Province of the
EASTERN CAPE
EDUCATION

# NATIONAL SENIOR CERTIFICATE

## GRADE 11

## NOVEMBER 2015

# LIFE SCIENCES P1

**MARKS:** **150**

**TIME:** **2½ hours**

*ILFSCE1*

This question paper consists of 14 pages.

1. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page.
3. Read ALL the questions correctly and answer only what is asked.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Non-programmable calculators may be used.
6. Show ALL your calculations, including units and formula, where applicable.
7. 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 numbers (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 A.

1.1.1 If a drop in the pH of the blood occurs, the kidneys will …

A increase the absorption of urea.
B decrease the absorption of sodium ions.
C decrease the secretion of hydrogen ions.
D increase the re-absorption of bicarbonate ions.

1.1.2 Which of the following will cause the kidneys to reabsorb more sodium ions?

A A decrease in blood pressure
B An increase in the volume of blood
C Constriction of the afferent arterioles
D A decrease in the amount of ADH secreted

1.1.3 Cilia are found lining which of the following structures?

A Larynx
B Alveoli
C Trachea
D Pleural membranes

1.1.4 Which of the following takes place in the cytoplasm of a plant cell but not in the mitochondria?

A Oxidative phosphorylation
B Krebs cycle
C Glycolysis
D Light dependent reactions of photosynthesis

1.1.5 The conversion of pyruvic acid into lactic acid occurs during ...

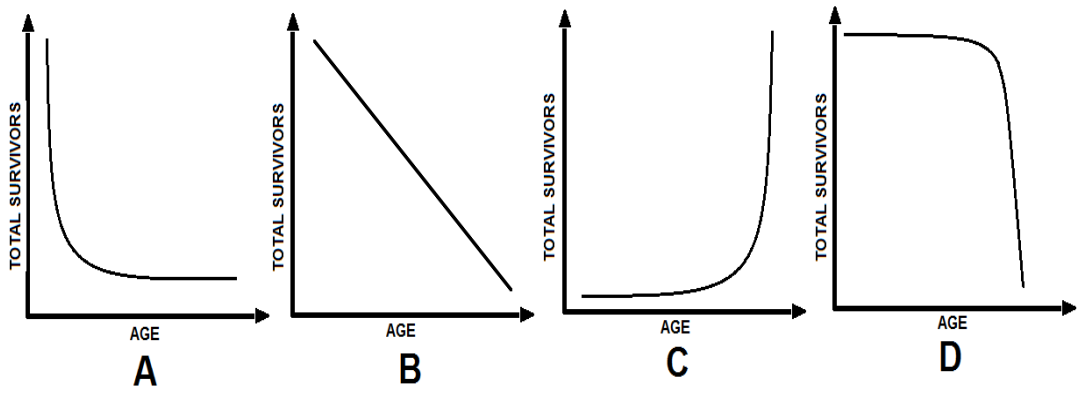
A photolysis.
B glycolysis.
C anaerobic respiration.
D oxidation of glucose.

1.1.6 Which of the following substances can be absorbed by blood without further digestion?

A Fats
B Proteins
C Starch
D Glucose

1.1.7 Which of the following survival curves represents a troop of baboons?




1.1.8 Fecundity is...

A the average number of children born in one generation per female of child bearing age.
B the actual number of children born in one generation per female of child bearing age.
C the average number of children born per 10 000 females of child bearing age.
D the average number of children born in one generation per females aged between 45 and 55 years.

1.1.9 The resource partitioning observed in an ecosystem effectively reduces ...

A the ability of closely related species to interbreed.
B competition between closely related species by reducing overlap of ecological niches.
C predatory instinct of related species.
D the wastage of food resources.

1.1.10 Which of the following represents the characteristic feature of developing Countries such as Ethiopia, Mexico and Thailand?

A Highly industrialised
B High birth rates
C Longer life expectancy
D Low infant mortality rates (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 (1.2.1–1.2.6) in the ANSWER BOOK.

