GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION

2016

10831

LIFE SCIENCES

FIRST PAPER

TIME: **2½ hours**

MARKS: **150**

18 pages

X10

P.T.O.

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION – 2016

LIFE SCIENCES
(First Paper)

TIME: 2½ hours

MARKS: 150

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answer to each question at the top of a NEW page.
4. Number your answers correctly, according to the numbering system used in the question paper.
5. Present your answers according to instructions.
6. ALL diagrams should be drawn in pencil and structures labelled in blue or black ink.
7. Draw diagrams, tables and flowcharts ONLY when requested to do so.
8. The diagrams in the question paper may NOT necessarily be drawn to scale.
9. The use of graph paper is NOT permitted.
10. Non-programmable calculators and protractors may be used.
11. Write neatly and legibly.

SECTION A

QUESTION 1
SHORT QUESTIONS

1.1 MULTIPLE-CHOICE QUESTIONS

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 – 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Increasing deforestation …

A decreases the amount of greenhouse gases emitted.
B decreases biodiversity.
C increases biodiversity.
D decreases the loss of fertile topsoil.

1.1.2 Which ONE of the following pairs forms part of the pupillary mechanism in the eye?

A Choroid and retina
B Lens and suspensory ligaments
C Circular muscles and radial muscles
D Ciliary muscles and suspensory ligaments

1.1.3 Which ONE of the following aspects does not have an impact on water quality in South Africa?

A Wastewater disposal
B Industrial waste disposal
C Mining waste disposal
D Genetically modified foods

1.1.4 Which ONE of the following is a threat to wetlands?

A The building of a dam to counteract water restrictions
B An increase in the bird population
C Recycling of plastic found in wetlands
D Building a nature reserve

1.1.5 The hormone Gibberellins …

A promotes apical dominance.
B controls the direction of shoot growth.
C promotes the germination of seeds.
D promotes the dropping of ripe fruit from a plant.

1.1.6 How does meiosis guarantee variation between members of a species?

A By forming identical daughter cells
B By crossing-over and independent assortment
C Through two nuclear divisions
D By ensuring that the chromosome number remains constant

1.1.7 Which ONE of the following descriptions is correct for people who cannot see distant objects clearly because the image forms in front of the retina?

A Short-sightedness
B Long-sightedness
C Astigmatism
D Cataracts

1.1.8 The following list contains examples of human activities that have an impact on the environment.

(i) Burning of fossil fuel
(ii) Cutting down and burning trees
(iii) Fertilizers washing into rivers and streams
(iv) Urbanization

Which ONE of the following combinations causes an increase in the average concentration of carbon dioxide in the atmosphere?

A (ii), (iii) and (iv) only
B (i), (ii), (iii) and (iv)
C (i), (ii) and (iv) only
D (i) and (iv) only

1.1.9 Which ONE of the following is the hormone that is produced by the pituitary gland that stimulates the production of milk?

A ADH
B Prolactin
C Oxytocin
D Relaxin

1.1.10 The plant hormone Abscisic acid …

A promotes root growth.
B promotes apical dominance.
C stimulates flowering.
D encourages leaf fall. (10x2) **(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 – 1.2.10) in your ANSWER BOOK.

1.2.1 Part of the ear that converts sound waves into a nerve impulse

1.2.2 Glands that secrete substances straight into the bloodstream

1.2.3 The hormone that is secreted when the blood sugar level is lower than normal

1.2.4 The connecting tube between the middle ear and the pharynx

1.2.5 The structure against which the stirrup / stapes exerts pressure in the human ear

1.2.6 The growth of a part of a plant in response to gravity

1.2.7 The maintenance of a constant internal environment despite continuous changes in the external environment

1.2.8 Part of the brain that stimulates breathing muscles to contract when the carbon dioxide levels in blood increase above normal

