Education
KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

JUNE 2017

COMMON TEST

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answers 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. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, flow charts or tables 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

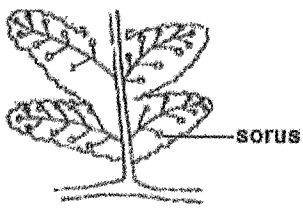
QUESTION 1

1.1 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 number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.

1.1.1 The dominant generation of the mosses and the angiosperms respectively, is ...

A gametophyte and sporophyte.
B sporophyte and gametophyte.
C sporophyte and sporophyte.
D gametophyte and gametophyte.

1.1.2 The diagram below represents the reproductive structure of a plant group that you have studied.



Which plant group has the above reproductive structure?

A Bryophytes
B Pteridophytes
C Gymnosperms
D Angiosperms

1.1.3 Bacteria that convert light energy to chemical potential energy stored in organic compounds, are called ...

A heterotrophic bacteria.
B denitrifying bacteria.
C autotrophic bacteria.
D nitrogen-fixing bacteria.

1.1.4 Study the list of characteristics below.

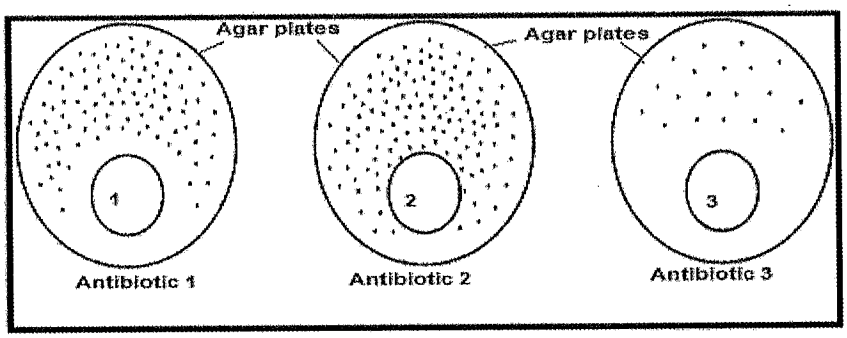
(i) Coelomate and triploblastic
(ii) Acoelomate and asymmetrical
(iii) Diploblastic
(iv) Bilateral symmetrical
(v) Radially symmetrical

Which ONE of the following applies to the Cnidarians?

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

1.1.5 The grade 11 learners conducted an investigation to compare the effect of three antibiotics on the growth of the bacteria. They set up agar plates containing nutrients and bacteria. Sterile discs (**1**, **2** and **3**) containing three different antibiotics were then placed in each of the plates. The dots represent the bacteria.

The results of the investigation are represented in the diagram below.



From the above it can be concluded that the bacteria are …

A least resistant to antibiotic 1.
B least resistant to antibiotic 2.
C least resistant to antibiotic 3.
D not affected by the antibiotics.

1.1.6 Micro-organisms that have a cell wall, no chlorophyll and reproduce by spores belong to the kingdom …

A Fungi.
B Plantae.
C Protista.
D Monera.

1.1.7 Organisms that obtain their food from dead remains of plants or animals are called ...

A producers.
B heterotrophs.
C parasites
D saprophytes

1.1.8 Which group of micro-organisms fix nitrogen in the roots of some plants and obtain nutrition in return?

A Fungi
B Protists
C Bacteria
D Viruses

1.1.9 The elimination of undigested food and indigestible material from the body is known as ...

A ingestion.
B absorption.
C egestion.
D assimilation.

1.1.10 A condition of malnutrition resulting from eating too much of the high-energy foods such carbohydrates and fats is ...

A bulimia.
B anorexia.
C obesity.
D kwashiorkor.

(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 to 1.2.9) in your ANSWER BOOK.