1.2.1 The pigment which is responsible for absorbing radiant energy during photosynthesis

1.2.2 Expected colour change of diluted iodine solution when the presence of starch in leaf is confirmed

1.2.3 Genetic material found in the mitochondrial matrix

1.2.4 The gas which is essential for the Kreb's cycle to occur

1.2.5 Folded structures found on the inner membrane of a mitochondria

1.2.6 Stage of aerobic respiration that releases carbon dioxide (6 x 1) (6)

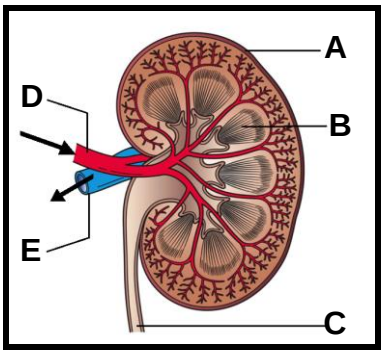
1.3 Indicate whether each of the statements in COLUMN **I** applies to **A only**, **B only**, **both A and B** or **none** of the items in COLUMN **II.** Write **A only**, **B only**, **both A and B**, or **none** next to the question number (1.3.1–1.3.6) in the ANSWER BOOK.

| | **COLUMN I** | **COLUMN II** |
|---|---|---|
| 1.3.1 | Molecule that stores energy | A. ATP<br>B. ADP |
| 1.3.2 | The fuel required for cellular respiration | A. Glycogen<br>B. Glucagon |
| 1.3.3 | Products of anaerobic respiration in yeast | A. Alcohol<br>B. $CO_2$ |
| 1.3.4 | The organelle in which photosynthesis takes place | A. Mitochondria<br>B. Chloroplast |
| 1.3.5 | Storage of chlorophyll | A. Grana<br>B. Lamella |
| 1.3.6 | Acid secreted in the stomach during digestion | A. HCl<br>B. Fatty acid |

(6 x 2) (12)

1.4 Study the longitudinal section through the human kidney and answer the questions that follow.




1.4.1 Label parts A, B and C. (3)

1.4.2 Which labelled part becomes a site of obstruction to the flow of urine when a pellet of renal stone is dislodged? (1)

1.4.3 State the NAME and LETTER of the blood vessel that contain higher percentage of waste products. (2)

1.4.4 Which one of the labelled blood vessels has the lowest blood pressure? (1)

1.5 Study the following passage on obesity and answer questions.

Obesity can be described as an imbalance between energy intake and expenditure such that excess energy is stored in fat cells, which enlarge or increase in number. In a sample of 7 726 South African women aged 15–95 years old, black women had the highest prevalence of overweight and obesity (58,5%), followed by women of mixed ancestry (52%), white women (49,2%) and then Indian women (48,9%). A different pattern was seen in men. In a sample of 5 401 South African men aged 15–95 years, the prevalence of overweight and obesity was highest in white men (54,5%), followed by Indian men (32,7%) and men of mixed ancestry (31%), with the lowest prevalence in African men (25%). Some of the health risks associated with obesity are diabetes, coronary heart disease, hypertension, cancer and psychological ill health.

