



Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

COMMON TEST

JUNE 2016

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

MARKS: 150

TIME: 2½ hours

N.B. This question paper consists of 12 pages.

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, learners will lose marks.
7. ALL drawings should be done in pencil and labelled in blue or black ink.
8. Draw diagrams or flow charts only 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 – 1.1.9), for example 1.1.10 A

1.1.1 Which ONE of the following substances is usually used to extract chlorophyll from leaves?

- A Iodine solution
- B Benedict's solution/Fehling's solutions A and B
- C Alcohol
- D Millons reagent

1.1.2 The following processes occur during cellular respiration:

- (i) Release of carbon dioxide
- (ii) Formation of pyruvic acid
- (iii) Phosphorylation of glucose
- (iv) Formation of water

In what order do these processes occur?

- A (iv), (iii), (ii), (i)
- B (iv), (iii), (i), (ii)
- C (iii), (ii), (i), (iv)
- D (iii), (i), (ii), (iv)

1.1.3 Angiosperms are classified as spermatophytes because they ...

- A produce flowers.
- B produce seeds.
- C have seeds enclosed in a fruit.
- D produce cones.

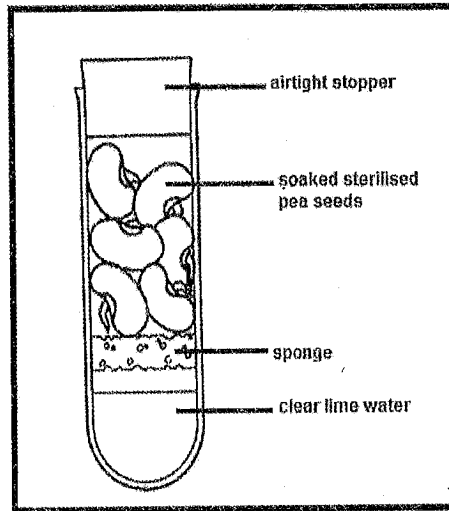
1.1.4 A function of bile in the human alimentary canal is to ...

- A convert glycogen into glucose.
- B create an acidic environment for enzyme action.
- C hydrolyse sucrose into glucose and fructose.
- D create an alkaline environment for enzyme action.

1.1.5 ALL viruses contain ...

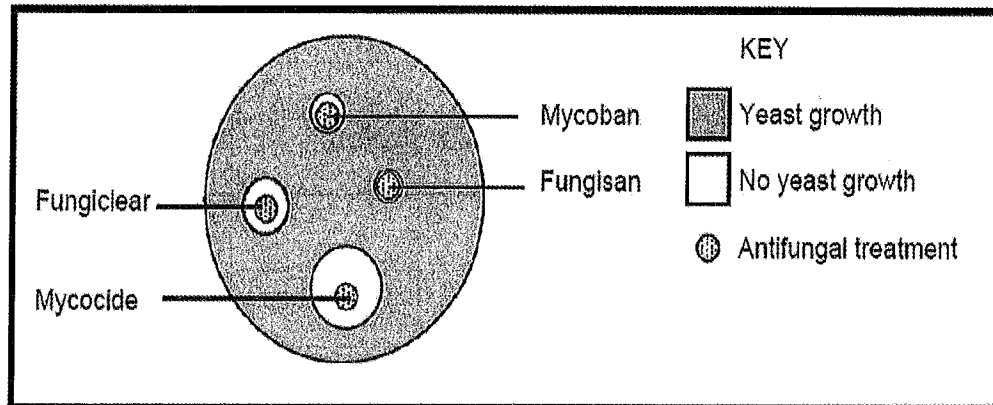
- A RNA, DNA and a protein coat.
- B RNA and a protein coat.
- C DNA and a protein coat.
- D a nucleic acid and a protein coat.

- 1.1.6 The apparatus illustrated below is used to show that carbon dioxide is given off during respiration.



