GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION

2017

10831

LIFE SCIENCES

FIRST PAPER

TIME: 2½ hours

MARKS: 150

16 pages

X10

P.T.O.

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION

LIFE SCIENCES
(First Paper)

TIME: 2½ hours

MARKS: 150

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 answer 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 necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.

SECTION A
QUESTION 1

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 – 1.1.7) in the ANSWER BOOK.

1.1.1 The reproductive strategy where the hatching of fertilised eggs occur inside the body of the female, the young are born 'alive', is called …

A external fertilisation.
B oviparous.
C ovoviviparous.
D viviparous.

1.1.2 One of the functions of the amnion is to …

A serve as a reserve food supply.
B give rise to the placenta.
C prevent the developing foetus from moving about.
D enclose the fluid that protects the embryo against injury.

1.1.3 Which of the following pairs of body functions are normally involuntary actions but can be controlled voluntarily for short periods of time?

A Heartbeat and blood pressure
B Blinking of the eye and the mechanism of breathing
C Contraction of skeletal muscles and pupil size
D Control of body temperature and shivering

1.1.4 The function of the pinna is to …

A amplify sound waves.
B keep the tympanic membrane moist.
C direct sound waves to the tympanic membrane.
D convert sound waves into mechanical vibrations.

1.1.5 Which of the following are functions of adrenalin?

A Influences the pupil size and controls the amount of water lost by the body through the kidneys
B Increases the blood sugar level and blood pressure
C Decreases metabolic rate and blood sugar level
D Affects growth and increases muscle tone

1.1.6 Eutrophication in dams is caused by …

A excess nitrates and phosphates from rivers.
B increased numbers of fish species in the dam.
C hot water released into rivers.
D the reduction in the availability of water supply from the rivers.

1.1.7 The correct way of disposing nuclear waste must be by …

A burying it deep underground in sealed containers.
B dumping it in landfill sites.
C burning it in large incinerators.
D dumping it in the sea.

(7x2) **(14)**

1.2 TERMINOLOGY

Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1 – 1.2.9) in the ANSWER BOOK.