1.2.1 The type of respiration that occurs in the presence of oxygen

1.2.2 The rhythmical contractions of the muscles of the alimentary canal causing food to move along the gut

1.2.3 The digestive juice which has no enzymes

1.2.4 Organisms consisting of a cell or cells in which the genetic material is contained within a distinct nucleus

1.2.5 A disease-causing organism

1.2.6 A method of asexual reproduction where unicellular organisms simply splits into two

1.2.7 The micro-organism that causes malaria

1.2.8 A part of the alimentary canal that serves as a passage for both air and food

1.2.9 A plant with no true roots, stems and leaves

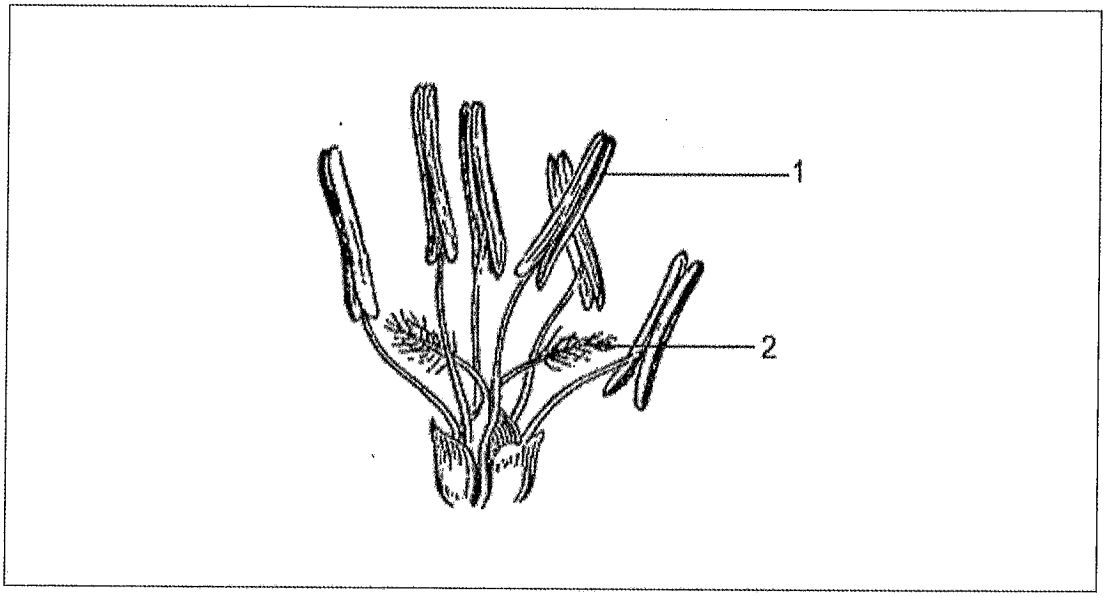
(9 x 1) **(9)**

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 to 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	The products of final digestion in the gut	A. Proteins B. Lipids
1.3.2	Animals without back bones	A. Invertebrates B Vertebrates
1.3.3	A biological agent that can only reproduce inside the cell of a living organism	A. Protist B. Virus
1.3.4	Micro-organisms used in medical biotechnology	A. Fungi B. Bacteria

(4 x 2) **(8)**

1.4 The diagrams below represent the reproductive structures of a plant studied.



1.4.1 Provide labels for parts **1** and **2**. (2)

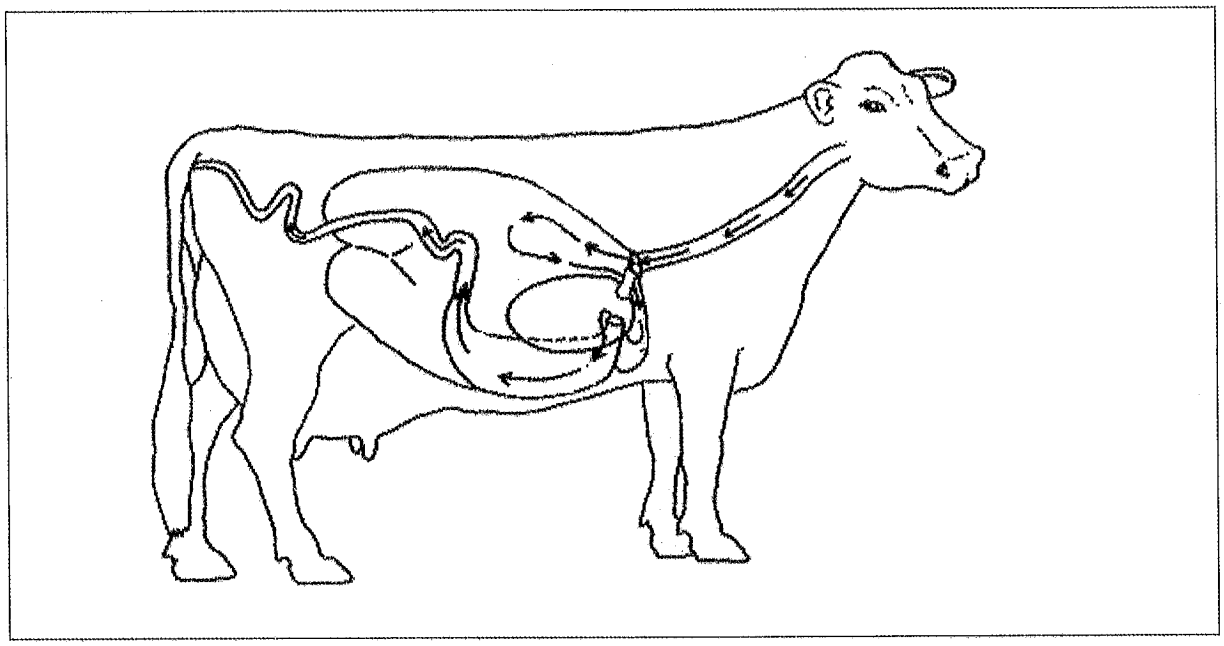
1.4.2 What is the most likely pollinating agent for the above flower. (1)