Source: http://www.mrc.ac.za/chronic/cdlchapter7.pdf

1.5.1 What is main cause for obesity? (2)

1.5.2 What is the total number of people sampled during this survey? (1)

1.5.3 What could be the possible reason for the different prevalence of obesity between men and women? (1)

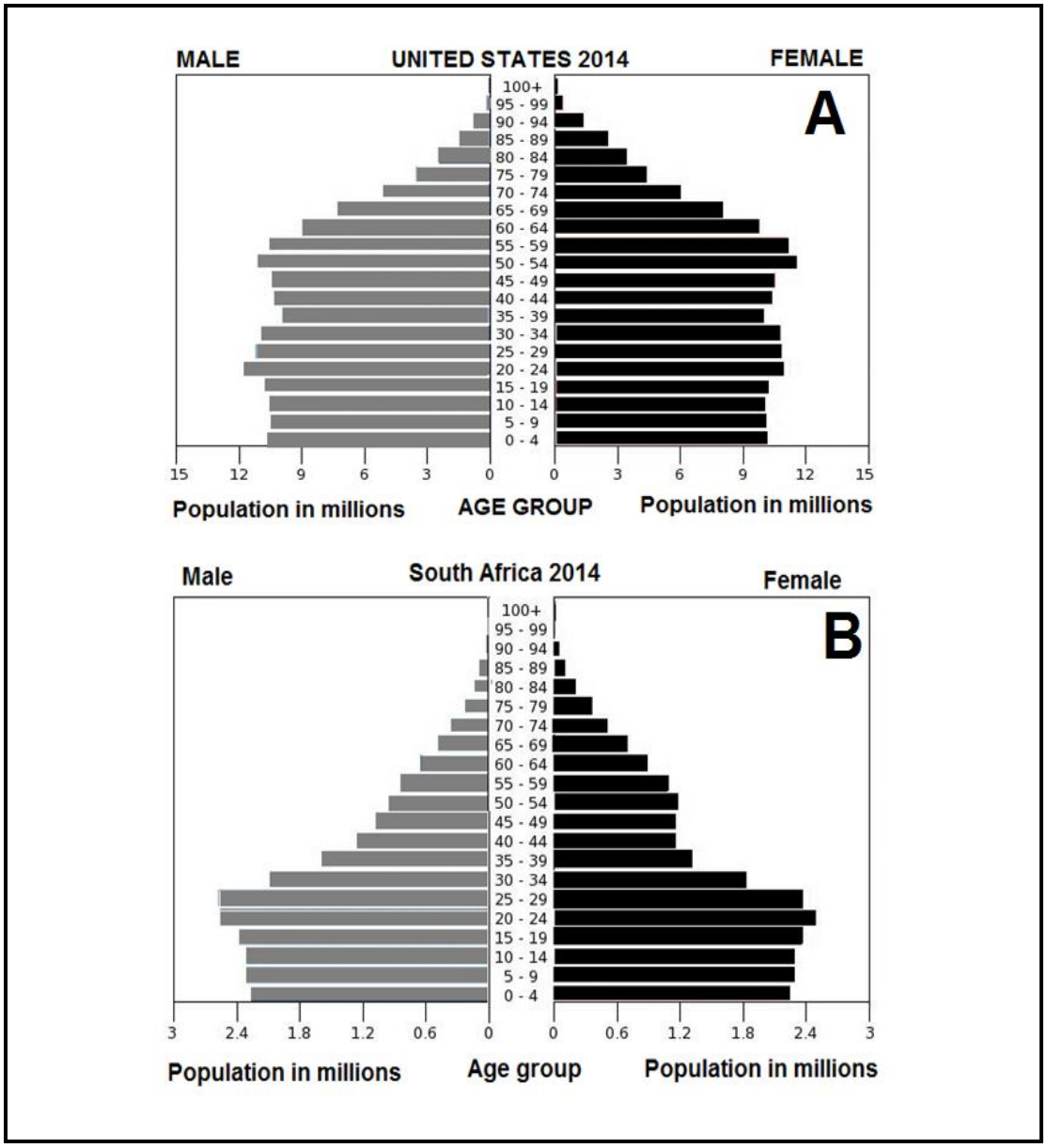
1.5.4 Name ONE of the health risks mentioned in the extract that has the potential of causing stroke. (1)