1.2.1 Plant growth substance whose main effect on plants is to stimulate the germination of seeds

1.2.2 Duct connecting the ovaries to the uterus in females

1.2.3 The time period from fertilisation to birth

1.2.4 The part that connects the foetus to the placenta

1.2.5 The place where young immature sperm cells are temporarily stored in males until they mature

1.2.6 The hormone that controls the concentration of water in the blood

1.2.7 The hormone that regulates the amount of salt in the blood

1.2.8 The term used for a human baby in the first seven weeks from conception

1.2.9 The process where the blastula settles on the endometrium and attaches itself to it

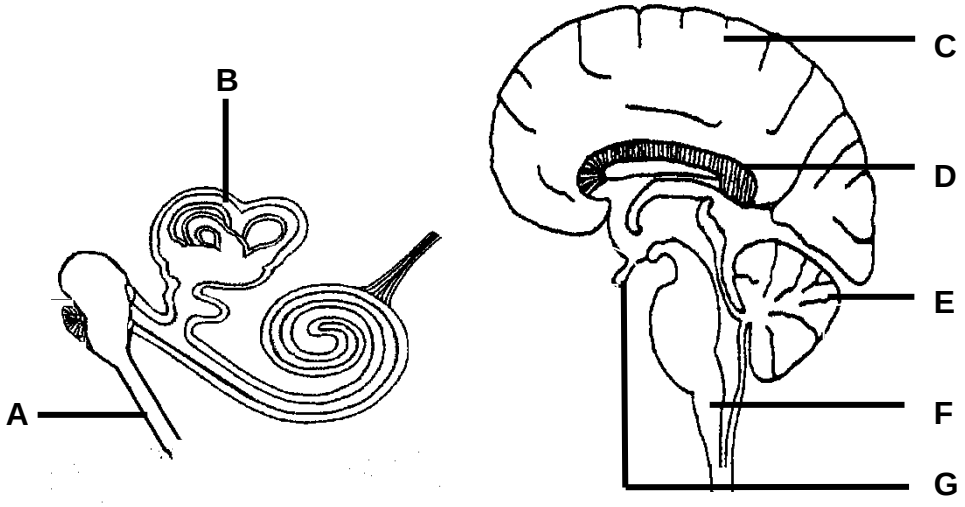
(9x1) **(9)**

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 – 1.3.4) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	Hatchling can move immediately after birth	A. B.	Precocial Altricial
1.3.2	Hyperthyroidism	A. B.	Under secretion of ADH Increased metabolic rate
1.3.3	The human testes are protected by this	A. B.	Scrotum Prostate gland
1.3.4	The advantage of the amniotic egg	A. B.	Provides nutrition Protects against dehydration

(4x2) **(8)**

1.4 The diagrams below represent a part of the human ear and a part of the human central nervous system



Structure of a part of the human ear and a part of the human central nervous system

1.4.1 Write down the **LETTER** of the part of the brain / ear that ...

(a) controls breathing. (1)
(b) balances air pressure between the outer and inner ear. (1)

1.4.2 Give ONE function of the parts labelled ...

(a) B. (1)
(b) C. (1)

1.4.3 (a) Name the endocrine gland found at the base of the brain labelled **G**. (1)

(b) Name the hormone that this endocrine gland secretes, mentioned in QUESTION 1.4.3.(a), which changes the empty Graafian follicle to a yellow mass tissue. (1)
(6)

1.5 The diagrams below represent two different phases in meiosis of the same cell.

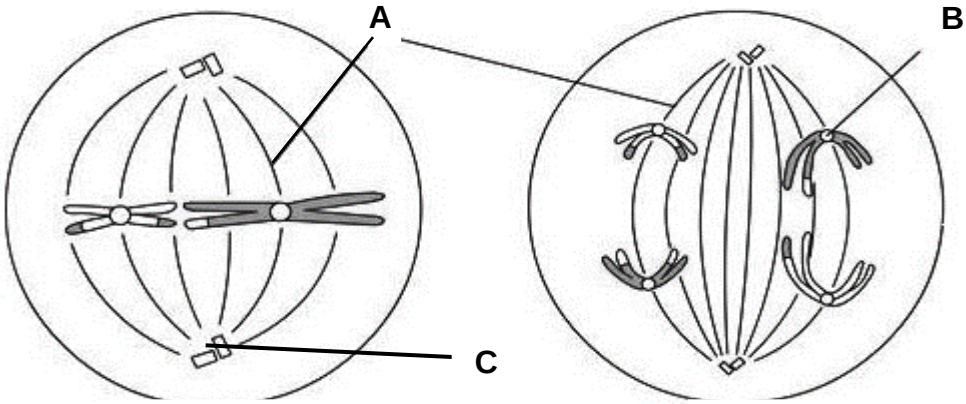


Diagram 1 **Diagram 2**

1.5.1 Give the names of the parts labelled:

(a) **A** (1)
(b) **B** (1)
(c) **C** (1)

1.5.2 Identify the phase represented in:

(a) Diagram **1** (1)
(b) Diagram **2** (1)

1.5.3 State the number of chromosomes in the original mother cell. (1)

1.5.4 Name the process during prophase 1 which is responsible for the appearance of the chromosomes illustrated in Diagram **1**. (1)

1.5.5 How many chromosomes would be found in each of the resulting cells at the end of the division of the cell shown in Diagram **1**? (1)