1.2.9 The illegal hunting / trapping of animals

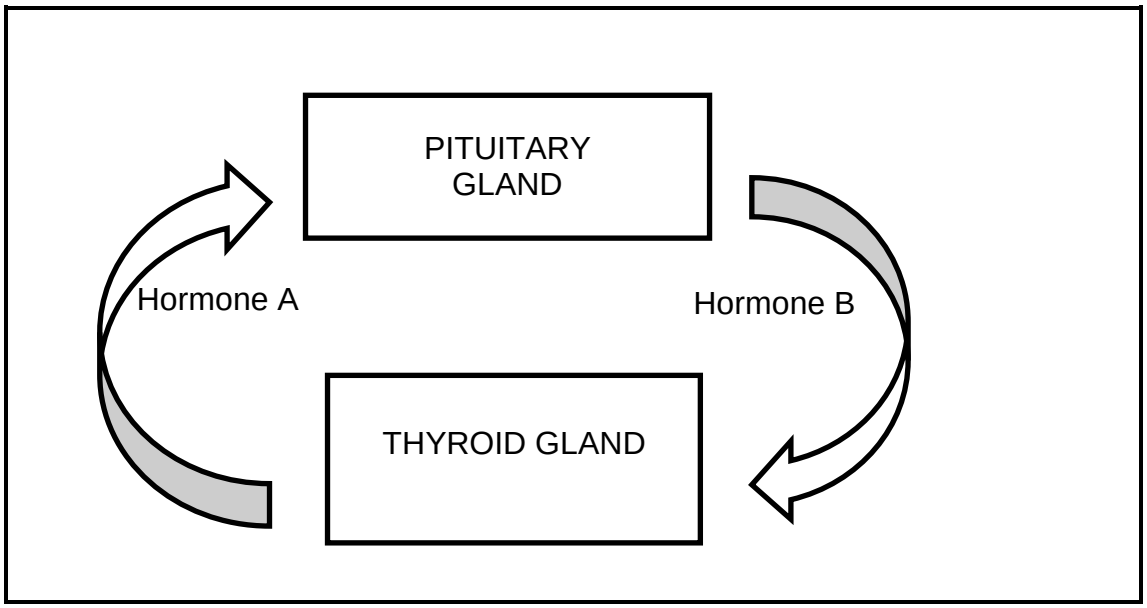
1.2.10 Areas where water covers the soil, or is present either at or near the surface of the soil, all year or for varying periods of time during the year **(10)**

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 – 1.3.3) in the ANSWER BOOK provided.

COLUMN I	COLUMN II
1.3.1 Growth hormone	A: Adrenal gland B: Pituitary gland
1.3.2 Eutrophication	A: Carbon footprint B: Desertification
1.3.3 Accumulation of greenhouse gases	A: Commercial plantation B: Radioactive waste

(3x2) **(6)**

1.4 The diagram below shows the interaction between the hormones secreted by the pituitary gland and the thyroid gland.



1.4.1 What is the interaction, between the two hormones secreted by these glands, called? (1)

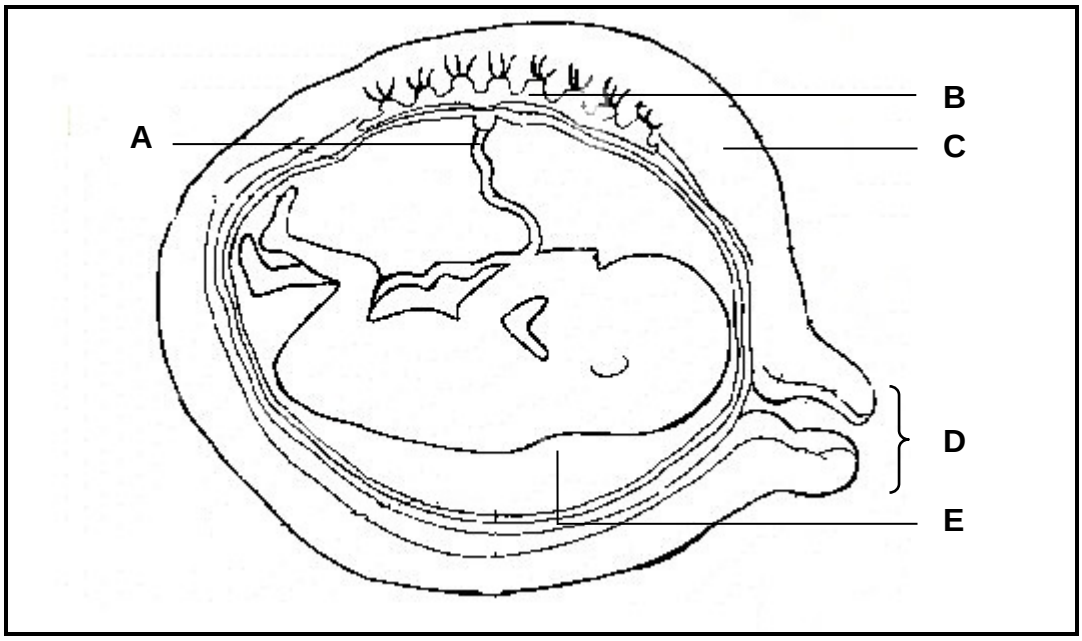
1.4.2 Name hormone **A** which is secreted by the thyroid gland. (1)

