consists of a **statement or description** in the first column and two **items** [numbered (a) and (b)] in the second column. Consider which item(s) relate(s) to the statement or description. Write your choice next to the relevant question number by using the following codes:

- A – if only item (a) refers to the statement or description
- B – if only item (b) refers to the statement or description
- C – if both items (a) and (b) refer to the statement or description
- D – if neither of the items refers to the statement or description.

Statement or description		Item	
1.3.1	Protects the brain	(a)	Cranium
		(b)	Cerebrospinal fluid
1.3.2	Produced by endocrine glands	(a)	Tears
		(b)	Wax
1.3.3	Functions of medulla oblongata	(a)	Breathing rate
		(b)	Body temperature
1.3.4	Parts of a sensory neuron	(a)	Dendrite
		(b)	Synapse

[4]

1.4 Read the passage below and answer the questions that follow.

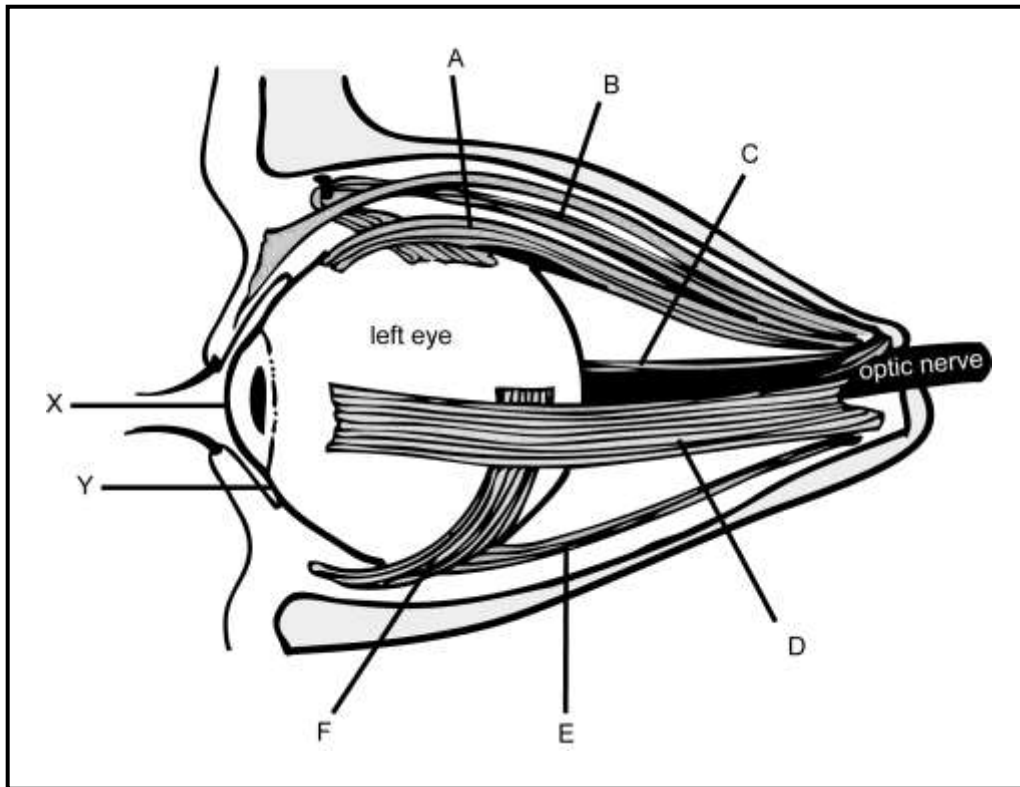
*Conjunctivitis is caused by a bacterial infection of the epithelial layer of the conjunctiva. As it causes pain, it is usually treated quickly, before any permanent damage can occur. More serious, however, is a condition called trachoma, which is caused by bacteria that cause repeated conjunctivitis. Trachoma eventually causes permanent damage to the cornea as the amount of tears produced is reduced. Trachoma is common in places where there is little water for people to wash their hands and faces regularly. It is one of the most common causes of blindness in the developing world.*

1.4.1 Give a function of the:  
 a) Conjunctiva  
 b) Cornea

[2]

(2)

1.5 Examine the diagram below and answer the questions that follow.



- 1.5.1 Provide labels for X and Y. (2)
- 1.5.2 To what part of the brain does the optic nerve carry nerve impulses for the sensation of sight? (1)