1.4.3 Give ONE observable reason for your answer in QUESTION 1.4.2 (1)

1.4.4 After fertilisation the ovule becomes the seed.

Explain ONE advantage of seeds over spores. (2)
(6)

1.5 The diagram below shows the gut in an animal from one of the phyla you have studied.



1.5.1 State whether the animal has a *blind gut* or a *through gut.* (1)

1.5.2 Explain ONE advantage of the gut mentioned in 1.5.1. (2)

1.5.3 Name TWO phyla that have animals with a gut like the one in the diagram. (2)

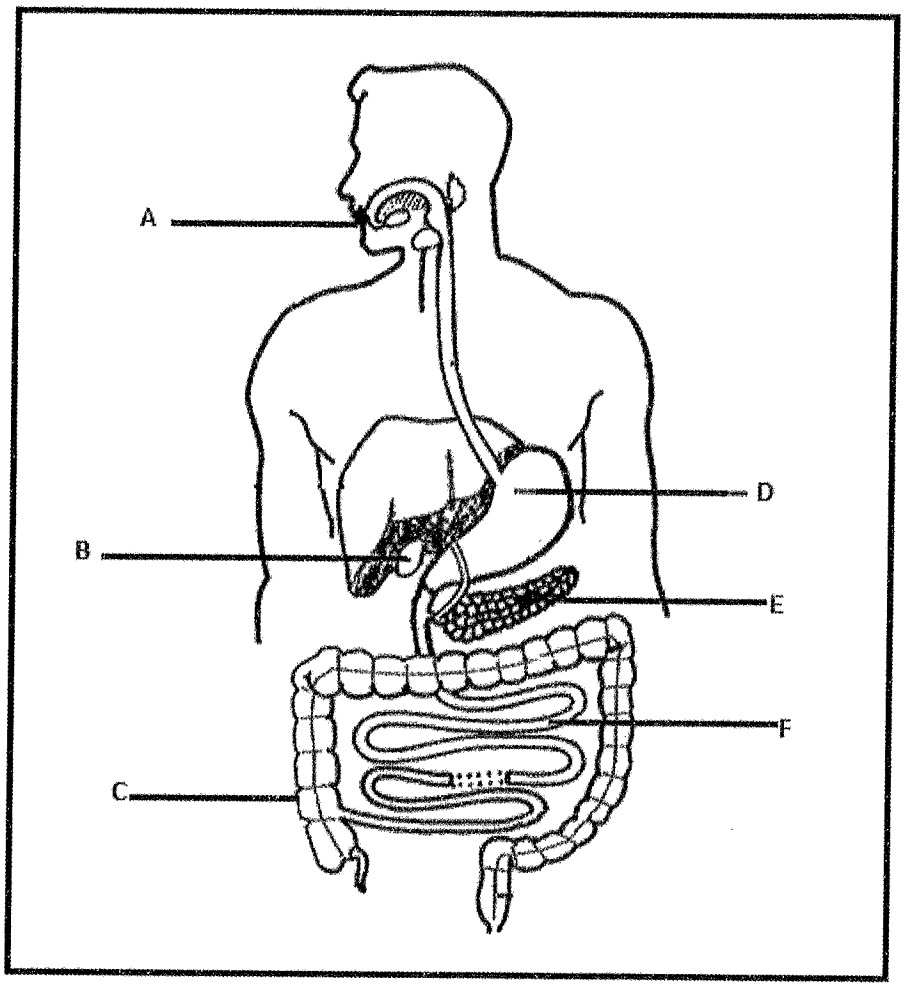
1.5.4 State what is meant by cephalisation. (2)
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents the human digestive system.



2.1.1 Give the **LETTER/S** and the **NAME/S** of the part/s which:

(a) Contain or secrete enzymes which act upon carbohydrates (4)

(b) Secrete hydrochloric acid (2)

(c) Is made up of the caecum, colon and rectum (2)

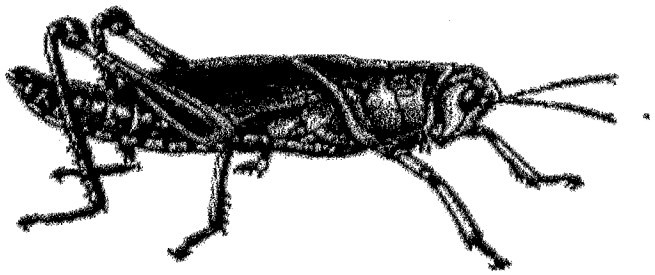
2.1.2 State TWO functions of the liquid stored in part **B**. (2)