**TOTAL SECTION A: 50**

## SECTION B

## QUESTION 2

2.1 Study the Age-gender pyramids representing two different countries and answer the questions that follow.




2.1.1 Name the source of information required to plot the above graph. (1)

2.1.2 Which population pyramid (A or B) shows an increasing population? (1)

2.1.3 Explain your response to QUESTION 2.1.2. (4)

2.1.4 Describe the trend of population growth in Graph A. (3)

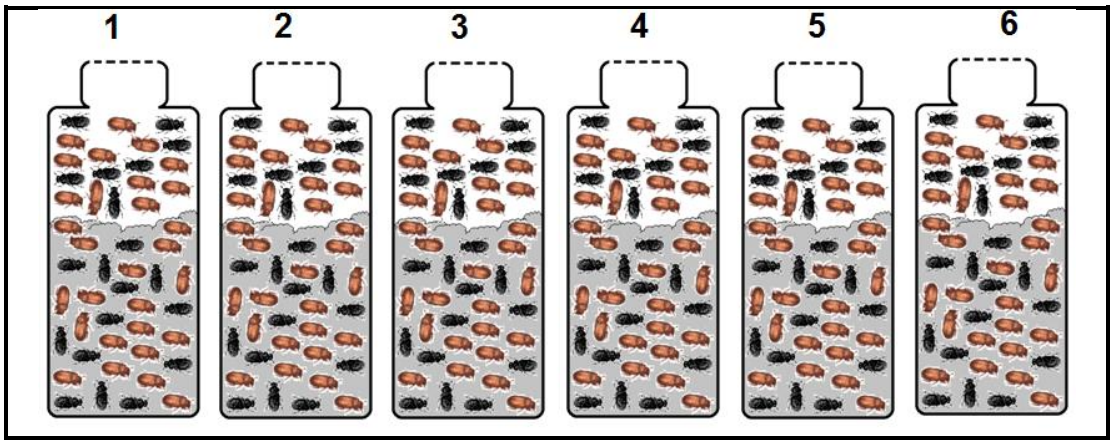
2.1.5 Does graph A represent increasing, declining or stable population? (1)

2.2 Learners at a certain school conducted an investigation to study the communal interaction between two different species in a particular ecological niche.

The investigation was set up as follows:

- Populations of two different species of *Tribolium* (a flour beetle) were kept in six different bottles of flour numbered 1–6 as shown in the diagram below. (The bottles of flour served as food and habitat).
- Each bottle contained approximately 100 beetles of each species.
- Each bottle was kept under different temperatures and humidity conditions:




- After a period of time the number of each species surviving in each of the bottles was determined and the results were recorded.

The results are shown below:

| Bottle | Temperature (°C) | Relative humidity (in %) | No: of T. *castaneum* surviving | No. of T. *confusum* surviving |
|---|---|---|---|---|
| 1 | 34 | 70 | 100 | 0 |
| 2 | 34 | 30 | 10 | 90 |
| 3 | 29 | 70 | 86 | 14 |
| 4 | 29 | 30 | 13 | 87 |
| 5 | 24 | 70 | 29 | 70 |
| 6 | 24 | 30 | 0 | 100 |

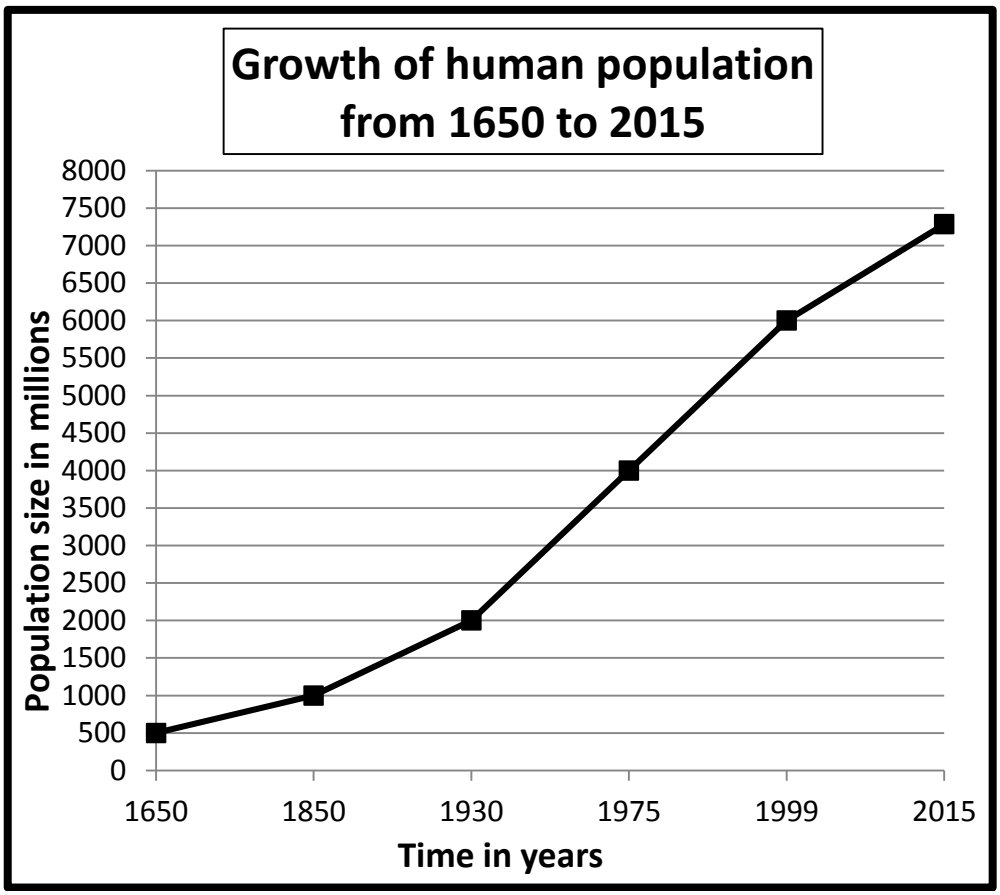
2.2.1 Define the following terms:
(a) Community (2)
(b) Ecological niche (2)