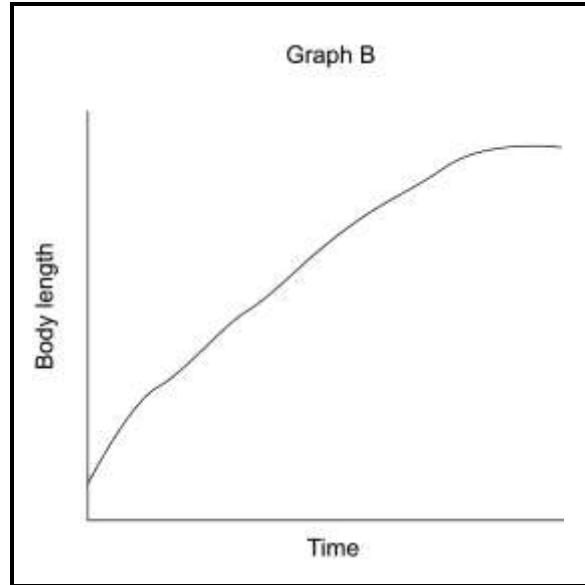
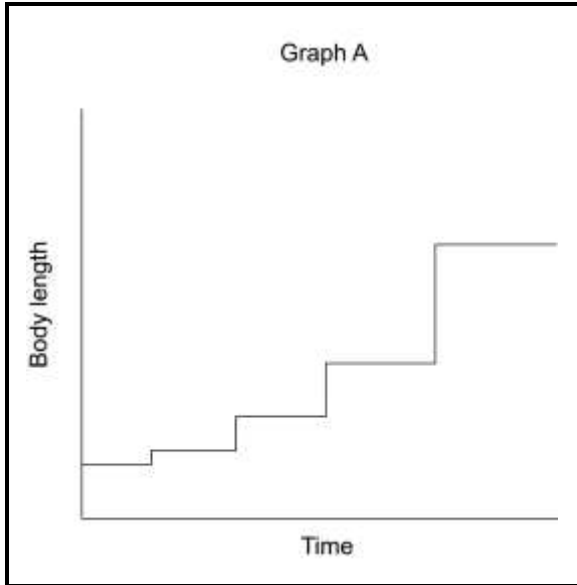
[3]

TOTAL SECTION A: 22

**SECTION B**

**QUESTION 2**

2.1 The graphs below show the growth patterns over a period of time in a human and in an insect.



2.1.1 Name the hormone that is responsible for the growth pattern in humans. (1)

2.1.2 Name the endocrine gland that produces the hormone mentioned in your answer to Question 2.1.1. (1)

2.1.3 Which graph, A or B, represents the growth pattern of:

a) An insect? (1)

**[3]**

2.2 An experiment was carried out to investigate the effect of thyroxin on laboratory rats. There were twelve rats, all the same age and more or less the same size. The rats were divided into three groups: A, B and C.

- Group A rats were fed a normal diet. Group B rats were fed a normal diet plus a thyroid extract. Group C rats were fed a normal diet plus some antithyroxin, which inhibits the production of thyroxin.

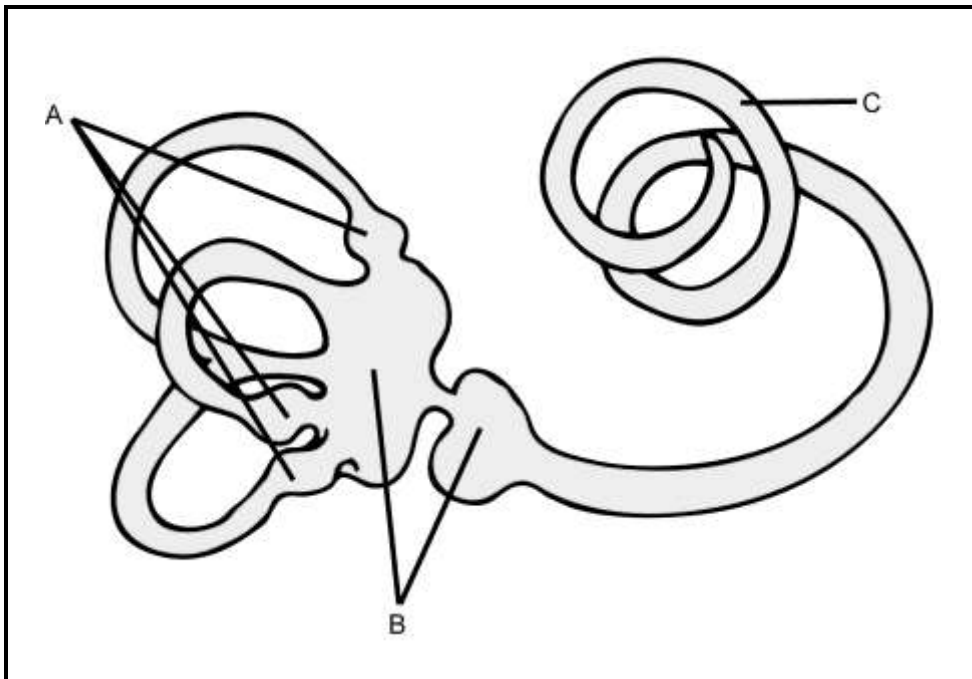
The oxygen consumption of each rat was measured while at rest. The average was calculated for each group. The results are shown in the table below.

