education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 11

LIFE SCIENCES

PROVINCIAL COMMON TEST

JUNE 2018

MARKS: 150

TIME: 2½ hours

This question paper consists of 14 pages including this page.

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 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, tables 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 must 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 A vector is an organism that ...

A is affected by pathogens.
B carries a disease from one organism to another.
C is autotrophic.
D improves immunity.

1.1.2 Saprophytic bacteria ...

A obtain food from dead matter.
B use chemicals to make their own food.
C always cause disease.
D have chlorophyll.

1.1.3 Which ONE of the following groups of organisms does the malaria parasite belong to?

A Algae
B Fungi
C Bacteria
D Protista

1.1.4 A characteristic of all bacteria is that they ...

A lack a true nucleus.
B move by means of flagellae.
C are autotrophs.
D have mitochondria for respiration.

1.1.5 The pistil of a flower consists of the ...

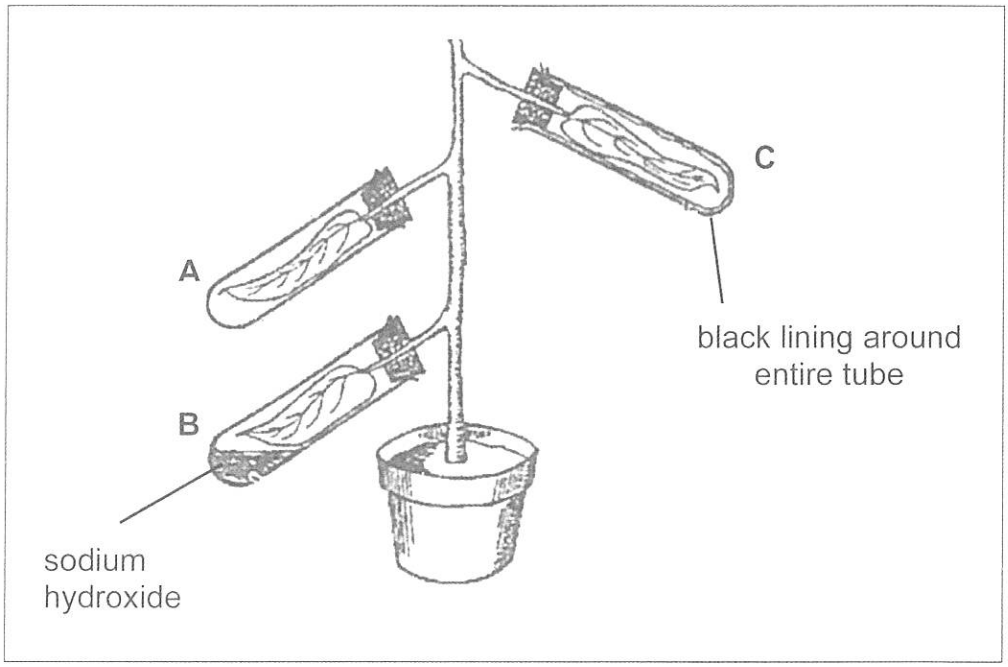
A anther, style and ovary.
B stigma, filament and ovary.
C anther, filament and ovary.
D stigma, style and ovary.

1.1.6 Fertilisation in angiosperms occurs when ...

A the pollen tube grows down the style.
B pollen moves from the anther to the stigma.
C the ovary enlarges into a fruit.
D a sperm cell unites with the ovum.

QUESTIONS 1.1.7 AND 1.1.8 ARE BASED ON THE INFORMATION AND APPARATUS BELOW.

The diagram below represents a part of a potted plant showing three leaves. Each leaf is treated differently. This apparatus is used to investigate the factors essential for photosynthesis.



1.1.7 After a few hours in the sun, which of the following will give a positive result with the iodine test?

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

1.1.8 Which ONE of the following combinations of test tube/s and aim of investigation is correct?

A Test tube A – to show that oxygen is given off during photosynthesis
B Test tube B – to show that carbon dioxide is given off during photosynthesis
C Test tube C – to show that light is necessary for photosynthesis
D Test tubes A, B and C – to show that chlorophyll is necessary for photosynthesis

1.1.9 Which ONE of the following characteristics is shared by bird and insect pollinated flowers?

A Colourful with very feathery stigmas
B Produce both nectar and a scent
C Have pollen grains that stick together in clumps
D Have anthers that are very large and dangle on the filaments

1.1.10 The condition of a muscle that has been subjected to extreme exhaustion has a ...

A large amount of ATP, large amount of glucose and large amount of lactic acid.
B small amount of or no ATP, small amount of glucose and large amount of lactic acid.
C large amount of ATP, no glucose and small amount of lactic
D acid.
small amount of ATP, no glucose and small amount of lactic acid.