- A suitable control for this investigation would be to ...
- A leave out the stopper.
 - B use boiled pea seeds.
 - C use bean seeds instead of pea seeds.
 - D use boiled pea seeds which have been sterilised.
- 1.1.7 An example of triploblastic animals that lack a through-gut and coelom is ...
- A cnidarians.
 - B flatworms.
 - C annelids.
 - D arthropods.
- 1.1.8 Which ONE of the following is a phase in cellular respiration?
- A Glycolysis
 - B Dark phase
 - C Light independent phase
 - D Light phase

- 1.1.9 An investigation was carried out to test the effectiveness of four antifungal treatments on preventing the growth of yeast. The results are shown in the diagram below.



Which ONE of the following conclusions can be made from the results?

- A All the antifungal treatments are equally effective
- B All the antifungal treatments are ineffective
- C Mycocide is most effective and Fungisan is least effective
- D Fungisan is most effective and Mycocide is least effective

(9 x 2) (18)

- 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 the answer book.

- 1.2.1 A disease in which the hormonal control of glucose is defective because of a deficiency of insulin
- 1.2.2 A 6-carbon molecule that is broken down during cellular respiration to provide energy in a living cell
- 1.2.3 A type of reproduction that does not involve the fusion of male and female gametes
- 1.2.4 A micro-organism used in the manufacturing of beer and bread
- 1.2.5 The flap-like structure which prevents food from entering the trachea
- 1.2.6 The process by which small quantities of a micro-organism or toxin is injected into the body to produce antibodies
- 1.2.7 A group of sporangia on the pinna of a fern plant
- 1.2.8 An evolutionary trend in the animal kingdom toward centralisation of neural and sensory organs in the anterior region of the body
- 1.2.9 A group of plants that have seeds enclosed in an ovary
- 1.2.10 Arrangement of body structures in relation to some axis of the body

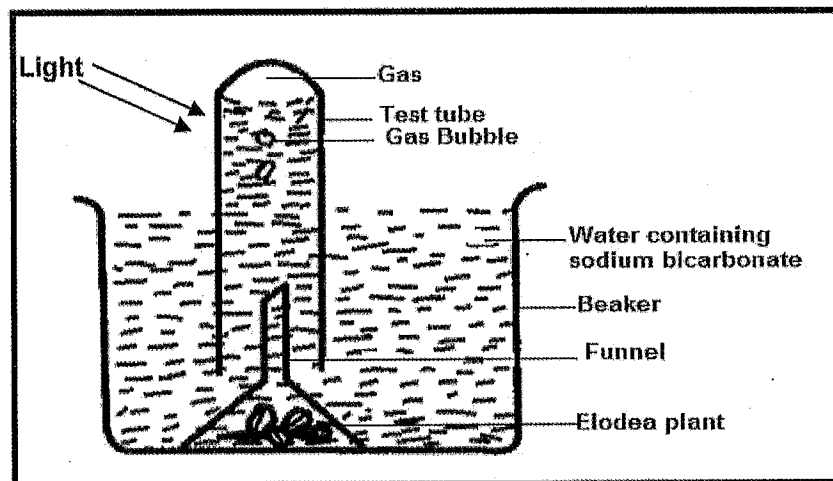
(10 x 1) (10)

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 to 1.3.7) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	A division of plants with a vascular system, seeds, and no flowers	A:	Gymnospermae
		B:	Angiospermae
1.3.2	Triploblastic	A:	Platyhelminthes
		B:	Annelida
1.3.3	The type of symbiotic relationship displayed by <i>E. coli</i> living in the human intestines	A:	Commensalism
		B:	Mutualism
1.3.4	A fluid-filled body cavity lined by mesoderm	A:	Gut
		B:	Coelom
1.3.5	Some are autotrophic while others are heterotrophic	A:	Bacteria
		B:	Protists
1.3.6	Transports end products of digested food from the intestine to the liver	A:	Hepatic portal vein
		B:	Hepatic vein
1.3.7	Root-like structures in moss plants	A:	Thallus
		B:	Rhizoids

(7 x 2) (14)

1.4 Study the diagram that illustrates bubbles of gas being released during an investigation and answer the questions that follow.