2.2.2 Which one of the species is more tolerant to low temperature and low humidity? State a reason for your answer. (2)

2.2.3 Are the factors being investigated density-dependent or density independent? (1)

2.2.4 From the above results, what deduction can be made with regards to the type of competition which has occurred? (1)

2.3 Study the graph showing the growth of human population and answer questions:




2.3.1 What kind of growth form is followed by the humans? (1)

2.3.2 Which phase of growth form mentioned in the above question is represented from 1930 to 1999? (1)

2.3.3 Explain why the stage of population growth depicted from 1930 to 1999 has occurred. (4)

2.3.4 Give any TWO reasons for the slow population growth from 1999 to 2015. (2)

2.3.5 Read the extract below and answer questions

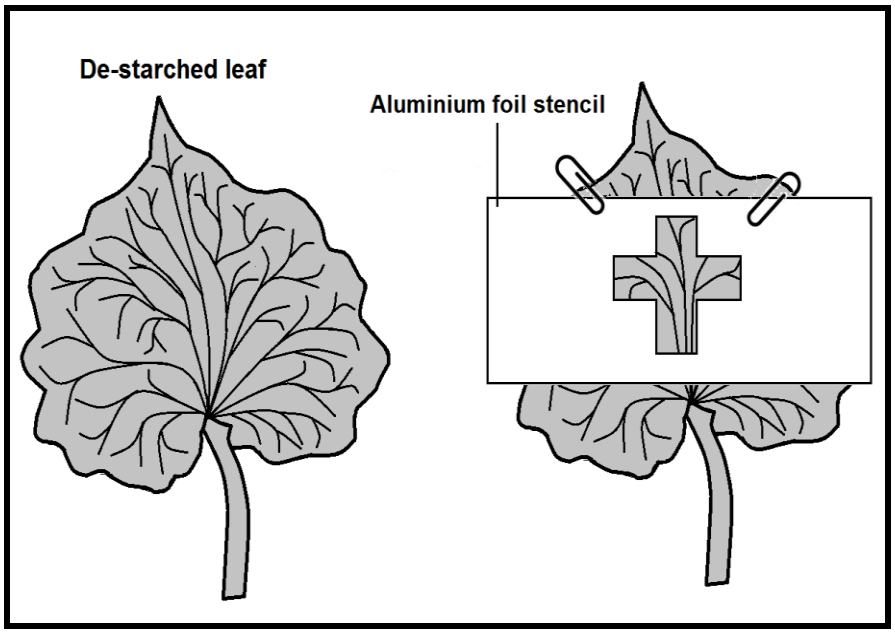
> Current global population of over 7 billion is already two to three times higher than the sustainable level. Several recent studies show that Earth's resources are enough to sustain only about 2 billion people at a European standard of living.
>
> http://www.worldpopulationbalance.org/3_times_sustainable