1.4.3 Name hormone **B** which is secreted by the pituitary gland. (1)

1.4.4 State the response by the pituitary gland when the levels of hormone **A** are low. (2)

1.4.5 What effect does high levels of hormone **A** have on body temperature? (1)
(6)

1.5 The diagram below shows structures in the female reproductive system.



Give the LETTER and NAME of the structure that …

1.5.1 acts as a thermoregulatory organ. (2)

1.5.2 acts as a filter. (2)

1.5.3 carries foetal blood. (2)

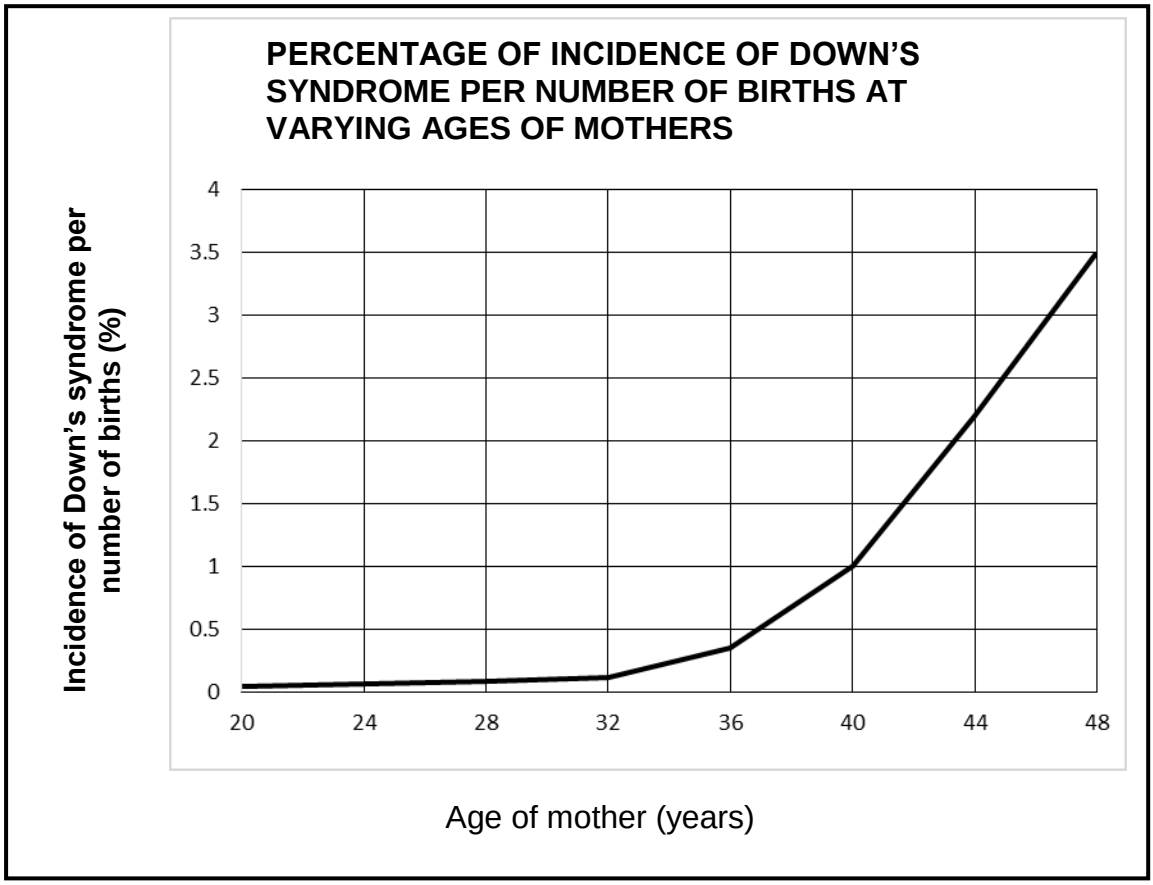
1.5.4 dilates during labour. (2)
(8)