1.5.6 Which phase took place before the phase illustrated in Diagram **2**? (1)

1.5.7 Give TWO ways other than genetic variation, in which meiosis is important. (2)

1.5.8 State ONE place where meiosis takes place in ...

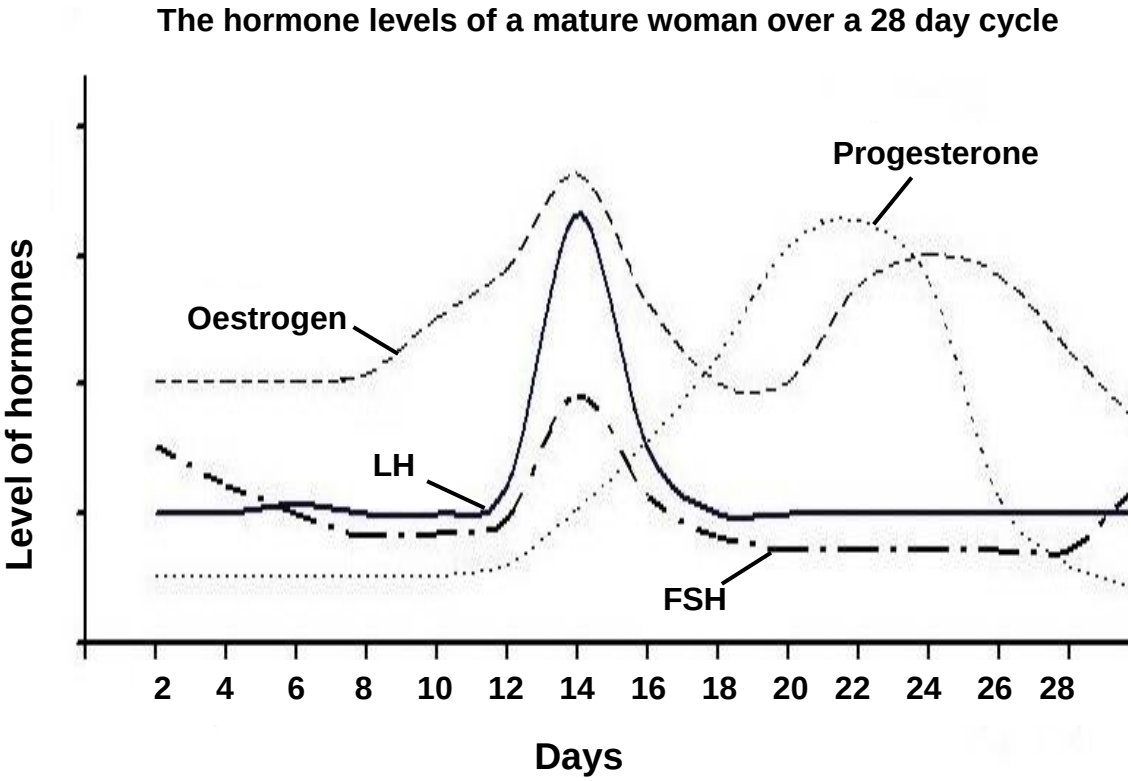
(a) females. (1)
(b) males. (1)

(13)

TOTAL SECTION A: 50

SECTION B
QUESTION 2

2.1 The graph below represents the concentration of oestrogen, progesterone, FSH and LH in the blood of a mature woman over a 28-day cycle.