(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 1.2.10) in the ANSWER BOOK.

1.2.1 A type of diet that excludes all animal products including eggs and dairy products

1.2.2 A type of anaerobic respiration that occurs in yeast cells

1.2.3 The general energy carrier in all living cells

1.2.4 A protein made by white blood cells that destroys or neutralises an antigen

1.2.5 A group of organisms composed of multinucleate, aseptate hyphae

1.2.6 Site of the light-independent phase of photosynthesis in the chloroplast

1.2.7 A leaf that has areas containing chlorophyll and areas without chlorophyll

1.2.8 Places where seeds are stored to help preserve biodiversity

1.2.9 Structure from which a fruit develops after fertilisation

1.2.10 Plant structure that lacks true roots, stems and leaves

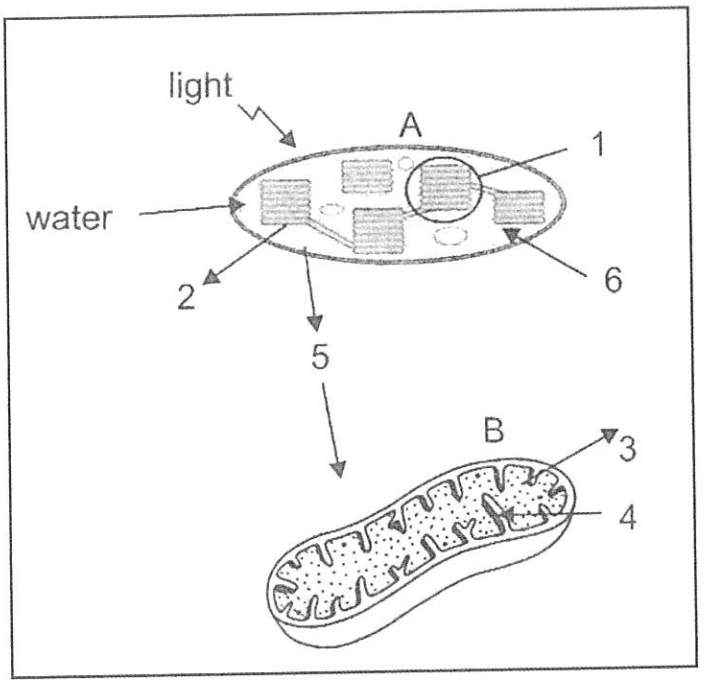
(10 x 1) **(10)**

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 1.3.5) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Contains vascular tissue	A: Mosses B: Ferns
1.3.2	Present in the moss plant	A: Underground stem B: Thick cuticle
1.3.3	Characteristic of wind pollination	A: Large, showy anthers B: Brightly coloured flowers
1.3.4	Produces seeds	A: Gymnosperms B: Angiosperms
1.3.5	Function of flowers	A: Attract pollinators B: Source of food

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

1.4 Study the diagrams below and answer the questions that follow.



1.4.1 Identify:

(a) Organelle **A** (1)

(b) Organelle **B** (1)

(c) Part **1** (1)

(d) Gas **2** (1)

(e) Gas **3** (1)

(f) Part **4** (1)

(g) Compound **5** (1)

(h) Gas **6** (1)

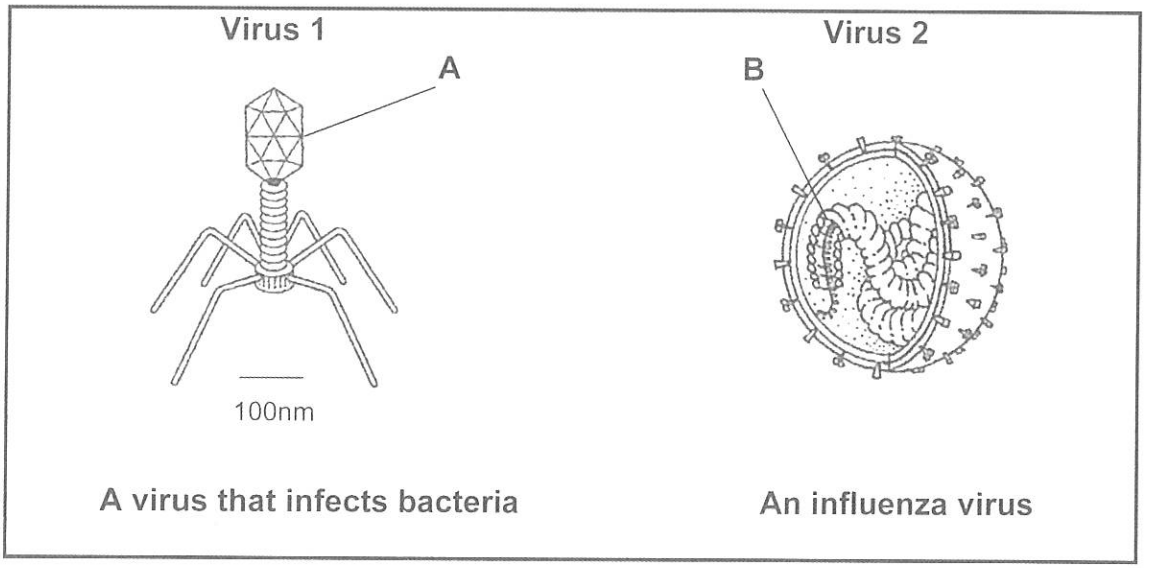
1.4.2 Explain ONE way in which organelle **A** is adapted for its functions. (2)
(10)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Two types of viruses are represented below.