1.4.1 Name the process that is being investigated in this experiment. (1)

1.4.2 Identify the gas that accumulates in the test tube. (1)

1.4.3 Describe the procedure used to test for the gas referred to in Question 1.4.2. (2)

1.4.4 Explain why sodium bicarbonate was added to the water in this investigation. (2)

1.4.5 Explain how a control can be set up for this experiment. (2)

(8)

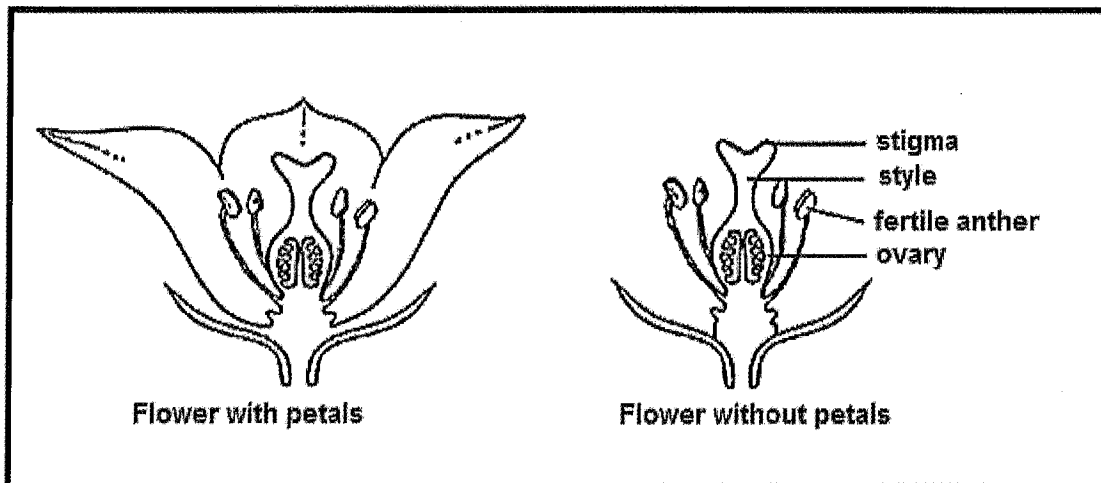
Total Question 1: [50]

SECTION B**QUESTION 2**

2.1 An investigation was done to determine the role of petals in insect pollination in apple flowers. When flowers are self-pollinated, the pollen tube grows only a little into the stigma and style and fertilisation does not take place.

- 10 flowers with petals and 10 flowers without petals were used.
- After two days the flowers were prevented from further pollination.
- After seven days the extent of pollination and fertilisation was recorded.

The diagrams below show the appearance of the flowers with and without petals.



The results are shown in the table below.

	NUMBER	
	Flower with petals	Flower without petals
Pollen on stigma	158	25
Pollen tubes in the style	86	8
Ovules fertilized	38	4

- 2.1.1 Give an explanation for the presence of more pollen on the stigmas of the flowers with petals than on the flowers without petals. (2)
- 2.1.2 Explain why there are more pollen tubes present in the style of both types of flowers than the number of ovules fertilised. (2)
- 2.1.3 State THREE ways in which the validity of this investigation can be ensured. (3)
- 2.1.4 State TWO ways in which the angiosperms are better adapted to terrestrial life than bryophytes. (2)
- (9)**

2.2 Read the extract below and answer questions that follow.

Aerobic and anaerobic respiration are used to supply energy during exercise. During certain types of exercise, for example, athletic events such as 100m, 200m, 1500m and 3000m, the muscles are unable to obtain sufficient oxygen for the removal of large quantities of lactic acid from their cells. When sprinting, an athlete cannot possibly inhale more than the fraction of the oxygen required, and the body goes into 'oxygen debt'. 'Oxygen debt' can be defined as the extra oxygen needed to normalize the process after strenuous exercise. This debt can only be repaid by rapid breathing after the sprint ends.

