education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

LIFE SCIENCES P1

EXEMPLAR PAPER

MARKS: 150

TIME: 2 hours

This question paper consists of 16 pages.

151 1 E

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

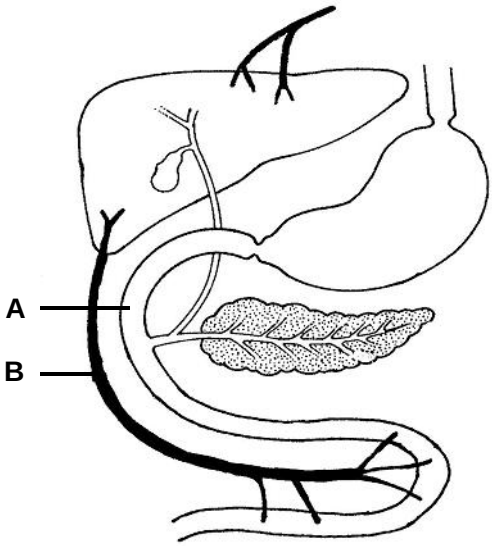
1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answer to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Write neatly and legibly.
6. If answers are NOT presented according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

SECTION A

QUESTION 1

1.1 Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A - D) next to the question number (1.1.1 - 1.1.5) in the answer book, for example 1.1.6 D.

QUESTIONS 1.1.1 and 1.1.2 are based on the diagram below. Study the diagram and then answer the questions that follow.



Part of the human digestive system

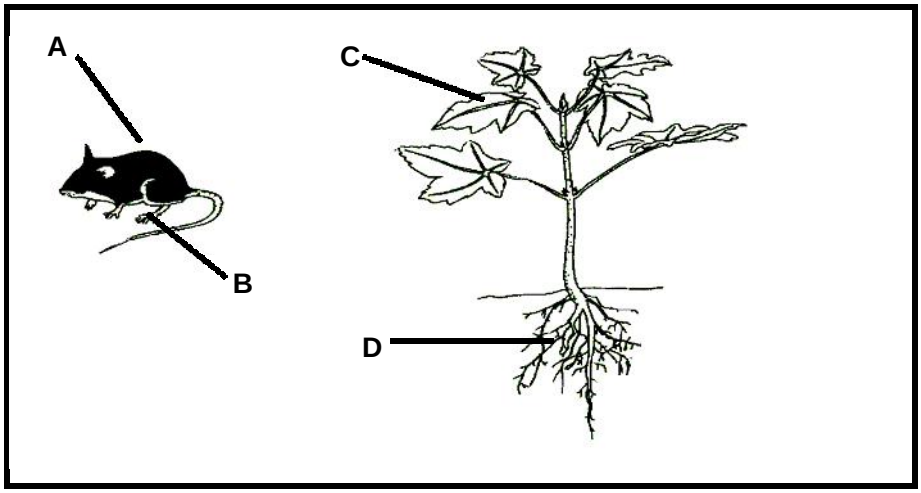
1.1.1 The part labelled A is the ...

A stomach.
B duodenum.
C pancreas.
D large intestine.

1.1.2 The function of part B is to ...

A secrete bile.
B secrete intestinal juice.
C store faeces.
D transport absorbed nutrients to the liver.

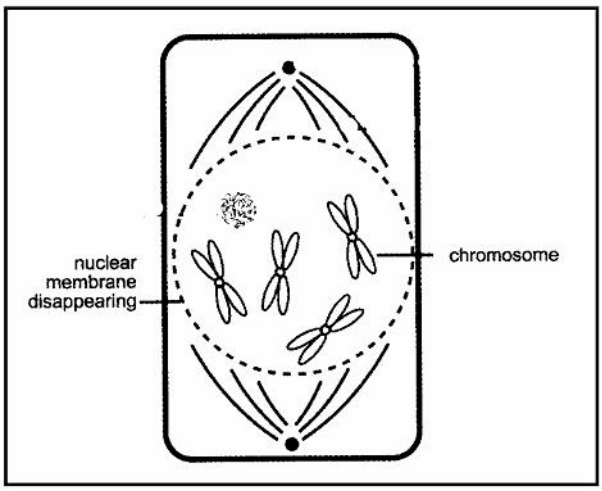
1.1.3 Study the diagram below showing an animal and a plant.



Where does cell respiration occur in the animal and in the plant shown in the diagram?