2.1.1 Name the parts labelled **A** and **B**. (2)

2.1.2 State why viruses are described as acellular. (1)

2.1.3 A vaccine was produced using proteins from Virus **2.**

Explain the effect of this vaccine in preventing influenza. (2)

2.1.4 Briefly explain how Virus **1** may be used as a biological control agent. (3)

2.1.5 What information, shown on the diagram, provides evidence that viruses can pass through microfilters? (2)
(10)

2.2 Read the extract below and answer the questions that follow.

Listeriosis outbreak in South Africa in 2017-2018

Listeriosis is an illness caused by the bacterium *Listeria monocytogenes*. *Listeria* bacteria can grow at cold temperatures.

The widespread outbreak of *Listeria monocytogenes* food poisoning in South Africa was a result of consuming contaminated processed meats.

This foodborne illness produces fever, muscle aches and diarrhoea. Severe infections can cause headaches, meningitis, convulsions and death. Older adults and people with weak immune systems, pregnant women and babies have a high risk of developing life threatening infections.

As at 12 March 2018, there had been 973 confirmed infections and 183 deaths from listeriosis in South Africa.

2.2.1 Name the bacterium that causes listeriosis. (1)

2.2.2 List TWO symptoms of listeriosis mentioned in the extract. (2)

2.2.3 Name TWO groups of people, indicated in the extract, which are more likely to develop listeriosis. (2)

2.2.4 State why refrigeration does not prevent contamination of food by the listeriosis bacterium. (1)

2.2.5 Antibiotics are currently being used as a treatment for listeriosis.

Explain TWO conditions under which the antibiotic prescribed may not be successful in treating the disease. (4)
(10)