2.1.1 From the graph, state on which day ovulation takes place. (1)

2.1.2 Give ONE visible reason from the graph for your answer to QUESTION 2.1.1 (2)

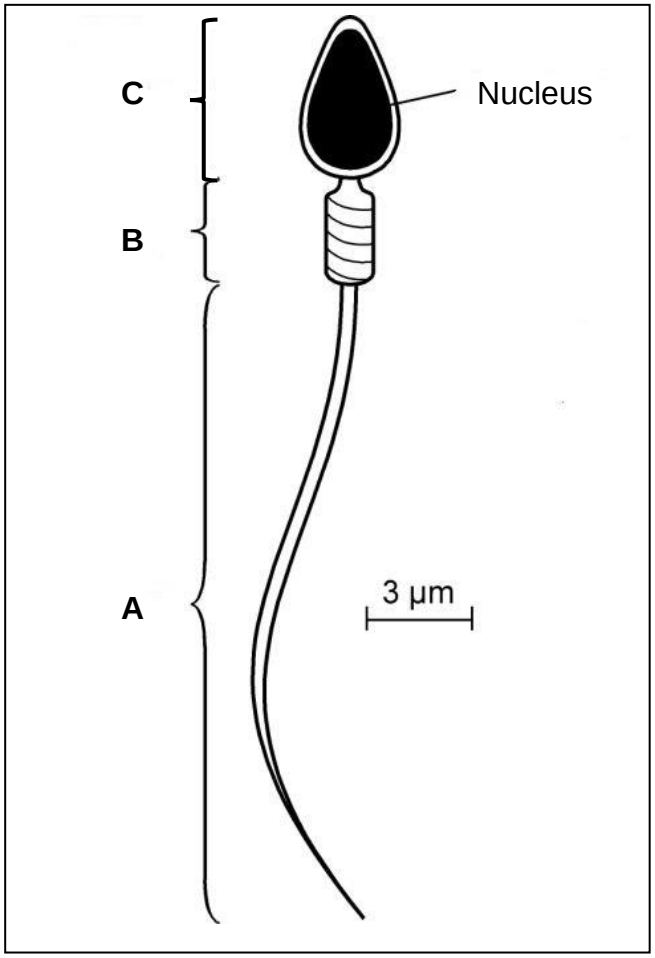
2.1.3 What has caused the increasing levels of oestrogen, as shown on the graph, from days 8 to 14? (2)

2.1.4 What is the function of oestrogen in the uterus from day 8 to 14 of the cycle? (2)

2.1.5 (a) Did fertilization take place during the 28-day cycle as illustrated in the graph? (1)

(b) Give ONE explanation for your answer to QUESTION 2.1.5 (a) (2)
(10)

2.2 Study the following diagram of a human sperm cell.



2.2.1 Give a function of the enzymes that are contained in the structure that covers part **C**. (1)

2.2.2 Provide a name for label **A**. (1)

2.2.3 Explain how the structure of part **A** makes it suitable for its function. (2)

2.2.4 State the name and function of the organelles found in part **B**. (2)

2.2.5 How does the male body ensure that sperm cells are not killed by acidic urine as they travel through the urethra? (2)

2.2.6 What temperature is most favourable for the production of sperm? (1)
(9)

2.3 The table below shows the amount of solid waste generated in a town over a period of 6 years. Study the table and answer the questions that follow.

Year	Total Solid Waste (tons)
1999	255
2000	276
2001	300
2002	330
2003	388
2004	428

2.3.1 Draw a line graph to represent the data in the above table. (6)

2.3.2 What is the difference in the amount of waste generated in the town between 2001 and 2003? Show all the calculations. (3)

2.3.3 Name TWO strategies that the town could employ to manage the increase in solid waste produced and explain the impact on the environment. (4)
(13)

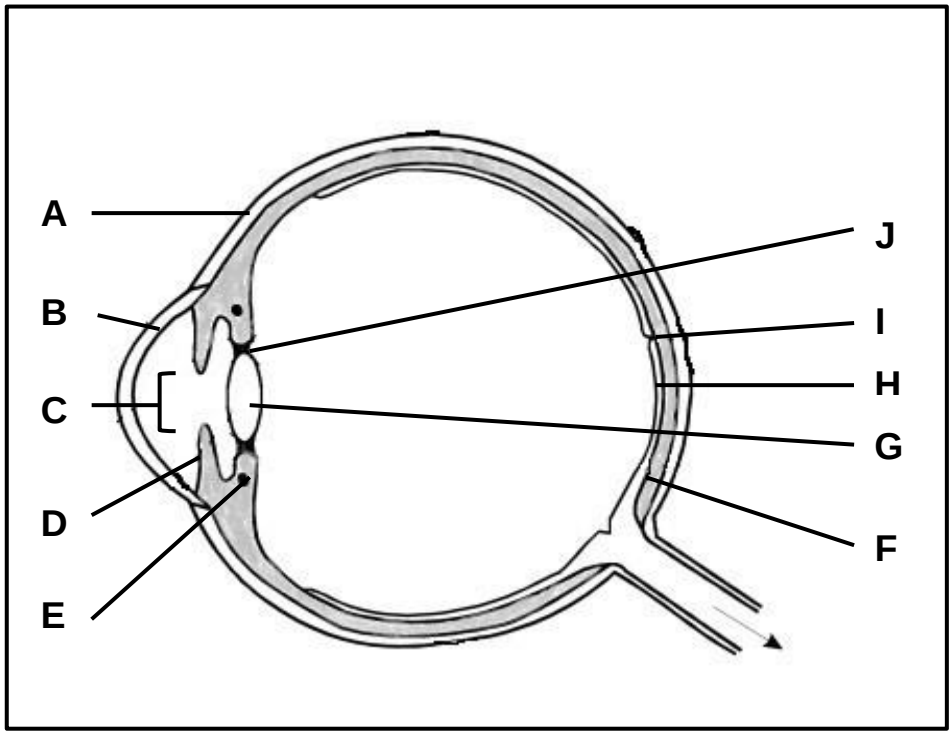
2.4 2.4.1 Explain how an excess of carbon dioxide concentration in the atmosphere could lead to climate change. (3)