(a) Predict the fate of humans if the current trend of population growth is sustained without check. (1)

(b) Suggest a practical solution to reduce the accelerated growth of human population. (1)

2.4 An experiment was conducted to determine whether light is necessary for photosynthesis. The procedure followed was given below:

- A geranium potted-plant was destarched
- A cross-shaped light-slit was cut out on an aluminium foil
- The aluminium foil stencil was then clipped on to one of the destarched leaves as shown in the diagram below
- The potted plant was exposed to bright sunlight for 4–5 hours
- After 5 hours, the aluminium foil stencil was removed and the leaf was tested for starch




2.4.1 How was the plant de-starched? (1)

2.4.2 Explain why all the starch have disappeared during the process mentioned in QUESTION 2.4.1. (4)

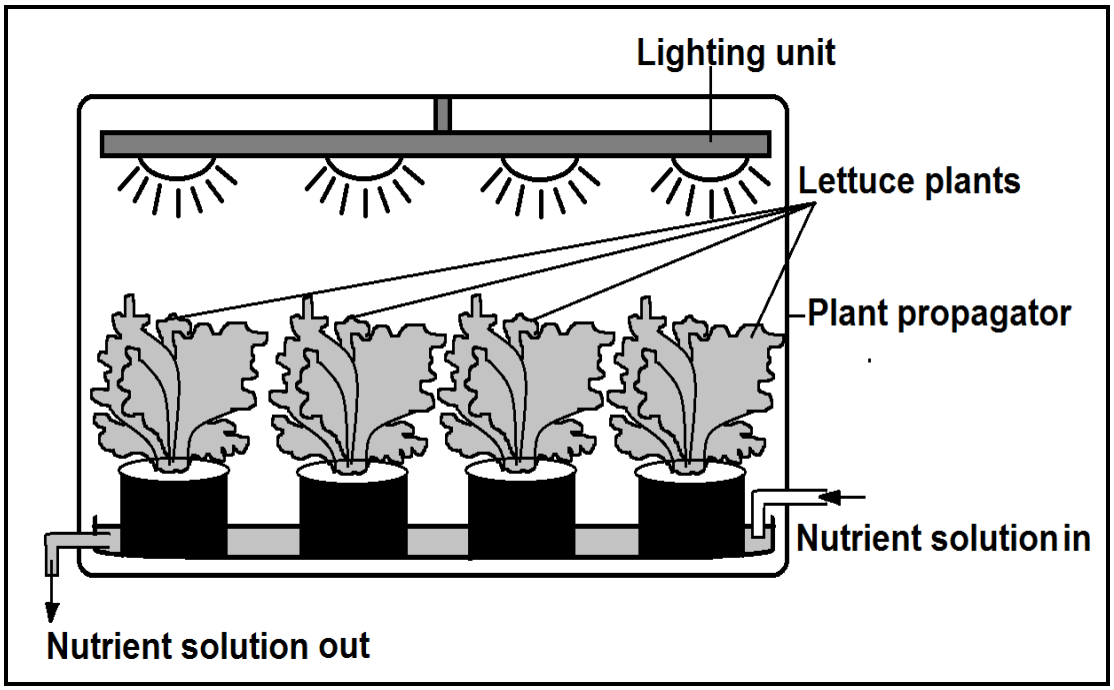
2.4.3 Describe various steps that were followed during a starch test in the correct sequence. (4)

2.4.4 Draw a labelled diagram of leaf showing the result of the investigation. Use a lead pencil and shade the parts which tested positive for starch. (3)