A A only
B A and B only
C A, B and C only
D A, B, C and D

QUESTIONS 1.1.4 and 1.1.5 refer to the following diagram of a phase of mitosis:



1.1.4 After completion of this division, the nucleus of each new cell will have ...

A two chromosomes.
B four chromatids.
C four chromosomes.
D eight chromosomes.

1.1.5 If a somatic/body cell in a human being was undergoing mitosis, how many chromosomes will be found in each of the two daugther cells?

A 4
B 8
C 46
D 23

(5 x 2) **(10)**

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).

1.2.1 A stack of parallel, flattened sacs in the chloroplast

1.2.2 A membrane that only allows certain substances to pass through it

1.2.3 The growth or tumour that forms as a result of uncontrolled mitosis

1.2.4 Cell fragments without nuclei that play a role in the clotting of blood

1.2.5 The part of a chromosome that holds the two chromatids together

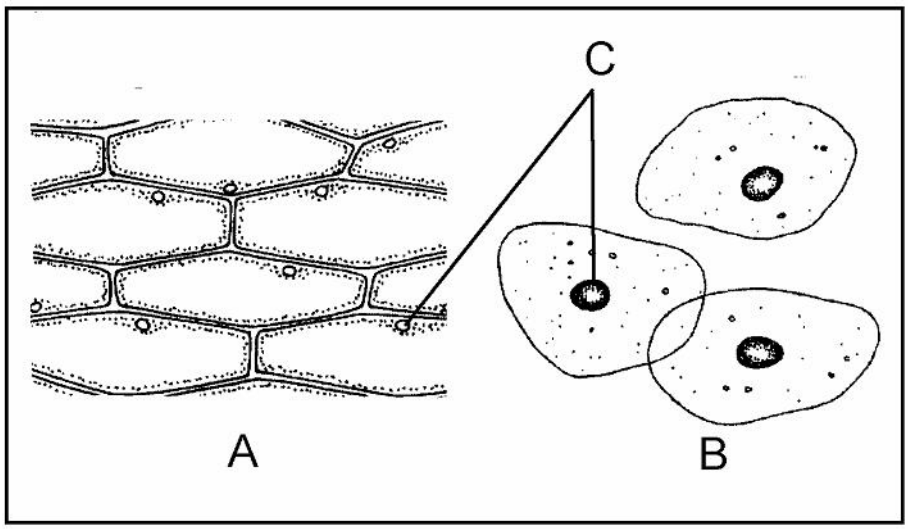
1.2.6 The part of the microscope which regulates the amount of light passing into it **(6)**

1.3 Match the statements in COLUMN A with the items in COLUMN B. Write only the letter (A - K) next to the question number (1.3.1 - 1.3.6), for example 1.3.7 L.

	COLUMN A		COLUMN B
1.3.1	Process where food is chewed and mixed with saliva	A	stomata
1.3.2	Green pigment in the leaves of plants	B	ingestion
1.3.3	Gas which plants need for photo-synthesis	C	organ
1.3.4	Structure that contains many types of tissues, grouped together to perform a particular function	D	chlorophyll
1.3.5	Membrane bound structures found within a cell	E	carbon dioxide
1.3.6	Carbohydrate that makes up cell walls	F	system
		G	mastication
		H	oxygen
		I	organelles
		J	cellulose
		K	phospholipid **(6 x 1)**

(6)

1.4 A Grade 10 learner submitted the following drawings of animal cells and plant cells that he viewed under a light microscope:



1.4.1 Which ONE of the drawings (A or B) represents:

(a) Plant cells
(b) Animal cells (2)

1.4.2 State TWO visible differences between cells A and B. (2)

1.4.3 List TWO visible similarities between cell A and cell B. (4)

1.4.4 Mitochondria and chloroplasts were not visible under the microscope. Explain why this is so. (2)

1.4.5 State TWO functions of the part labelled C. (2)
(12)

1.5 Read the passage below and then answer the questions based on it.

Absorption normally occurs in the small intestine and not the stomach. Unlike the small intestine, the wall of the stomach does not have many structures, which allow for fast or easy absorption. However, alcohol, which is fat soluble and aspirin (a drug that relieves pain) which is fat soluble in acidic, but not in a neutral medium, are both absorbed through the stomach lining into the bloodstream. Unfortunately, aspirin has side effects such as bleeding and it inhibits the secretion of mucus by cells in the stomach lining.