2.3 Evolutionary trends in animals show increasing complexity with regards to body structure.

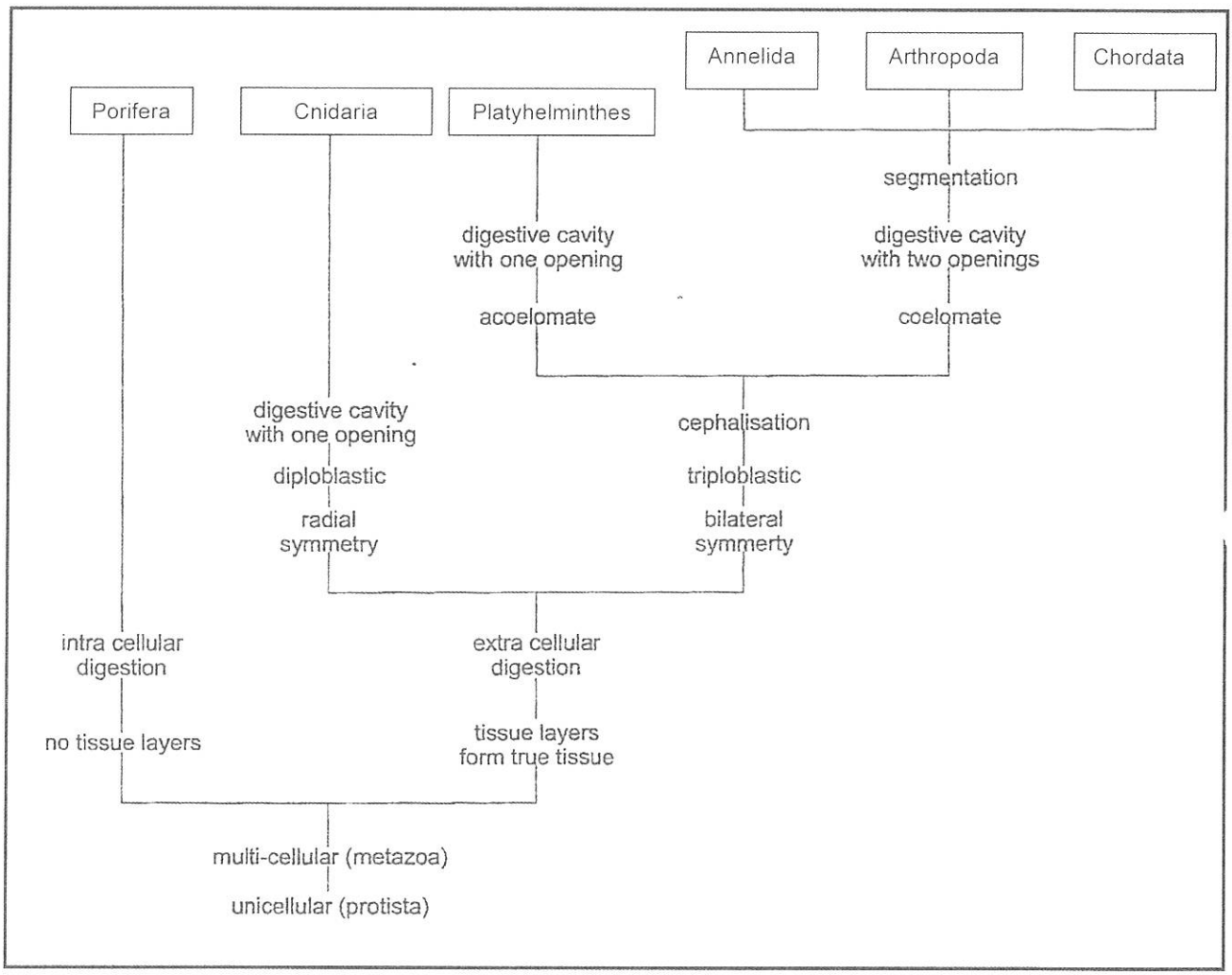
2.3.1 Explain TWO advantages of a through gut to an animal. (4)

2.3.2 A coelom separates the gut wall from the body wall in certain animals.

Explain the problem that this creates for such animals. (2)

2.3.3 Explain how the problem stated in Question 2.3.2 is overcome in these animals. (2)
(8)

2.4 The phylogenetic tree below shows different groups of animals.



2.4.1 Name the ancestral form of all groups of animals shown. (1)

2.4.2 List THREE evolutionary features, from the phylogenetic tree, that Cnidaria and Platyhelminthes have in common. (3)

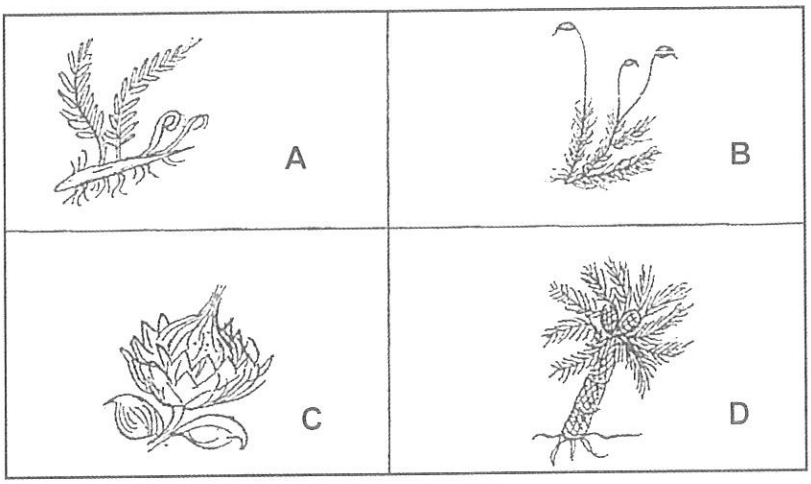
2.4.3 Tabulate any TWO structural differences, from the phylogenetic tree, between Cnidaria and Platyhelminthes. (5)

2.4.4 State why annelids are more closely related to arthropods than to platyhelminths. (2)

2.4.5 Identify a feature of cnidarians, from the phylogenetic tree, that suits a sedentary mode of life. (1)
(12)
[40]

QUESTION 3

3.1 The diagrams below represent different plant groups.



3.1.1 Write the LETTER only of the plant group that has:

(a) Seeds that are not enclosed in a fruit (1)

(b) A dominant haploid generation (1)

(c) Sporangia in a sorus (1)