2.1.3 Explain TWO structural adaptations of a villus found in part **F**. (4)

2.1.4 State why gland **E** is regarded as both endocrine and exocrine. (2)

2.1.5 Describe how the hormone secreted by the pancreas regulates the blood glucose level when it drops below normal. (4)
(20)

2.2 The diagram below represents an organism in one of the phyla of the kingdom Animalia.



Locust

2.2.1 Identify the phylum to which the locust belongs. (1)

2.2.2 State whether the locust is *diploblastic* or *triploblastic* animal. (1)

2.2.3 Name the type of skeleton found in a locust. (1)

2.2.4 State TWO disadvantages of the type of skeleton mentioned in 2.2.3 and explain how the locust overcomes each of these disadvantages. (4)

2.2.5 Explain why a blood system is necessary in coelomate organisms such as the locust. (2)
(9)

2.3 Read the extract below and then answer the questions that follow.

Most important of the tropical diseases

Malaria has been called the 'most important' of the tropical diseases by World Health Organisation (WHO, 1990). It leaves a heavy toll of illness and is lethal, especially to the children. It poses a risk to business travels, tourists and immigrants. Imported cases of malaria are increasingly seen in non-endemic area such as Europe and North America.

In many parts of Africa people are infected so frequently that they develop a degree of acquired immunity, and may become 'asymptomatic' carriers of the infection. Epidemics are most frequent in rural areas. The global distribution is mostly concentrated near the equator.

2.3.1 Name the vector of malaria. (1)

2.3.2 List TWO symptoms of malaria. (2)

2.3.3 Suggest TWO reasons for the high incidence of malaria infections in Central Africa. (2)

2.3.4 Give ONE reason why malaria poses a risk to the business travellers. (1)

2.3.5 Describe how *acquired immunity* is achieved. (3)

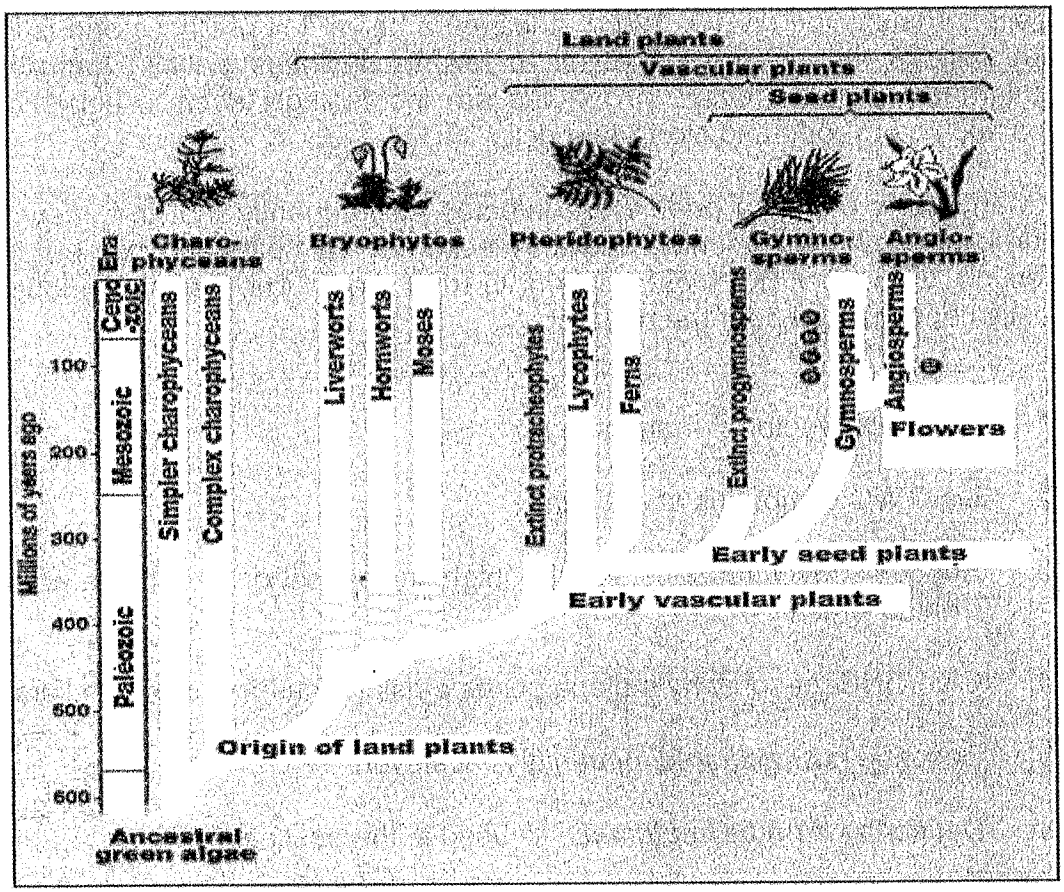
2.3.6 Define the term *asymptomatic* as used in the passage. (2)