1.5.1 Explain the property of the cells in the stomach lining that allows alcohol and aspirin to be absorbed into the bloodstream. (2)

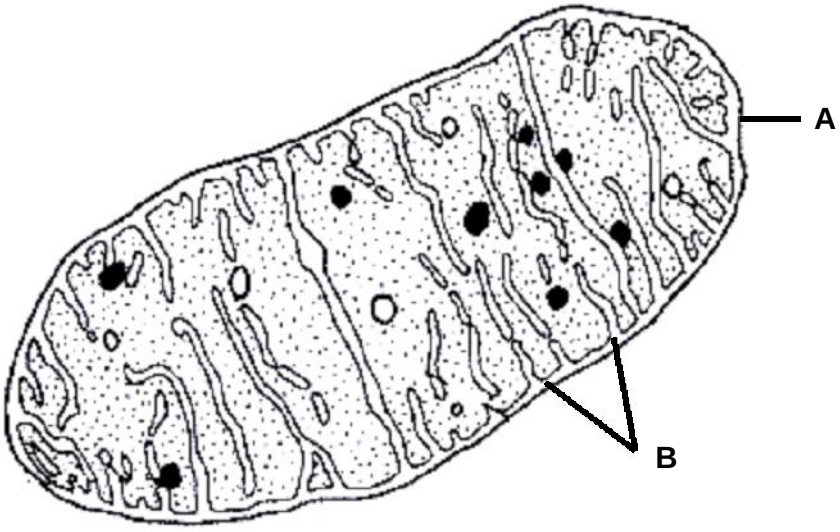
1.5.2 Name TWO health conditions that can arise from the mentioned side effects of aspirin. (2)

1.5.3 Explain your answer in QUESTION 1.5.2 above. (2)

1.5.4 The companies that sell aspirin-containing drugs advertise them as 'fast acting' in the relief of pain. Is this claim justified? (1)

1.5.5 Explain your answer in QUESTION 1.5.4 above. (3)
(10)

1.6 The questions that follow are based on the micrograph of a cell organelle.



Micrograph of a cell organelle ***Magnification: X 25 000***

1.6.1 Identify the cell organelle shown in the micrograph. (1)

1.6.2 Name the parts labelled A and B. (2)

1.6.3 Name the biochemical process that occurs in this cell organelle. (1)

1.6.4 Calculate the actual length of the organelle in millimetres (mm). (2)
(6)

TOTAL QUESTION 1: 50

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The function of the erythrocytes/red blood corpuscles, is to carry oxygen around the body. They can do this, because they are packed with an iron-containing pigment, called haemoglobin. Haemoglobin combines with oxygen to form an unstable compound called oxyhaemoglobin.

HAEMOGLOBIN + OXYGEN ⇌ OXYHAEMOGLOBIN

2.1.1 The reversible reaction sign (⇌) shows that oxyhaemoglobin splits easily. What is formed when oxyhaemoglobin splits? (2)

2.1.2 Erythrocytes have no nuclei. Without nuclei, erythrocytes have a large surface area and can carry a higher amount of haemoglobin.

Explain how this is an advantage in exchanging and carrying oxygen. (2)

2.1.3 Iron is essential for the synthesis of haemoglobin. If there is a shortage of iron in our diet, we become anaemic. Anaemic people have fewer red blood corpuscles.

Explain why people who are anaemic:

(a) Look pale (2)
(b) Often feel tired and cold (2)
(8)

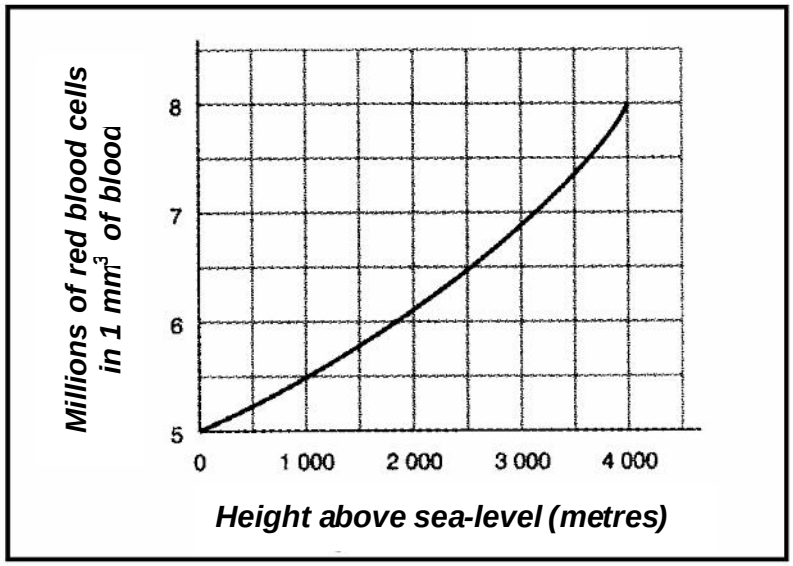
2.2 A scientist knew that as one moves to higher altitudes (height above sea-level), the air becomes rarified (has less oxygen). She therefore wanted to investigate the relationship between altitude and the number of red blood corpuscles in a person's blood.