- 2.2.1 Name TWO end products of aerobic respiration in muscle cells. (2)
- 2.2.2 Which athletic event relies the most on anaerobic respiration? (1)
- 2.2.3 Explain your answer to QUESTION 2.2.2. (2)
- 2.2.4 Which TWO athletic events would give rise to a high 'oxygen debt'? (2)
- 2.2.5 Describe what happens to the energized hydrogen atoms released during aerobic respiration. (5)
- 2.2.6 Tabulate TWO differences between aerobic and anaerobic respiration. (5)
(17)

2.3 Malaria is a parasitic disease that is transmitted in humans through the bite of a female mosquito of the *Anopheles* species, which is a vector for the parasite. The most effective way of managing malaria is to destroy its vector. An insecticide that has been successful to date is DDT.

Scientists investigated the resistance of mosquitos to DDT. The following steps were followed:

- A sample of mosquitos was captured from the environment
- The mosquitos were then exposed to a standard dose of DDT (4% DDT for 1 hour) in the laboratory.
- The number of mosquitos that died was counted and the percentage of mortality was determined.
- Those that survived were left to reproduce.
- A sample was taken from this population every two months and the same procedure was followed for a period of 16 months.

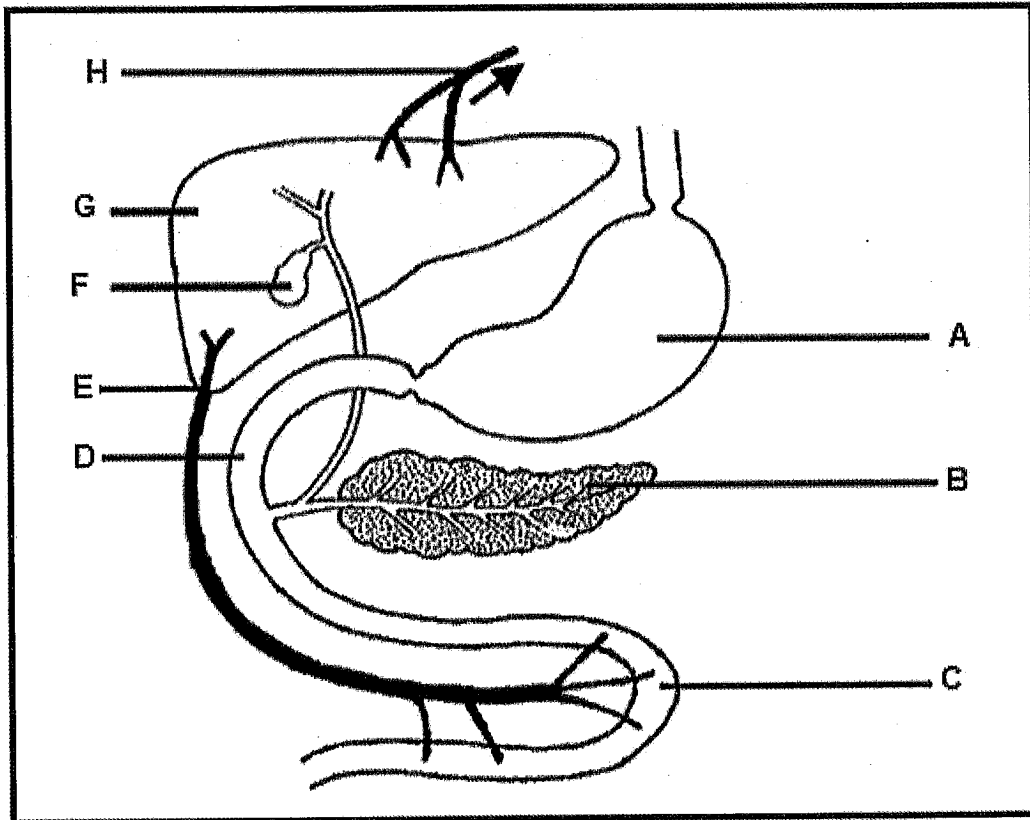
The results are shown in the table below.