(d) Wind pollination only (1)

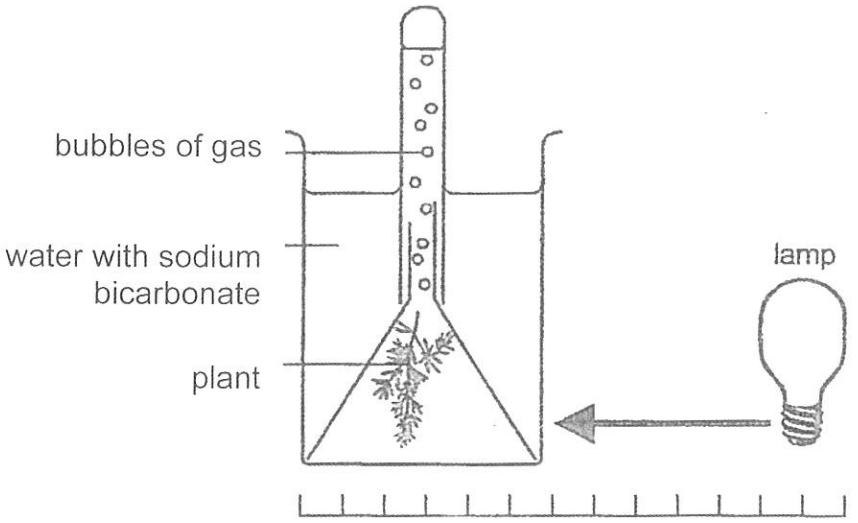
3.1.2 Explain the significance of the development of vascular tissue in plant evolution. (2)

3.1.3 Under conditions of severe drought, plant group **C** has a higher chance of survival than plant group **B**

Explain TWO adaptive features of plant group **C** that will allow it a higher chance of survival during a drought. (4)
(10)

3.2 When a water plant is placed near bright light it gives off bubbles of gas. An investigation was conducted to measure the rate of photosynthesis when a lamp is placed at different distances from the plant.

The diagram and graph below show the apparatus used and results obtained for the investigation.



3.2.1 Identify the dependent variable and state how it was measured. (2)

3.2.2 Name ONE environmental factor that should be kept constant during the investigation. (1)

3.2.3 Apart from controlling the environmental factors state TWO other factors that should be kept constant. (2)

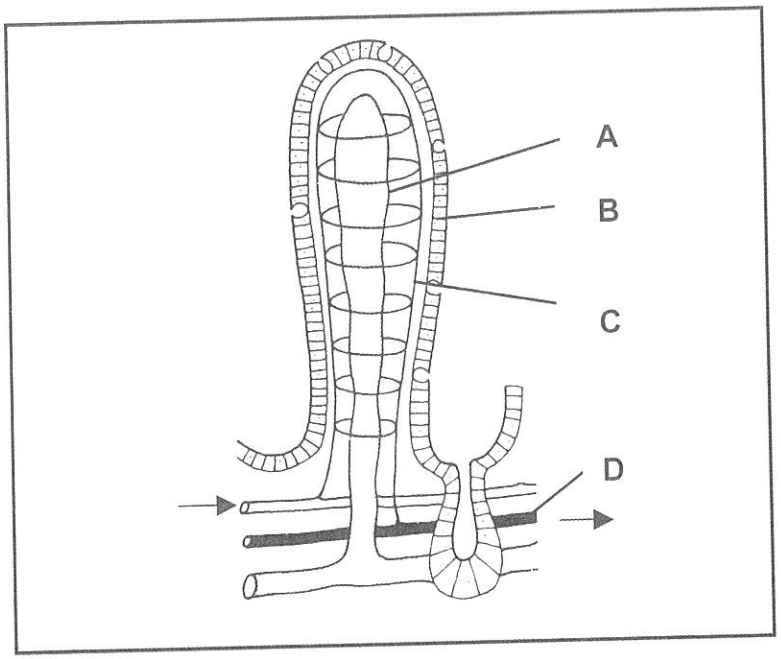
3.2.4 State TWO ways in which the reliability of the results can be increased. (2)

3.2.5 This investigation must be conducted as quickly as possible.

Explain why the lamp should not be close to the plant for a long period of time. (2)

3.2.6 Describe the events of the light phase of photosynthesis. (5)
(14)

3.3 The structure below is found in the small intestine and is responsible for absorption of food.



3.3.1 Identify:

(a) Part **A** (1)

(b) Tissue **B** (1)

(c) Part **C** (1)

(d) Vessel **D** (1)

3.3.2 Explain how this structure is suited for:

(a) Active absorption of food (2)

(b) Protection of the lining of the small intestine (2)
(8)

3.4 The table below shows the nutritional information of a cereal provided to learners at a local high school to supplement their daily nutrient intake.