2.2.1 Write a hypothesis for the scientist's investigation. (2)

2.2.2 Identify the following:

(a) The variable to be tested (dependent variable) (1)
(b) The independent variable (1)

2.2.3 The scientist drew the following graph after she finished her investigation. Study and answer the questions based on it.



(a) What is the relationship between the number of red blood corpuscles and altitude? (2)

(b) Explain the relationship mentioned in QUESTION 2.2.3(a). (2)

(c) Members of the Lamontville Golden Arrows soccer team from Durban often get very tired in the last twenty minutes of their matches when they play Kaizer Chiefs (a team from Gauteng) in Gauteng.

Explain why, in terms of the information from the graph.

(HINT: Durban is at the coast and Gauteng is at a higher altitude.) (3)

(d) Suggest how the Golden Arrows team can overcome the problem outlined in QUESTION 2.2.3(c). (2)

(e) The scientist lost the table from which she drew the graph above. Draw a table to represent the graph. (7)

(f) Explain why it is advisable to take the blood sample of more than one person at each altitude. (2)
(22)

TOTAL QUESTION 2: 30

QUESTION 3

3.1 Tabulate THREE differences between respiration and photosynthesis. **(7)**

3.2 *Umqombothi* is a traditional beer that people in South Africa brew and drink.

The following is a common recipe used to make this beer:

* Ground sorghum, sorghum malt and maize malt are the main ingredients.
* Boiling water is added to a mixture of ground sorghum and sorghum malt.
  This is left overnight to ferment in a covered container.
* The next day, the mixture is cooked into a porridge and left to cool overnight
* A fresh mixture of ground maize malt and sorghum malt are added to it.
* The mixture is kept in a warm place for 2 to 3 days to ferment.
* The fermented mixture is strained (separated) to collect the liquid (beer).
* The residue is used as chicken-feed.

3.2.1 Why should the mixture be kept in a warm place during the final fermentation? (2)

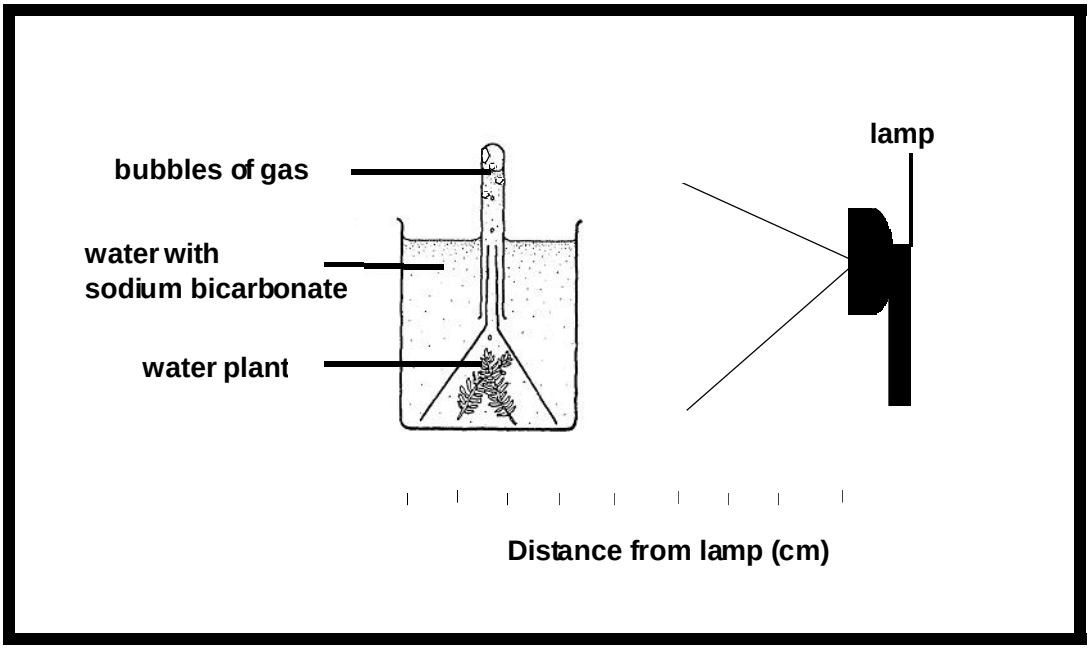
3.2.2 Why should the fermentation happen in a closed container? (2)