(11)

[40]

QUESTION 3

3.1 The diagram below represents a phylogenetic tree of different groups of plants.



3.1.1 According the phylogenetic tree, which group gave rise to all the other groups. (1)

3.1.2 In which era did the angiosperms first appear? (1)

3.1.3 Which characteristic separates the bryophytes from charophyceans? (1)

3.1.4 How long ago did the progymnosperms become extinct? (2)

3.1.5 Tabulate any TWO differences between the gymnosperms and the angiosperms with regards to reproduction. (5)

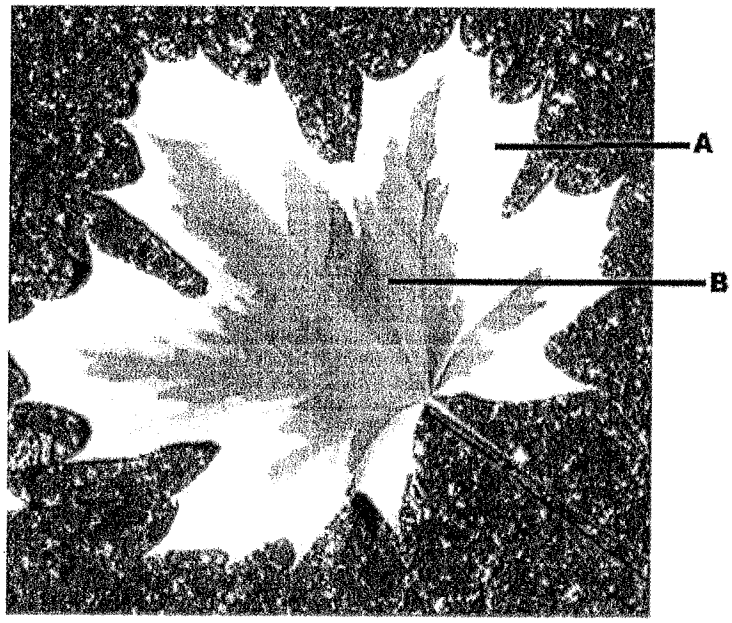
3.1.6 Are the mosses or angiosperms more closely related to the gymnosperms? (1)

3.1.7 Explain your answer in QUESTION 3.1.6. (2)

3.1.8 Angiosperm plants undergo sexual and asexual reproduction.

Explain TWO advantages of sexual reproduction for the survival of plants. (4)
(17)

3.2 A grade 11 learner conducted an investigation to determine whether chlorophyll is necessary for photosynthesis using a variegated leaf. Part **A** is white and part **B** is green.



Variegated leaf

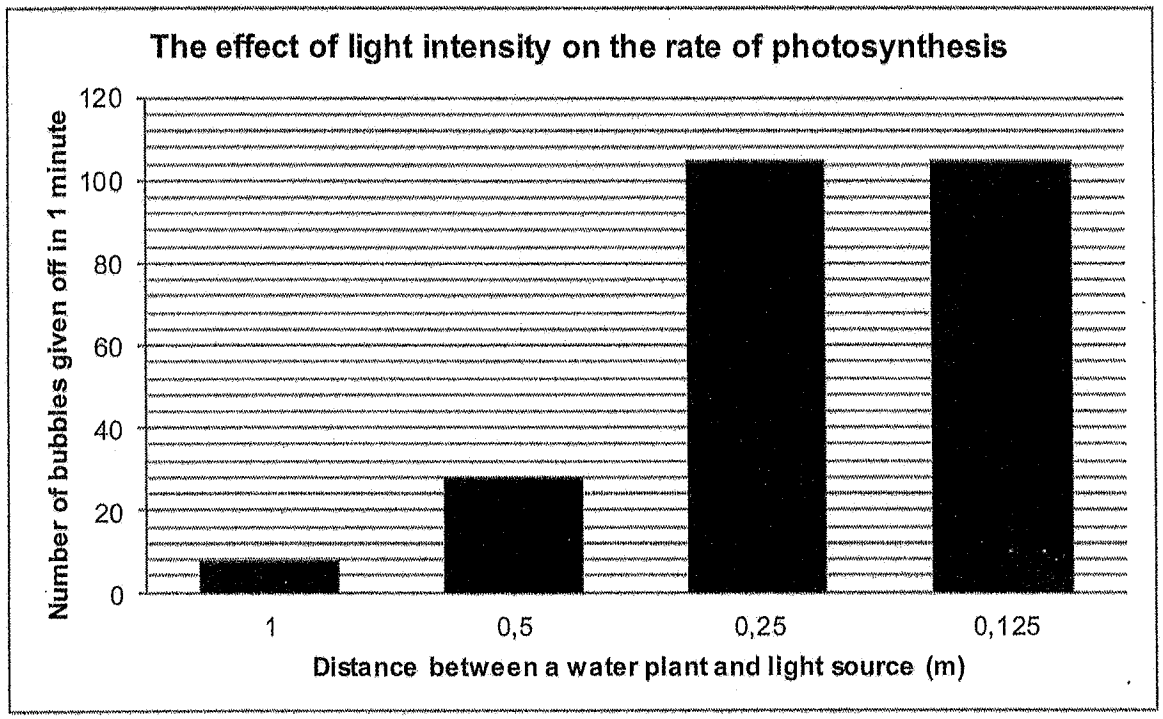
3.2.1 Why should the plant be destarched before a leaf can be tested for starch. (2)