**[40]**

## QUESTION 3

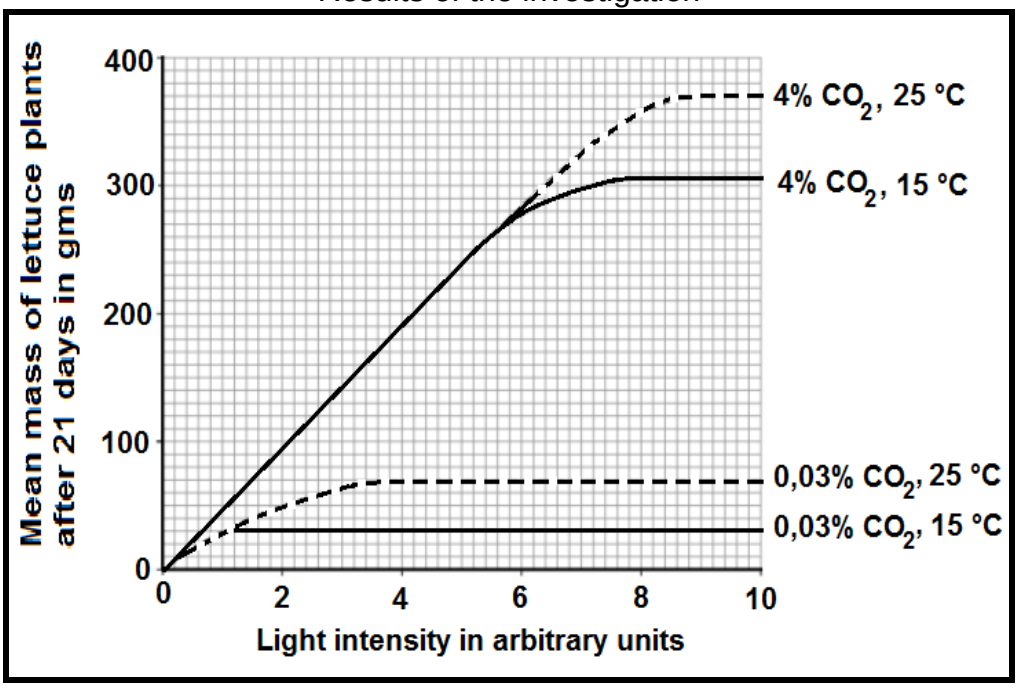
3.1 The diagram shows a plant propagator in which scientists can control temperature, light intensity and carbon dioxide concentration:




- The scientists set different temperature, $CO_2$-concentration and light intensity for four lettuce plants.
- The graphical of illustration of the results are given below.
- Mean mass of lettuce plants serves as an indication of rate of photosynthesis.

Study the results given below and answer the following questions:

Results of the investigation



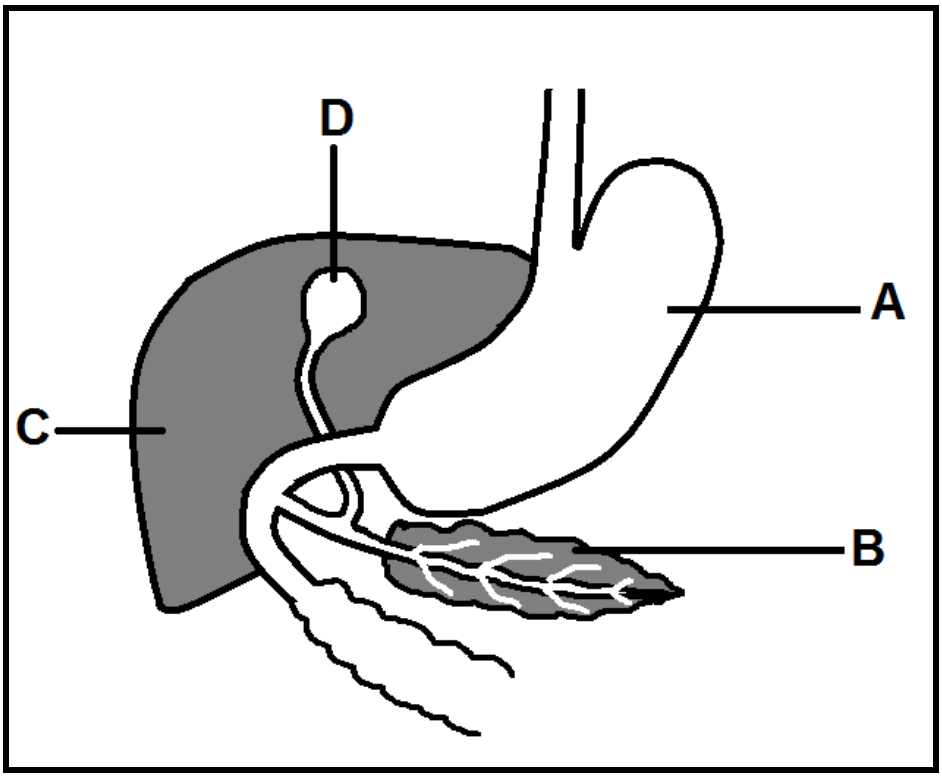
3.1.1 What is the influence of light intensity on mean mass of lettuce plants? (2)