3.2.3 List FOUR ways in which the above-mentioned process is economically important. (4)
(8)

3.2 A learner carried out an investigation on certain aspects of photosynthesis. He exposed a submerged water plant to decreasing light intensities by moving a lamp further away from the plant at regular intervals. He then counted the number of gas bubbles released by the plant at different light intensities.

The table below shows the results that the learner obtained.

Distance of plant from lamp (cm)	10	20	30	40	50
Number of bubbles per minute	60	40	20	5	1



3.3.1 Use the data in the table to draw a line graph. (11)

3.3.2 Explain why the number of bubbles decreased as the lamp was moved further away. (2)

3.3.3 State TWO ways in which the process of photosynthesis is biologically important. (2)
(15)

TOTAL QUESTION 3: 30

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 Read the following passage and answer the questions that follow:

SAN PEOPLE AND THE HOODIA PLANT

San people from the Kalahari dessert use the Hoodia plant to ward off hunger and thirst during the long hunting expeditions away from home. This is necessary, because food and water are not readily available in the dessert.

Hoodia has a substance that 'fools' the brain into believing that the person is not hungry and not thirsty. Also the plant provides sufficient energy for the San people to survive on.

South African scientists have identified the active substance which they call 'P57' that 'fools' the brain. The scientists have sold the commercial rights of 'P57' to a British-based company who intend producing an anti-obesity drug from it.

4.1.1 Describe how the *Hoodia* plant works to ward off hunger and thirst. (2)

4.1.2 The San people had no formal education, but they knew about the benefits of the *Hoodia* plant.

Suggest how the San people could have gained this information. (2)

4.1.3 Suggest TWO ways in which the development of the anti-obesity drug can influence peoples' attitude towards eating a balanced diet. (4)

4.1.4 Should the San people or the scientists have the commercial rights to the anti-obesity drug? (1)

4.1.5 Explain your answer in QUESTION 4.1.4 above. (2)

4.1.6 Explain how you feel about the use of anti-obesity drugs to loose weight. (3)
(14)

4.2 Read the passage below and answer the questions that follow:

Tuberculosis (TB) of the lungs results in the overproduction of mucus by the goblet cells, which line the airways/breathing passages. A TB sufferer often coughs and produces mucus which contains the bacteria that cause TB. Hence TB can be easily contracted by breathing in the bacteria from the air or through contact with the mucus of the sufferer.

In the past TB sufferers were not allowed to mix with other people, they were removed from their communities and isolated in special towns or villages for people with infectious diseases. Presently, they can lead normal lives although advised to be responsible in the way they dispose of their sputum and follow treatment strictly.

4.2.1 Why do you think TB sufferers were isolated in the past? (2)

4.2.2 Compare the attitudes of people towards TB sufferers in the past and at present. (4)

4.2.3 Do you think people with infectious diseases like TB should still be removed from their communities? (1)

4.2.4 Give TWO possible reasons for your answer in QUESTION 4.2.3 above. (4)
(11)

4.3 The anti-smoking legislation bans the advertising of tobacco products. It also bans sports and arts sponsorship by tobacco interests, the use of tobacco trade marks on other products and smoking in public places, including the workplace.

However, the tobacco industry has been putting a lot of pressure on the department of health through the media, sometimes trying to mobolise the trade unions against the department. They claim that the new laws violate the constitutional principle of freedom of expression.

The health department, however, says freedom of speech is not an unlimited right; there are limitations to every right and that smoking is an area where the limitation has to be applied.

Write an essay to express your view on this issue and how you think this problem should be handled.

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams. **(15)**

TOTAL QUESTION 5: 40

TOTAL SECTION C: 40

GRAND TOTAL: 150