3.2.2 State the colour of Part **A** after the starch test. (1)

3.2.3 Explain the various steps the learner will follow when testing for starch in the leaf of the plant. (6)

3.2.4 Draw a labelled diagram of a chloroplast. (4)
(13)

3.3 The graph below shows the results of an investigation to determine the effect of light intensity on the rate of photosynthesis.



3.3.1 Formulate a hypothesis for this investigation. (2)

3.3.2 How was the rate of photosynthesis measured in this investigation? (1)

3.3.3 Identify the gas released in this investigation. (1)

3.3.4 How many bubbles were released per minute when the light source was 0,5 m from the water plant? (1)

3.3.5 The number of bubbles given off remained the same even though the light intensity increased when the light was moved from 0,25m to 0,125m..

Provide an explanation for the above observation. (2)

3.3.6 State THREE factors that should be kept constant in this investigation. (3)
(10)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Carbon dioxide is required in the dark phase of photosynthesis but is released during the Kreb's cycle of cellular respiration.

Describe the dark phase of photosynthesis and Kreb's cycle of respiration and then explain the structural adaptations of the mitochondria for respiration.

CONTENT: (17)
SYNTHESIS: (3)
(20)

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

TOTAL SECTION C: 20

GRAND TOTAL: 150

Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

JUNE 2017

COMMON TEST

MARKING GUIDELINE

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS: 150

This marking guideline consists of 11 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.

2. **If, for example, three reasons are required and five are given**
   Mark the first three irrespective of whether all or some are correct/incorrect.

3. **If whole process is given when only part of it is required**
   Read all and credit relevant part.

4. **If comparisons are asked for and descriptions are given**
   Accept if differences / similarities are clear.

5. **If tabulation is required but paragraphs are given**
   Candidates will lose marks for not tabulating.

6. **If diagrams are given with annotations when descriptions are required**
   Candidates will lose marks

7. **If flow charts are given instead of descriptions**
   Candidates will lose marks.

8. **If sequence is muddled and links do not make sense**
   Where sequence and links are correct, credit. Where sequence and links is incorrect, do not credit. If sequence and links becomes correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognized abbreviation but credit the rest of answer if correct.

10. **Wrong numbering**
    If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.

11. **If language used changes the intended meaning**
    Do not accept.

12. **Spelling errors**
    If recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names given in terminology**
    Accept provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**
No credit

15. **If units are not given in measurements**
Candidates will lose marks. Memorandum will allocate marks for units separately

16. Be sensitive to the **sense of an answer, which may be stated in a different way.**

17. **Caption**
All illustrations (diagrams, graphs, tables, etc.) must have a caption

18. **Code-switching of official languages (terms and concepts)**
A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

SECTION A

QUESTION 1

1.1	1.1.1	A✓✓		
	1.1.2	B✓✓		
	1.1.3	C✓✓		
	1.1.4	B✓✓		
	1.1.5	C✓✓		
	1.1.6	A✓✓		
	1.1.7	D✓✓		
	1.1.8	C✓✓		
	1.1.9	C✓✓		
	1.1.10	C✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Aerobic✓ respiration		
	1.2.2	Peristalsis✓		
	1.2.3	Bile✓		
	1.2.4	Eukaryotes✓/eukaryotic		
	1.2.5	Pathogen✓		
	1.2.6	Binary fission✓		
	1.2.7	Plasmodium✓		
	1.2.8	Pharynx✓		
	1.2.9	Thallus✓		**(9)**
1.3	1.3.1	None✓✓		
	1.3.2	A only✓✓		
	1.3.3	B only✓✓		
	1.3.4	Both A and B✓✓	(4 x 2)	**(8)**
1.4	1.4.1	A - Anther✓ B - Stigma✓		(2)
	1.4.2	Wind ✓		(1)
	1.4.3	- No petals✓ - Large anther✓ - Feathery stigma✓ - Long filaments✓ **Mark first ONE only**	Any	(1)
	1.4.4	- Seeds have more food than spores✓ - and can therefore survive longer✓ - Seeds are dispersed in many ways✓ - whereas spores are dispersed by wind only✓ **Mark the first ONE only**	Any 1 x 2	(2) **(6)**