TIME (IN MONTHS)	MORTALITY OF MOSQUITOES (%)
0	95
2	87
4	80
6	69
8	60
10	54
12	35
14	27
16	22

- 2.3.1 Identify the:
- (a) Independent variable (1)
 - (b) Dependent variable (1)
- 2.3.2 Formulate a hypothesis for this investigation. (2)
- 2.3.3 Using the information from the table, write a suitable conclusion regarding the effect of DDT on mosquitos. (2)
- 2.3.4 State TWO ways in which the scientists could improve the reliability of their results. (2)
- 2.3.5 Draw a line graph to show how the mortality of mosquitos changed over the period of investigation due to the application of DDT. (6)
- (14)**
- Total Question 2: [40]**

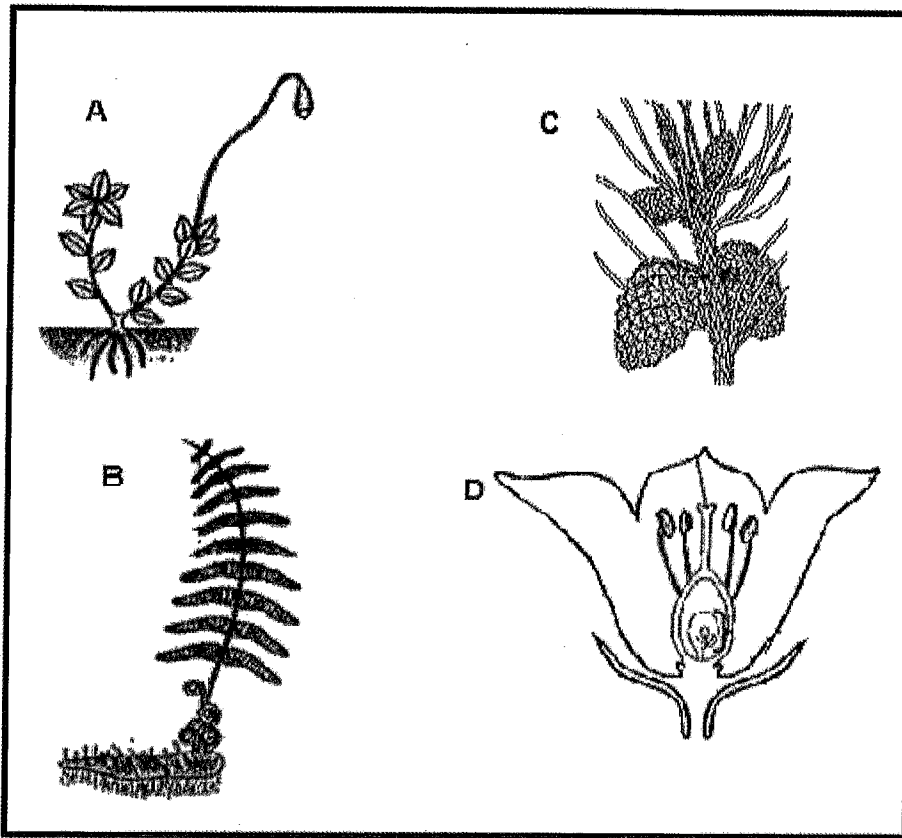
QUESTION 3

3.1 The diagram below shows part of the human digestive system.



- 3.1.1 Identify organ **B**. (1)
- 3.1.2 Name: (1)
- (a) TWO substances that can be stored in **G**. (2)
- (b) The chemical substance which creates an acidic pH in **A**. (1)
- 3.1.3 List TWO structural features of part **A** which makes it suitable for its function. (2)
- 3.1.4 During a long distance race an athlete uses a high amount of glucose from his blood. Explain how the glucose level is brought back to normal. (5)
- 3.1.5 Describe what happens to excess amino acids in the body. (4)
- (15)**