Energy and nutrients	Unit	Per 50g serving
Energy	kJ	746
Protein	g	12
Total Carbohydrate	g	29
Total Fat	g	6
Saturated fats	g	1
Polyunsaturated fats	g	3
Monounsaturated fats	g	2
Cholesterol	mg	0

3.4.1 A 14-year-old girl needs 7 530 kJ of energy per day.

Calculate the number of servings of cereal that would provide this amount of energy. Show all working. (2)

3.4.2 Draw a bar graph to represent all data in the table relating to the fat content of the cereal. (6)

(8)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

In recent years, there has been an increase in the number of people affected by diabetes. Hormonal control of blood glucose levels is affected in diabetics.

Give a brief description of diabetes and discuss the homeostatic control of high blood glucose levels in a healthy person. Also describe what happens to glucose during the process of glycolysis in cellular 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

PROVINCIAL COMMON TEST

MEMORANDUM – JUNE 2018

NATIONAL
SENIOR CERTIFICATE

GRADE 11

MARKS: 150

This memorandum consists of 9 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 a part of it is required**
   Read all and credit the relevant part.

4. **If comparisons are asked for, but descriptions are given**
   Accept if the 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 are incorrect, do not credit. If sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the 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 recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

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

14. **If only the letter is asked for, but only the name is given (and vice versa)**
    Do not 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.

SECTION A

QUESTION 1

1.1	1.1.1	B ✓✓		
	1.1.2	A ✓✓		
	1.1.3	D ✓✓		
	1.1.4	A ✓✓		
	1.1.5	D ✓✓		
	1.1.6	D ✓✓		
	1.1.7	A ✓✓		
	1.1.8	C ✓✓		
	1.1.9	C ✓✓		
	1.1.10	B ✓✓	(10 x 2)	**(20)**
1.2	1.2.1	Vegan✓		
	1.2.2	Alcoholic fermentation✓		
	1.2.3	ATP✓/Adenosine triphosphate		
	1.2.4	Antibody✓/Immunoglobulin		
	1.2.5	Fungi✓		
	1.2.6	Stroma✓		
	1.2.7	Variegated✓		
	1.2.8	Seed banks✓		
	1.2.9	Ovary✓		
	1.2.10	Thallus✓		**(10)**
1.3	1.3.1	B only✓✓		(2)
	1.3.2	None✓✓		(2)
	1.3.3	A only✓✓		(2)
	1.3.4	Both A and B✓✓		(2)
	1.3.5	Both A and B✓✓		(2)
			(5 x 2)	**(10)**
1.4	1.4.1	(a) Chloroplast✓		(1)
		(b) Mitochondrion✓		(1)
		(c) Granum✓		(1)
		(d) Oxygen✓		(1)
		(e) Carbon dioxide✓		(1)
		(f) Crista✓		(1)
		(g) Glucose✓		(1)
		(h) Carbon dioxide✓		(1)
	1.4.2	Thylakoid - Granum contains chlorophyll✓ to absorb radiant energy✓ - Double membrane is permeable✓ to CO_2 and water✓/the requirements for photosynthesis - Thylakoids occur in stacks in the granum✓ to increase surface area for absorption of radiant energy✓ - Enzymes are present✓ to catalyse the reactions of photosynthesis✓ **(Mark first ONE only)**	Any 1 x 2	(2) **(10)**

TOTAL SECTION A: 50

SECTION B
QUESTION 2

2.1 2.1.1 A – Protein coat✓/capsid
B – Nucleic acid✓ (2)

2.1.2 No organelles✓/cytoplasm / no nucleus, ribosome, mitochondria (1)

2.1.3 - It stimulates the production of antibodies✓
- to prepare the body against exposure to the flu virus✓/immunity (2)

2.1.4 - Some bacteria cause disease✓
- Viruses that infect bacteria will destroy✓pathogenic bacteria
- Diseases caused by bacteria may thus be prevented✓ (3)

2.1.5 100nm✓✓ (2)
(10)

2.2 2.2.1 *Listeria monocytogenes*✓ (1)

2.2.2 - Fever✓
- Muscle aches✓
- Diarrhoea✓
- Headaches✓
- Meningitis✓
- Convulsions✓
(Mark first TWO only) Any 2 (2)

2.2.3 - Older adults✓
- People with weak immune systems✓
- Pregnant women✓
- Babies✓
(Mark first TWO only) Any 2 (2)