TOTAL SECTION A: [50]

SECTION B

QUESTION 2

2.1 Study the graph below and answer the questions that follow.



[Adapted from http://www.uic.edu/classes/bios/bios100/lectures/mitosis.htm]

2.1.1 According the graph, what is the relationship between the age of the mother and the incidence of Down's Syndrome? (2)

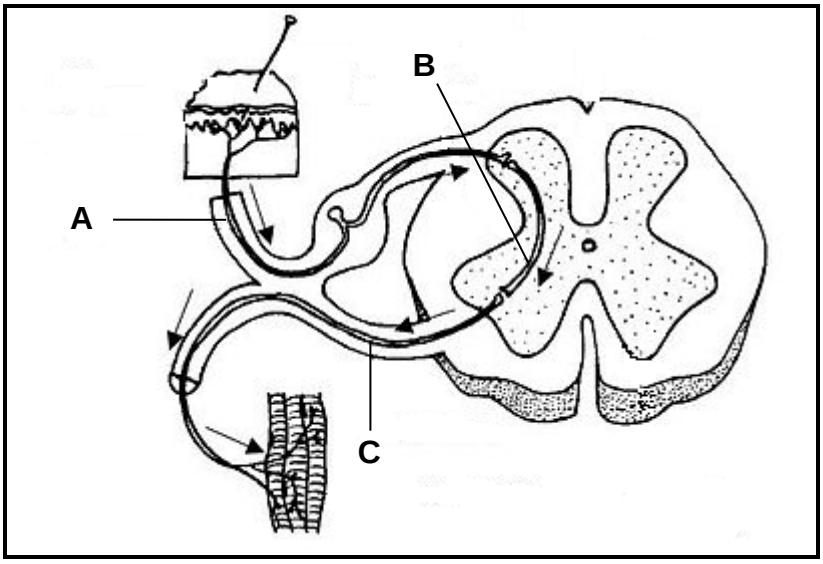
2.1.2 By how much did the incidence of Down's Syndrome increase from the age of 40 to the age of 48 years? Show your calculations. (2)

2.1.3 Name the type of abnormal meiosis where one pair of chromosomes fails to separate during metaphase. (1)

2.1.4 What would be the chromosome number of the gametes in humans, if the phenomenon mentioned in Question 2.1.3 occurred? (2)

2.1.5 What advice would a genetic counsellor give to a woman over 40 years old, who is thinking of having a child? (3)
(10)

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



2.2.1 Identify the mechanism shown in the diagram above. (1)

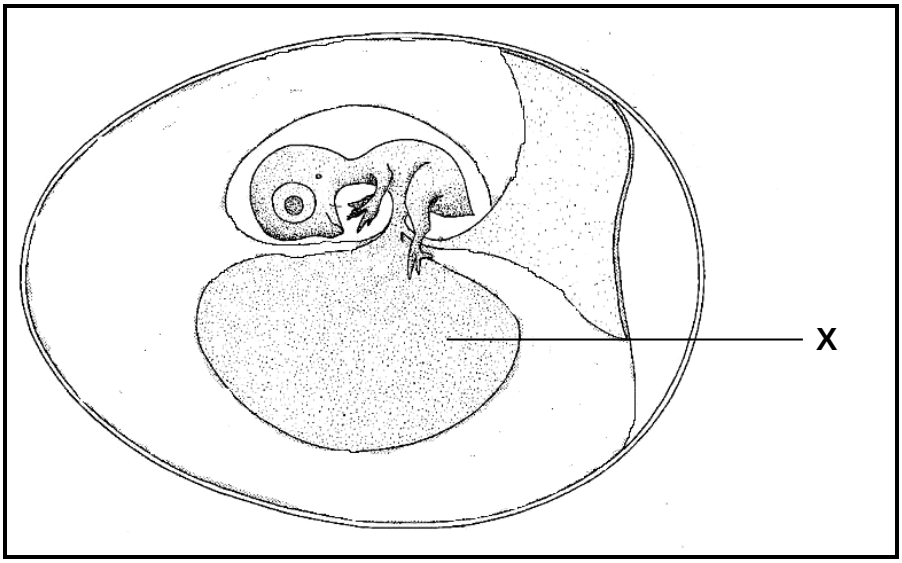
2.2.2 Write down ONLY the LETTER that represents a:

(a) Sensory neuron
(b) Connector neuron (2)

2.2.3 Explain the significance of the mechanism mentioned in Question 2.2.1. (2)

2.2.4 Describe the effect on the mechanism as shown in the diagram if part **C** was damaged. (2)
(7)

2.3 The diagram below represents a pigeon's egg. Study the diagram and answer the questions that follow.



[http://www.biology-resources.com/drawing-bird-embryo.html]

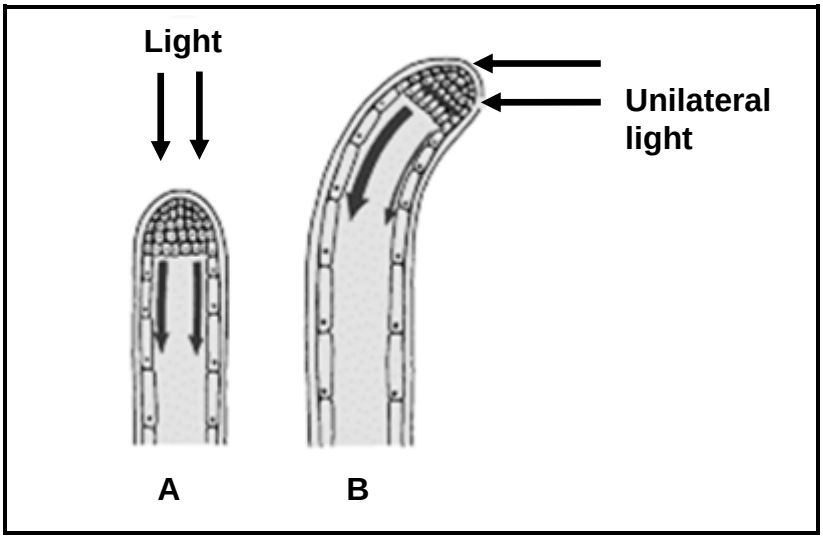
2.3.1 Define the term *ovipary*. (1)

2.3.2 Structure **X** is the yolk sac containing yolk.
What would be the equivalent structure in mammals? (1)

2.3.3 Explain the advantages of this kind of egg to a pigeon. (3)

2.3.4 What type of fertilization occurs in pigeons? (1)
(6)

2.4 Study the diagram below showing two plant stems under different lighting conditions and answer the questions that follow.



2.4.1 Name the plant growth substance indicated by the arrows **inside** the two plant stems. (1)

2.4.2 Plan an investigation to demonstrate the phenomenon illustrated above, using the following apparatus:

– two similar potted plants
– one cardboard box
– a pair of scissors

Write down the experimental method for your investigation. (5)
(6)

2.5 Read the passage on hunger statistics below and answer the questions that follow.

Hunger Statistics

Some **795 million people** in the world do not have enough food to lead a healthy active life.

The vast majority of the world's hungry people live in developing countries. Africa has 42 countries that are at risk of food insecurity while Asia has 24 countries at risk of food insecurity.
Sub-Saharan Africa has the highest prevalence of hunger. One person in four in this region is undernourished.