2.4.2 Describe how aquatic alien plants may reduce both the availability and quality of water. (5)
(8)

(40)

QUESTION 3

3.1 Study the following diagram of the eye.



3.1.1 Write the **LETTER** and the **NAME** of the region where the clearest image is formed. (2)

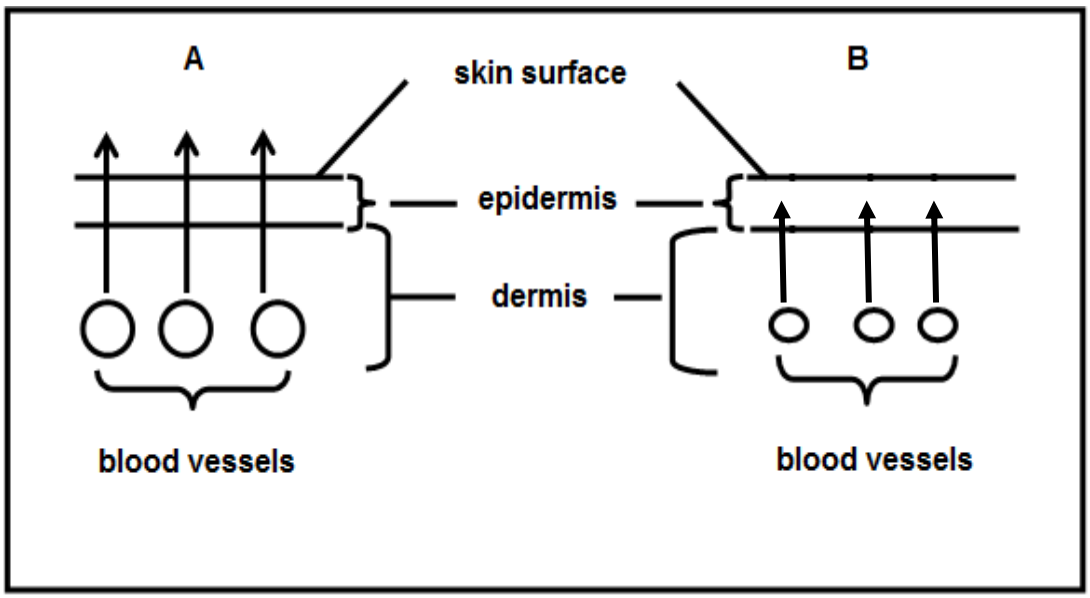
3.1.2 Name the parts in the correct sequence through which light passes in order to reach structure **H**. (Mention the **letter** from the **diagram** and the **name** of each structure in your answer.) (3)

3.1.3 Describe the change that occurs in the structures labelled **E**, **G** and **J** when focusing on a bird that is flying off into the distance. (7)
(12)

3.2 3.2.1 Define a negative feedback mechanism. (2)

3.2.2 Describe how the human body restores thyroxin concentration in the blood when it rises above normal levels. (5)
(7)