3.1.2 Name the TWO limiting factors that influence the photosynthesis as the light intensity increases. (2)

3.1.3 How did the scientists able to increase the rate of photosynthesis to the maximum level? (3)

3.1.4 What would happen to the rate of photosynthesis if the temperature is raised beyond 35 °C? Give a reason for your answer. (2)

3.2 The diagram below shows parts of human digestive system. Study the diagram and answer questions.




3.2.1 Label parts labelled A, B and D. (3)

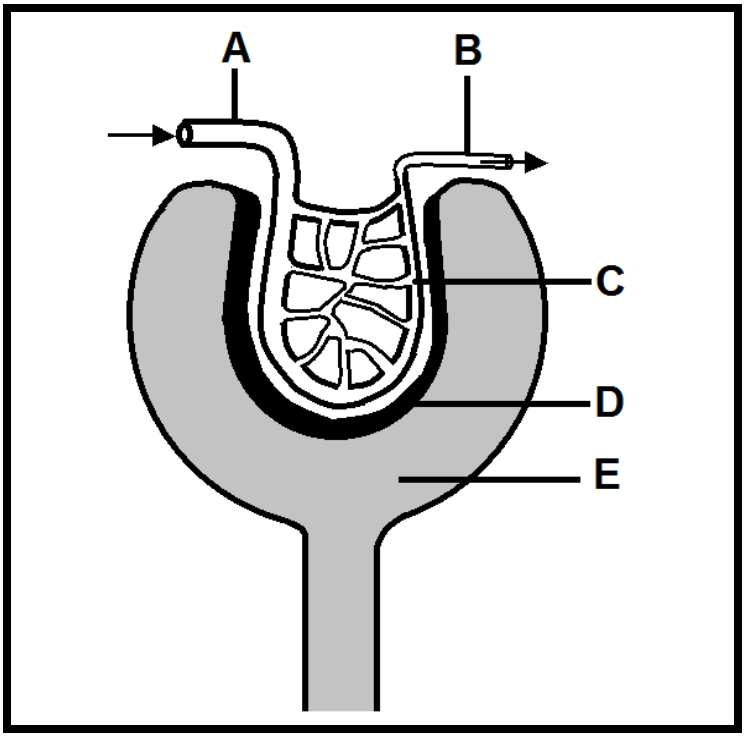
3.2.2 State the name and letter of a gland that secretes digestive juice containing no enzymes. (2)

3.2.3 State any FOUR functions of the digestive juice released from part labelled D. (4)

3.2.4 Name the chronic health risk caused by the malfunctioning of part labelled B. (1)

3.2.5 Briefly describe the homeostatic role of part labelled B when the blood sugar level rises in the human body. (8)

3.3 The diagram below shows the structure of a malpighian corpuscle. Study the diagram and answer the questions that follow.




3.3.1 Name parts labelled A, B and C. (3)

3.3.2 Which physiological process takes place in the diagram shown in the above diagram? (1)

3.3.3 Explain how the difference in diameter of the parts labelled A and B is responsible for the process that occurs in the malpighian body. (6)

3.3.4 Name the specialised cells found at D. (1)

3.3.5 Describe how these cells mentioned in QUESTION 3.3.4 are structurally suited for their function. (2)

**[40]**

**TOTAL SECTION B: 80**

## SECTION C

## QUESTION 4

Describe the mechanism of the breathing process and explain how the correct level of respiratory gases are restored soon after running a 100 m sprint.

Content: 17
Synthesis: 3

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