[Adapted from http://www.wfp.org/hunger/stats?gclid=CNDZ]

2.5.1 Define the term *food security*. (2)

2.5.2 According to the information above, which continent is the most at risk of food insecurity? (1)

2.5.3 Name THREE poor farming practices that have an impact on food security. (3)

2.5.4 In your opinion give THREE reasons other than farming practices, why Sub-Saharan Africa has the highest percentage of hungry people. (3)

2.5.5 Name any TWO factors that lead to loss of biodiversity. (2)
(11)
[40]

QUESTION 3

3.1 The table below shows the number of children born to women (per 1000) of various age groups in the US in 2013. Study the table and answer the questions that follow.

Age group (years)	Birth rate per 1000 women
10 – 14	0.3
15 – 19	26.5
20 – 24	80.7
25 – 29	105.5
30 – 34	98
35 – 39	49.3
40 – 44	10.4

[Adapted from http://www.childtrends.org]

3.1.1 Draw a bar graph using the data in the table. (6)

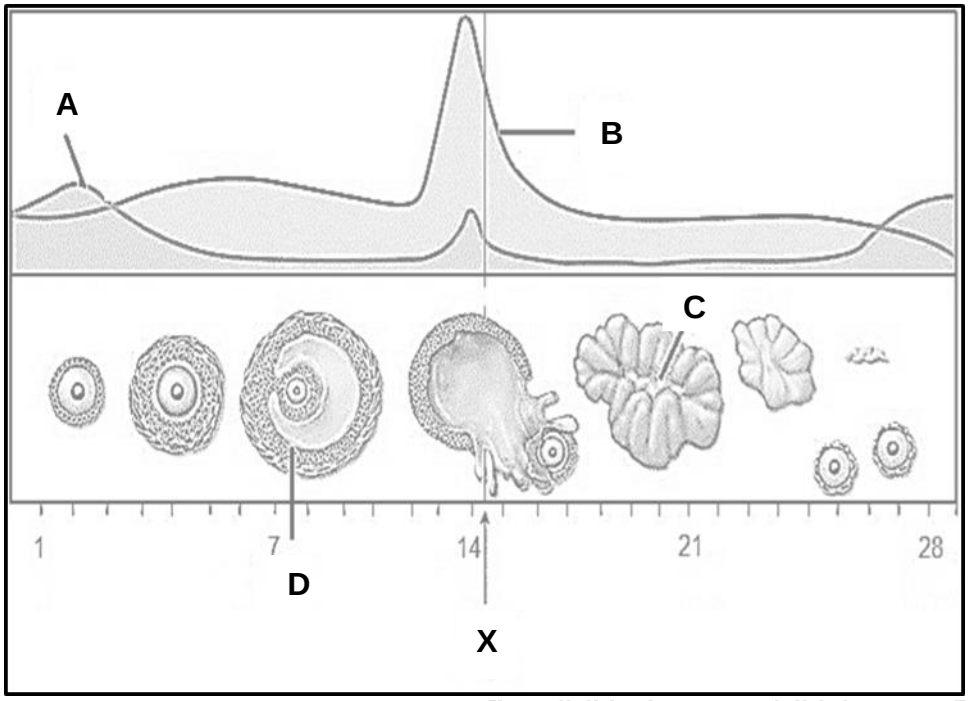
3.1.2 State the following for the data in the table above:

(a) The independent variable
(b) The dependent variable (2)

3.1.3 From the table above state which age group has the highest birth rate per 1000 women. (1)

3.1.4 Describe the trend for the number of children born to women of various age groups. (2)
(11)

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



[http://slideplayer.com/slide/3622072/]

3.2.1 Provide a caption (heading) for the diagram. (2)

3.2.2 Name the process occurring at point **X.** (1)

3.2.3 Identify structure **C**. (1)

3.2.4 Name the hormones labelled:

(a) **A**
(b) **B** (2)

3.2.5 Describe the interaction between hormone **A,** hormone **B** and structure **D** that leads to process **X.** (7)

3.2.6 Give TWO observations from the graph that indicate that fertilization has not taken place. (2)
(15)

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

Dagga is also called **marijuana** or **cannabis**.

When a person smokes dagga, the chemicals get into the blood and are carried quickly to the brain. THC (**tetrahydrocannabinol**) attaches to receptors of neurons that are used for *short-term memory*, *thought, concentration, time perception* and *distance perception.* THC replaces normal neurotransmitters in a synapse, but is not broken down or removed quickly. The effect is a feeling of pleasure followed by loss of memory, personality disturbance, depression and anxiety. It also reduces physical skills. It can take days and even weeks for the effects of THC to be removed from the body and allow neurons to work normally.