Oxygen consumption (cm <sup>3</sup> /g of body mass)		
X	Y	Z
1,37	1,86	2,77

- 2.2.1 Match the oxygen consumption X, Y and Z with the rats in groups A, B and C. (3)
- 2.2.2 Which group of rats do you think will produce the lowest amount of TSH (Thyroid Stimulating Hormone)? Give a reason for your answer. (2)
- 2.2.3 Name **two** other hormones that have the same effect on blood sugar level as thyroxin. (2)
- [7]

**QUESTION 3**

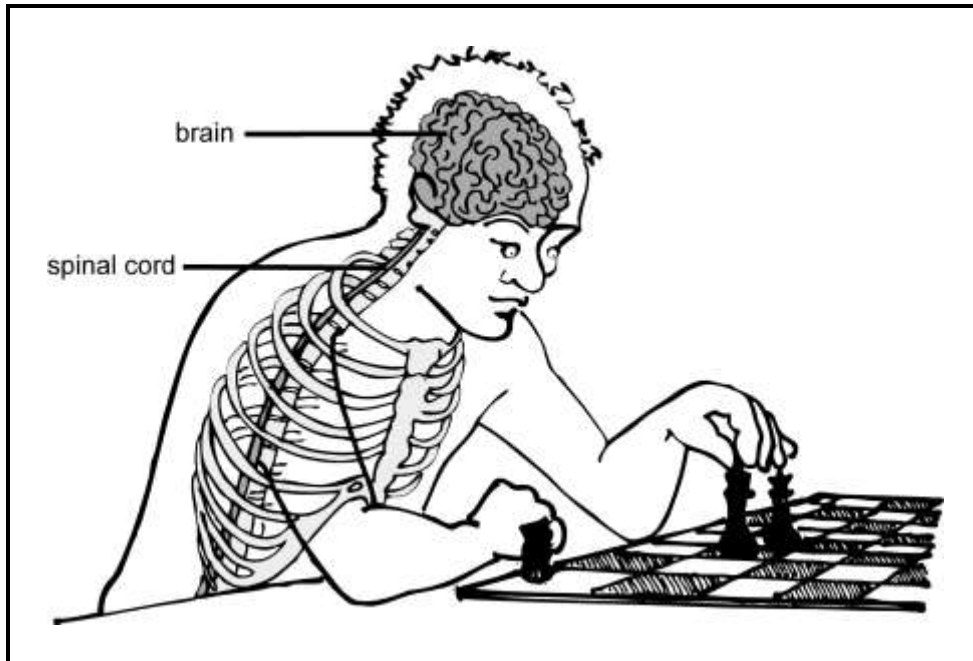
- 3.1 The diagram that follows shows the membranous part of the human inner ear.



- 3.1.1 Provide labels for parts A, B and C. (3)
- 3.1.2 Name the stimulus that will be converted to an impulse in each of the following:
- a) A  
b) B
- (2)

[5]

3.2 The diagram below shows a man playing a game of chess.



3.2.1 Name the part of the nervous system to which the brain and spinal cord belong. (1)

3.2.2 One of the main functions of the spinal cord is to perform reflex actions. Draw a cross section through the spinal cord to show the flow of impulse in a reflex action. (6)

[7]

3.3 Read the passage below and answer the questions that follow.

Tik (crystal meth) is the latest buzzword in drug circles. It is becoming increasingly popular amongst school children. Like alcohol, tik primarily affects dopamine, a neurotransmitter linked to pleasure and reward. It is one of the most psychologically addictive drugs. Tik gives adolescents what they want: confidence, power, heightened sexual levels and the feeling of being on top of the world.

The drug causes increased heart rate and blood pressure, and can result in irreversible damage to blood vessels in the brain, producing strokes. It sucks a lifetime's supply of dopamine out of a human body in months and speeds up aging tenfold. One of the most frightening effects of tik is that it not only modifies behaviour, but also changes the brain in fundamental ways.

3.3.1 What part of the brain does tik primarily affect? (1)

3.3.2 Besides tik use, what can cause strokes? (1)

- 3.3.3 The Cape Town Drug Counselling Centre (CTDCC) noticed that in 2002, fewer than 1% of their patients took tik. In 2003, this increased to 5%. In 2004, one-third of their patients were tik users. The number of patients that the CTDCC saw in 2002 was 360, in 2003 it was 374 and in 2004 it was 360.

Present the information in the paragraph above in the form of a table.

(6)  
[8]

### SECTION C

- 4.1 Read the passage below and answer the questions that follow.

#### Neurotransmitters and disease

Synapses can be classified into different groups depending on the type of neurotransmitter used. Cholinergic synapses occur mainly in the brain and use acetylcholine.

Some poisons (toxins) act by affecting the activity at the synapse. The black widow spider, for example, produces venom (poison) that causes a burst of the acetylcholine at the synapses and then inhibits (stops) its release.

Dopamine is a neurotransmitter that is released mainly in the brain. It is linked to the pleasure centre and many drugs such as cocaine. There is a great deal of interest in dopamine because it appears to be implicated in several diseases, including schizophrenia and Parkinson's disease. In schizophrenia, too much dopamine is produced. In Parkinson's disease, neurons that produce dopamine are lost.

- 4.1.1 Describe the relationship between a synapse and neurotransmitters.

(3)

[3]

- 4.2 Essay 20 marks – diseases...