1.5 1.5.1 Through gut✓ (1)

1.5.2
- The food enters the gut through one opening and leaves through the other opening✓
- thus preventing digested food to mix with undigested food✓

OR

- Each part of the gut becomes differentiated✓
- for effective digestion and absorption✓

Mark the first ONE only (2)

1.5.3 Arthropoda✓
Annelida✓
Chordata✓
Mark the first TWO only Any (2)

1.5.4
- The concentration of sense organs✓/nerves
- at the anterior end of the body✓/to form a head region (2)

(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) A✓ – Mouth✓
F✓ – Small intestine✓
E✓ – Pancreas✓
Mark first THREE only Any 2 x 2 (4)

(b) D✓ - Stomach✓ (2)

(c) C✓ - Large intestine✓ (2)

2.1.2
- Keeps food fluid enabling easy movement of the food. ✓
- Bile salts neutralise the acid food from the stomach. ✓
- Bile salts emulsify fats. ✓
- Bile salts help in absorption of vitamin A, B, E and K✓/fat soluble vitamins.
- It is slightly antiseptic✓/preventing decomposition of the food in the small intestine.

Mark first TWO only Any (2)

2.1.3
- The walls of villi are made up of a single layer of cells/columnar epithelial cells✓
- allow for easy diffusion✓ of food.
- Columnar epithelial cells have many mitochondria✓
- to provide energy for active absorption✓ of food.
- The lacteals and capillaries✓
- transport the absorbed food✓ away quickly.
- Goblet cells/crypts Lieberkuhn/Brunner 's gland secrete the alkaline mucus✓
- that lubricate and protects the lining of small intestine✓ against acid food from the stomach

Mark first TWO only Any 2 x 2 (4)

2.1.4
- Pancreas is endocrine by secreting hormones (insulin and glucagon) which are transported by blood✓ to the liver.
- It is exocrine by secreting pancreatic juice which is transported by pancreatic ducts✓ to small intestine. (2)

2.1.5
- Pancreas secretes glucagon✓
- which stimulates the conversion of glycogen into glucose✓
- in the liver✓/muscles
- for release into bloodstream✓
- increasing the glucose level to normal✓ Any (4)

(20)

2.2 2.2.1 Arthropoda✓ (1)

2.2.2 Triploblastic✓ (1)

2.2.3 Exoskeleton✓ (1)

2.2.4
- It is impermeable, gas exchange can no longer occur throughout the body surface.✓
- It has specialised gas exchange openings.✓
- It cannot stretch to accommodate growth of the body.✓
- This is avoided by moulting at regular intervals.✓ (4)

2.2.5
- The body wall of the animals are separated from the gut wall✓/there is increased distance between the gut and other parts of the body
- making diffusion inadequate for transport of food, gases and excretory wastes. ✓ (2)

(9)

2.3 2.3.1 Mosquitoes✓/*Anopheles* mosquitoes (1)

2.3.2
- Headache✓
- Fever✓
- Sweating✓
- Chills✓
- Muscular Pains
- Abdominal Pains✓
- Diarrhoea✓
- Nausea and Vomiting✓
- Loss of Appetite✓
- Cough✓

Mark first TWO only Any (2)

2.3.3
- High rainfall✓
- Inadequate medical facilities✓
- No money to buy insecticides✓
- Lack of awareness✓

Mark first TWO only Any (2)

2.3.4
- Business people may not have acquired immunity/antibodies✓ to fight the infection.
- Increased chances of exposure to diseases✓ Any (1)

2.3.5
- Person gets a mild form of a disease through natural infection✓
- The body produces antibodies to fight the disease✓, get better
- The antibodies remain✓ in the body
- To fight off any further infection of the same disease✓

Any (3)

2.3.6
- Is a person who is a carrier for a disease✓
- but experience no symptoms.✓ (2)

(11)
[40]

QUESTION 3

3.1 3.1.1 Green algae✓ (1)

3.1.2 Mesozoic✓ (1)

3.1.3 Bryophytes are land plants✓/Charophyceans are aquatic (1)

3.1.4 Accept in the range 250-260✓ mya✓/million years ago (2)

3.1.5 ✓

Gymnosperms	Angiosperms
- Bear naked seeds✓	- Bear seeds that are enclosed in a fruit✓
- Bear cones✓	- Bear flowers✓
- Seeds dispersed by wind only✓	- Seeds are dispersed by various agents✓
- Pollination occurs by wind only✓	- Pollination by various agents✓