[Taken from: SS Life Sciences, Grade 12]

3.3.1 State TWO effects that dagga will have on someone who uses it. (2)

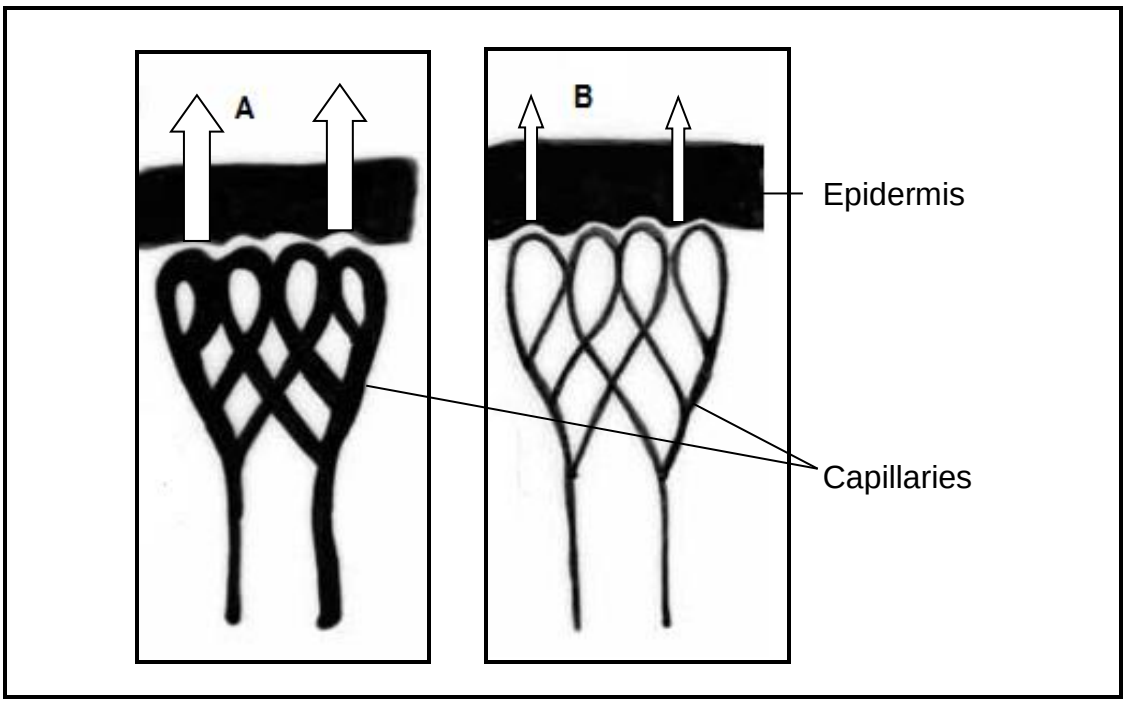
3.3.2 Name the most powerful chemical found in dagga. (1)

3.3.3 Explain why driving after using dagga would be dangerous. (3)

3.3.4 What is the function of a synapse? (1)

3.3.5 Give ONE strategy that governments use or should use to prevent people from using dagga. (1)
(8)

3.4 The diagrams **A** and **B** below show the condition of blood capillaries of the skin under different environmental conditions. Study the diagrams and answer the questions that follow.



3.4.1 What do the arrows from the capillaries through the epidermis represent? (1)

3.4.2 Explain why the blood capillaries of the skin would be in the condition illustrated in **A**. (1)

3.4.3 Explain the effect that dilated capillaries have on sweat glands. (3)

3.4.4 Under what type of environmental conditions would the blood capillaries of the skin be in the condition illustrated in **B**? (1)

(6)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

In a situation where a person is confronted by a vicious dog, his body reacts by going into a 'fight or flight' response. Write an essay where you refer to the particular role played by the autonomic nervous system and the hormone, adrenalin, during this response.

Content (17)
Synthesis (3)
(20)

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

TOTAL SECTION C: 20

TOTAL: 150

END