2.2.4 *Listeria* grows at cold/low temperatures✓ fridge T° is low. (1)

2.2.5 - The bacteria may mutate✓ / new strain of bacteria developed making them resistant to the antibiotic✓

- The patient may not complete the course of antibiotics✓/incorrect antibiotic causing the *Listeria* bacteria to flourish again✓ (4)
(Mark first TWO only) **(10)**

2.3 2.3.1
- Since food moves in one direction through the gut✓
- it prevents mixing of digested food and undigested material✓/ingestion and egestion can occur simultaneously
- Allows specialisation of different parts of the digestive system✓/systematic process
- making digestion more efficient✓/digestion can occur simultaneously (4)

(Mark first TWO only)

2.3.2
- The travel distance for gases, waste & nutrients is increased✓/animals become bigger ✓ diffusion is insufficient
- and hence diffusion is insufficient for this purpose✓ (2)

2.3.3
- The presence of a blood system✓
- allows for the transport of gases, waste & nutrients over a greater distance✓ (2)

(8)

2.4 2.4.1 Protista✓ (1)

2.4.2
- Multicellular✓
- Extracellular digestion✓
- Tissue layers form true tissues✓
- Digestive cavity with one opening✓ Any 3 (3)

(Mark first THREE only)

2.4.3

Cnidaria	**Platyhelminthes**
Radial symmetry✓	Bilateral symmetry✓
Diploblastic✓	Triploblastic✓
No cephalisation✓	Cephalisation✓

(Mark first TWO only) Any 2×2 + 1 for table (5)

2.4.4 Annelids have more characteristics in common with arthropods than platyhelminths ✓✓ **OR**

Annelids and arthropods share a more recent common ancestor✓✓ (2)

2.4.5 Radial symmetry✓ (1)

(12)
[40]

QUESTION 3

3.1 3.1.1 (a) D✓ (1)

(b) B✓ (1)

(c) A✓ (1)

(d) D✓ (1)

3.1.2
- Specialised tissue to transport food and water✓
- enabled plants to grow taller✓ (2)

3.1.3
- Does not need water for fertilisation✓
- so reproduction can still occur✓

- Seeds have a testa✓
- for protection✓/ to prevent dehydration

- Presence of cuticle✓
- to reduce water loss✓

- Deep rooting system✓
- to access underground water✓

- Seeds can remain dormant✓
- to germinate when conditions are favourable✓ Any (2 x 2) (4)

(10)

3.2 3.2.1
- Rate of photosynthesis✓
- Measuring the rate at which gas bubbles are released✓ (2)

3.2.2 only one
- Temperature✓
- Carbon dioxide concentration✓
- pH✓

(Mark first ONE only) Any 1 (1)

3.2.3
- Same individual ✓to take all readings/measurements
- Same measuring instruments✓/ stopwatch/ ruler must be used for all readings
- Same plant for entire investigation✓
- Same lamp for entire investigation✓

(Mark first TWO only) Any 2 (2)

3.2.4
- Repeat the investigation✓
- Take many readings at each distance✓/use average for each distance (2)

(Mark first TWO only)

3.2.5
- Lamp may cause increase in temperature/heating of apparatus✓
- which would affect the rate of photosynthesis✓/results will be tampered (2)

3.2.6
- Occurs in the grana of the chloroplast✓
- Chlorophyll absorbs radiant energy✓
- Some energy is used to combine ADP + P✓
- to form ATP✓
- Some energy is used to split water✓/photolysis
- into hydrogen and oxygen✓
- Oxygen is released✓ into the atmosphere
- Energised hydrogen is taken up by a carrier✓/Hydrogen goes into next phase

Any 5 (5)
(14)