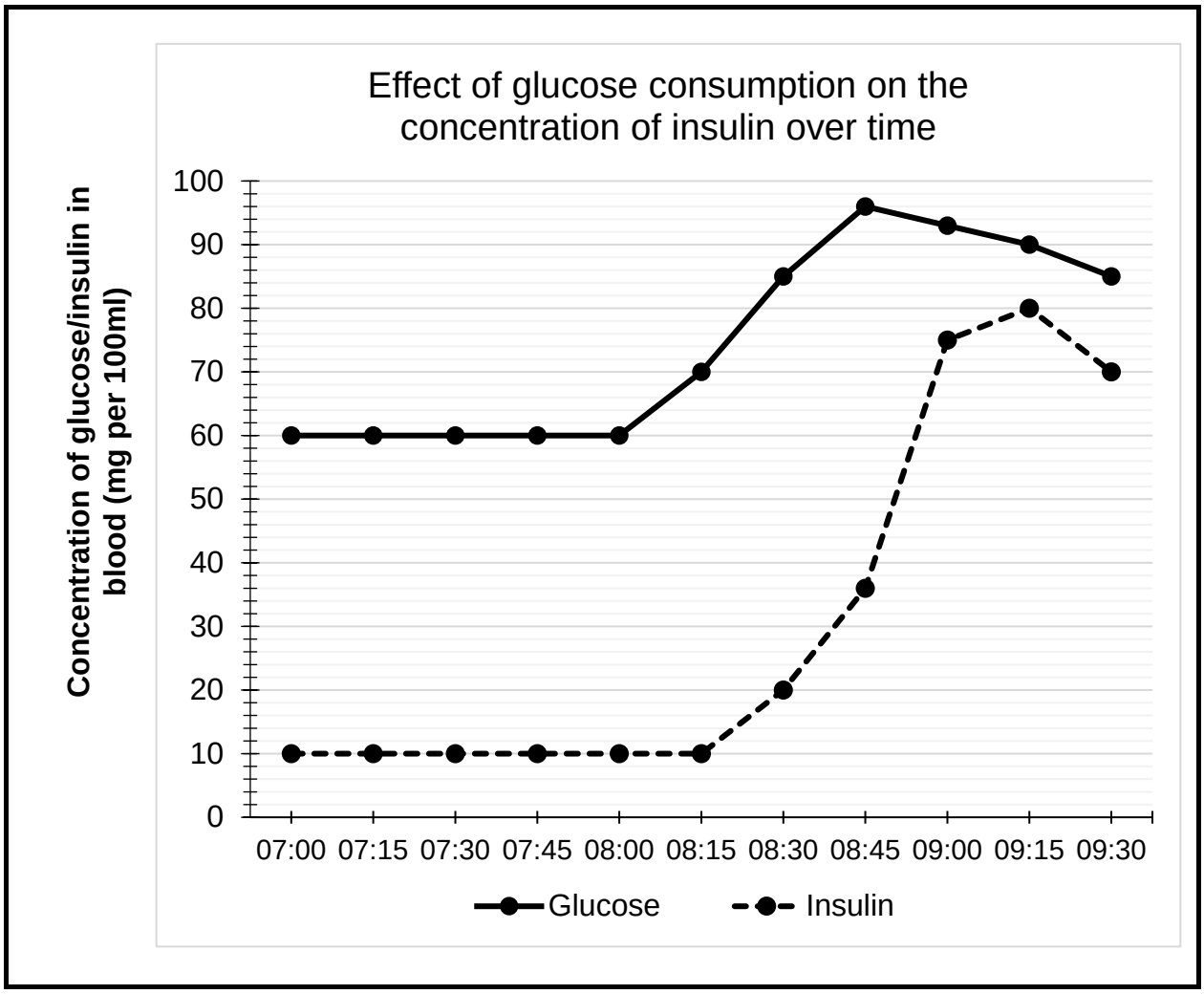
3.3 The sketch below is a diagrammatic representation of skin showing the transverse section through the blood vessels under different environmental conditions.