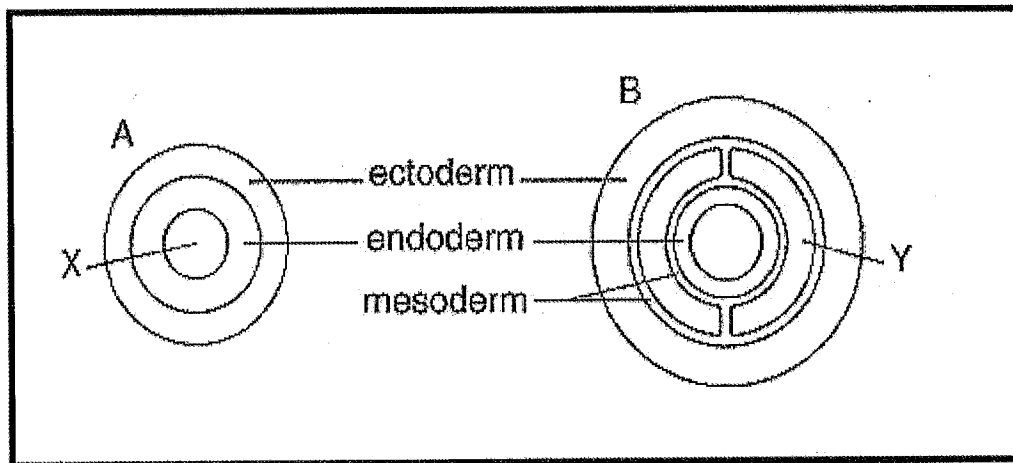
- 3.2 Study the diagrams that illustrate different plants and answer the questions that follow.



- 3.2.1 Identify the group to which **A** and **B** belong. (2)
- 3.2.2 Which of the four groups (**A**, **B**, **C** or **D**):
- (a) Are dependent on water for fertilisation (2)
 - (b) Produce seeds for reproduction (2)
- 3.2.3 Explain how the dependency on water for reproduction is reduced in the group represented by **C**. (3)
- 3.2.4 State TWO advantages of seeds over spores. (2)
- 3.2.5 List THREE similar structural features of the prothallus in ferns and the gametophyte in mosses, which make both to be poorly adapted to a terrestrial life. (3)
- 3.2.6 Explain how the presence of flowers have allowed for a greater diversity and abundance of angiosperms. (2)

(16)

- 3.3 Study the diagram, which represent the body plans of two animals and answer the questions that follow.



- 3.3.1 Provide labels for **X** and **Y**. (2)
- 3.3.2 Which body plan (**A** or **B**) represents an organism with radial symmetry? (1)
- 3.3.3 State whether body plan **B** represents a **diploblastic** or **triploblastic** animal. (1)
- 3.3.4 Give a reason for your answer to QUESTION 3.3.3. (1)
- 3.3.5 State TWO phyla that are represented by body plan **B**. (2)
- 3.3.6 Explain ONE advantage of the development of part **Y** to organisms with body plan **B**. (2)
- (9)

Total Question 3: [40]

SECTION C

QUESTION 4

Photosynthesis takes place within the chloroplasts of green plants. Explain THREE structural adaptations of chloroplasts and describe the process of photosynthesis.

NOTE: No marks will be awarded for answers in the form of tables, flow charts and diagrams.

Content: (17)
Synthesis: (03)
(20)

GRAND TOTAL [150]