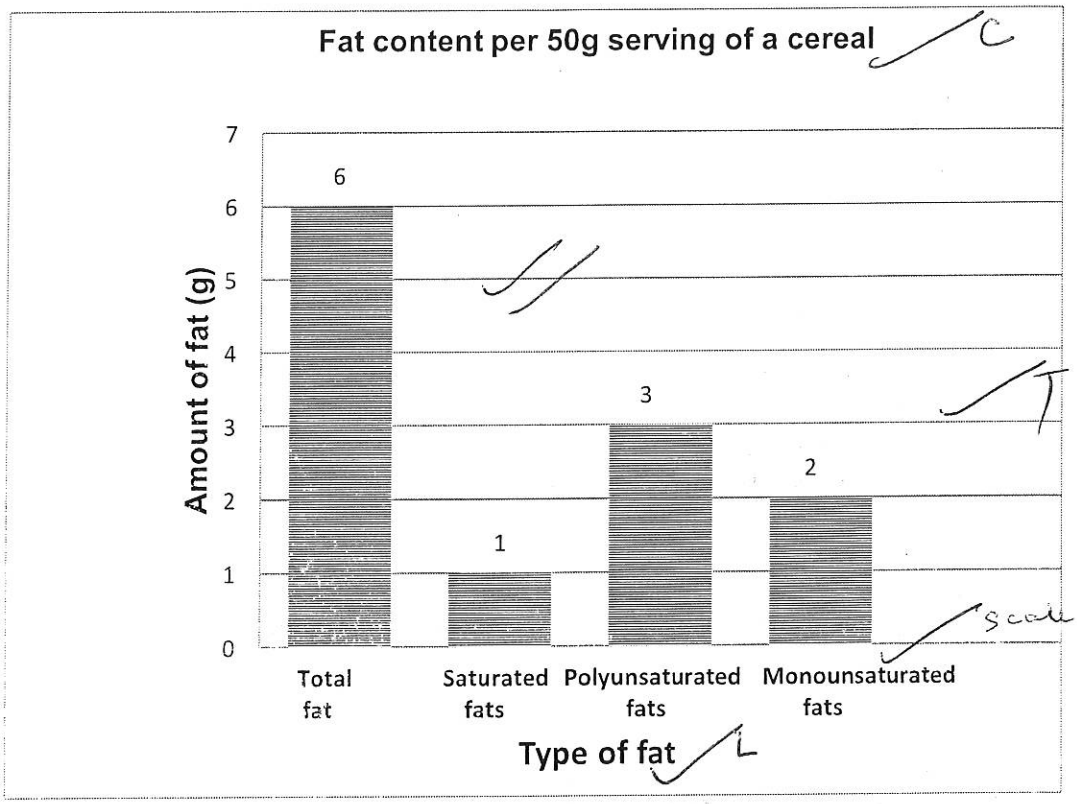
3.3 3.3.1
(a) Lacteal✓ (1)
(b) Columnar epithelium✓ (1)
(c) Blood capillary✓ (1)
(d) Venule✓ (1)

3.3.2 (a)
- Columnar epithelial cells have many mitochondria✓
- that provide energy✓ for active absorption (2)

(b)
- Brunners glands/goblet cells secrete an (alkaline) mucus✓
- which protects the lining of the small intestine from acid chyme✓/destructive enzymes (2)
- goblet cells secrete mucus ✓
To protect lining/wall against enzymes/acid chyme **(8)**

3.4 3.4.1 7530kJ ÷ 746kJ ✓= 10✓ (2)

3.4.2



Criterion	Mark
Type of graph	1
Title	1
Labels on x axis and y axis with units	1
Scale of x axis (equal width and spacing of bars) and y axis	1
Drawing of bars	2 marks: All correct
	1 mark: - 1 to 3 correct

(6)
(8)

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Diabetes

- The pancreas of diabetics produces insufficient amounts of insulin✓ (type 2)
- or no insulin✓ (type 1)
- or the body cells are not receptive to insulin✓
- Diabetes is characterised by high blood glucose levels✓
- and the elimination of glucose in the urine✓
- Diabetics experience frequent urination✓/thirst/hunger
- Diabetics get tired easily✓/lose weight easily

Any 5 (5)

Homeostatic control of high blood glucose levels

- When the blood glucose level is high✓/above normal
- The cells in the islets of Langerhans✓/pancreas
- secrete insulin✓ into the blood
- stimulating the absorption of glucose into the body cells✓
- Excess glucose is converted into glycogen✓
- and stored in the liver✓/muscles
- The blood glucose level decreases✓
- and returns to normal✓

Any 7 (7)

Glycolysis

- Occurs in the cytosol✓
- Glucose is broken down✓
- to form pyruvic acid✓
- Energy-rich hydrogen atoms are released✓
- Hydrogen combines with a carrier✓/co-enzyme
- Some energy released is used to combine ADP + P✓
- to produce ATP✓
- Process is controlled by enzymes✓

Any 5 (5)

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

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logical sequence	Comprehensive
All information provided is relevant to the topic	Ideas arranged in a logical/ cause-effect sequence	Answered all aspects required by the essay in sufficient detail
All information is relevant to: - Diabetes - Homeostatic control of glucose - Glycolysis There is no irrelevant information	Ideas are presented in a logical sequence with regards to: - Diabetes - Homeostatic control of glucose - Glycolysis	All aspects are answered comprehensively as follows: - Diabetes **(3/5)** - Homeostatic control of glucose **(5/7)** - Glycolysis **(3/5)**
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 150