3.3.1 What would the environmental conditions be as illustrated in **B**? (1)

3.3.2 Describe the process that is taking place in **A** to maintain a constant body temperature. (3)
(4)

3.4 The graph below indicates the effect of glucose concentration on insulin production, before and after a meal, measured for a healthy person over a 2½ hour period.



3.4.1 During which period of time was the person's blood glucose level constant? (1)

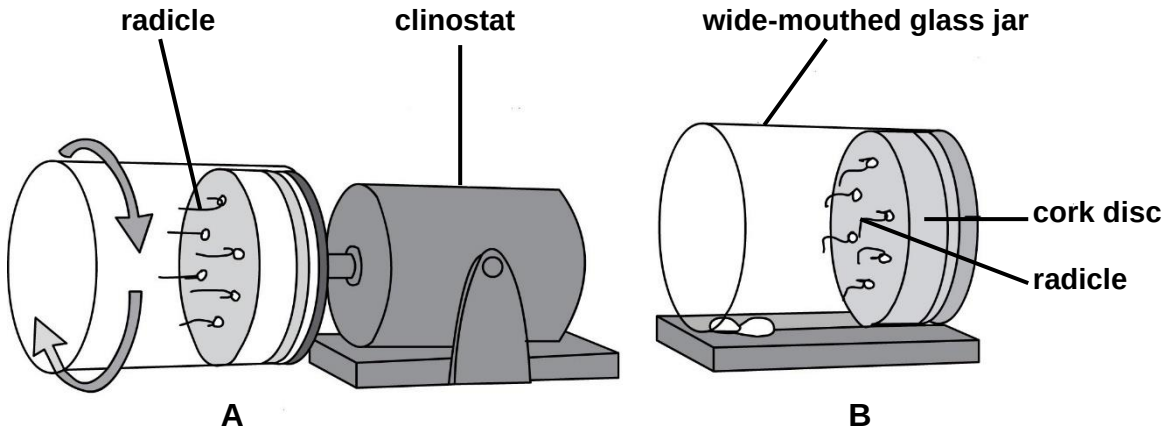
3.4.2 What is the glucose level in the blood at 09:00? (1)

3.4.3 Explain the effect of insulin after eating breakfast at 08:00. (4)

3.4.4 Describe the expected changes in insulin levels if this person was diabetic and untreated. (1)
(7)

3.5 Grade 12 learners carried out an investigation to determine the effect of the force of gravity on the direction of growth of young roots (radicles) of seedlings. They set up the investigation as follows.

Diagram showing the effect of the force of gravity on the radicals of seedlings



- They placed six germinated seedlings onto the rotating disc of a clinostat as shown in diagram **A**.
- They covered the seedlings on the clinostat with a wide-mouthed glass jar (**A**).
- They placed six germinated seedlings onto a cork disc as shown in diagram **B**.
- They put the cork disc on its side and covered it with a wide-mouthed glass jar (**B**).
- The seedlings were not rotated in **B.**
- They switched the clinostat in **A** on, so that the seedlings were continuously turning.
- They left the seedlings for two days.

3.5.1 Identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.5.2 Name TWO ways in which the learners could have ensured that this investigation was valid, other than that indicated in the investigation. (2)

3.5.3 Name ONE way in which the learners could increase the reliability of this investigation. (1)

3.5.4 Why did the learners set up the spinning clinostat in diagram **A**? (2)

3.5.5 What could be observed about the growth of the radicle in diagram **B**? (2)

3.5.6 State a conclusion, based on your observations in QUESTION 3.5.5 above. (1)

(10)

(40)

TOTAL SECTION B: 80

SECTION C
QUESTION 4

ESSAY QUESTION

A person walking barefoot stepped on a thorn with his left foot. He immediately withdrew his left foot, balancing himself on his right foot. Describe the process of the reflex action that takes place, as well as how the person maintained balance and body position.

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

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

TOTAL SECTION C: 20

TOTAL: 150

END