Any 2 x 2+ 1 Table (5)

3.1.6 Angiosperms✓ (1)

3.1 7
- They share a more recent✓ common ancestor✓

OR
- Both✓ bear seeds✓ (2)

3.1.8
- Offspring produced are genetically different from each other and their parents✓
- If conditions in the habitat change drastically, some of the individuals will survive. ✓
- The zygote/seeds covered with thick protective coat✓
- which allow it to survive unfavourable conditions. ✓
- Large store of food in seeds✓
- allows seeds to remain dormant until conditions are suitable✓

2 x 2 (4)

(17)

3.2 3.2.1
- To remove all starch✓
- so that any starch produced would be during the investigation✓ (2)

3.2.2 Brown✓ (1)

3.2.3
- Boil the leaf in the water✓
- to break the cell wall✓/increase permeability

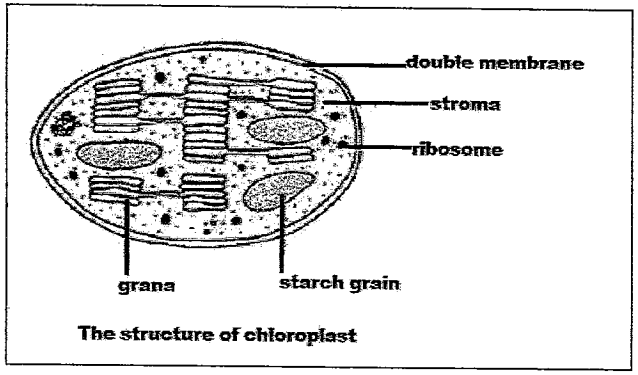
- Boil the leaf in the alcohol✓/methylated spirit
- to remove chlorophyll✓

- Rinse the leaf with hot water✓
- to remove alcohol✓/methylated spirit/to soften the leaf

- Spread the leaf in the evaporating dish and pour iodine solution✓
- to test for starch✓

Any 3 x 2 (6)

3.2.4



The structure of chloroplast

Mark allocation:
Caption✓
Any 3 correct labels✓✓✓

(4)
(13)

3.3 3.3.1
- As the light intensity increases/decreases, the rate of photosynthesis increases✓✓/decreases.

OR

- Light intensity has no effect on the rate of photosynthesis. ✓✓ (2)

3.3.2 By counting the number of bubbles per minute. (1)

3.3.3 Oxygen✓ (1)

3.3.4 28✓ (1)

3.3.5
- Other factors such as carbon-dioxide✓/water/chlorophyll
- May have been in short supply✓ (2)

3.3.6
- Same amount of carbon dioxide✓
- Same amount of water✓
- Use identical plants✓
- Use the same light source✓
- Use the same clock or stopwatch✓
- Identical container for water plants✓

Mark the first THREE only

Any (3)
(10)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Dark phase

- It occurs in the stroma of the chloroplast✓
- Carbon dioxide from the atmosphere✓
- combines with energised hydrogen atoms✓ from the light phase
- to form carbohydrates✓ such as glucose and starch.
- using energy from ATP✓
- The reactions are controlled by enzymes✓ Any 5

Kreb's cycle

- It occurs in the mitochondrion✓
- In the presence of oxygen✓
- Pyruvic acid✓ produced during glycolysis
- is used in a cyclic series of reactions✓
- Energised hydrogen atoms are released✓
- Which combine with co-enzymes✓
- and CO_2 is released✓into the atmosphere Any 6

Adaptations of the mitochondria for cellular respiration

- Outer membrane is smooth✓/mitochondria are rod-shaped
- allowing for easy movement✓ of the mitochondria

- Outer membrane is permeable✓
- to allow for diffusion of oxygen✓/pyruvic acid

- Inner membrane is highly folded to form cristae✓
- to increase the surface area for attachment of enzymes✓

- Mitochondria contain DNA✓/ribosomes
- for the manufacture of enzymes✓ Any 3 x 2 = 6

Content: **(17)**
Synthesis: **(3)**
[20]

ASSESSING THE PRESENTATION OF ESSAY

Relevance	Logical sequence	Comprehensive
All information provided is relevant to the question	Ideas arranged in a logical sequence	Answered all aspects required by the essay
All information provided is relevant to the: - Dark phase - Kreb's cycle - Adaptations of mitochondria There is no irrelevant information	All the information regarding - Dark phase - Kreb's cycle - Adaptations of mitochondria Are arranged in a logical sequence	At least the following marks should be obtained for each of the following: - Dark phase (3/5) - Kreb's cycle (4/6) - Adaptations of mitochondria (4/6)

TOTAL SECTION C: 20
GRAND TOTAL: 150