Basic Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

COMMON TEST

JUNE 2014

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. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams 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 of graph paper.
10. You must use a non-programmable calculator, a 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-D) next to the question number (1.1.1 – 1.1.8), for example 1.1.9 A

1.1.1 A seed and a spore differ in that …

A spores are diploid while seeds are haploid.
B spores can withstand dehydration while seeds cannot.
C spores require dispersal but seeds do not.
D spores are unicellular.

1.1.2 Triploblastic animals that lack a through-gut and coelom are classified as ...

A cnidarians.
B flatworms.
C annelids.
D arthropods.

1.1.3 Each of the following factors increases the rate of photosynthesis, except an increase in …

A carbon dioxide.
B light intensity.
C oxygen.
D temperature.

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 …

A have DNA and RNA.
B live on dead, decaying matter.
C can only reproduce inside a living cell.
D obtain food from the host.

1.1.6 Cellular respiration in a green leaf takes place …

A. during the day only.
B. continuously.
C. during the night only.
D. in tissues without chlorophyll only.

1.1.7 The feature that enables us to classify the bacterium as a prokaryote is the ...

A. presence of a cell wall.
B. absence of a true nucleus.
C. presence of storage granules.
D. absence of flagella.

1.1.8 In humans, digestion begins in the ...

A. duodenum.
B. mouth.
C. stomach.
D. pancreas.

(8 x 2 = 16)

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 Ability of the body to produce antibodies to fight infections

1.2.2 A plant body lacking true roots, stems and leaves

1.2.3 The removal of solid waste from the alimentary canal

1.2.4 A part of the chloroplast where the dark phase of photosynthesis occurs

1.2.5 The flap-like structure which prevents food from entering the trachea

1.2.6 The dominant generation of flowering plants

1.2.7 The phase of cellular respiration during which most ATP is formed

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 Places where seeds are stored to help preserve biodiversity

1.2.10 The phase in cellular respiration during which glucose is converted into pyruvic acid

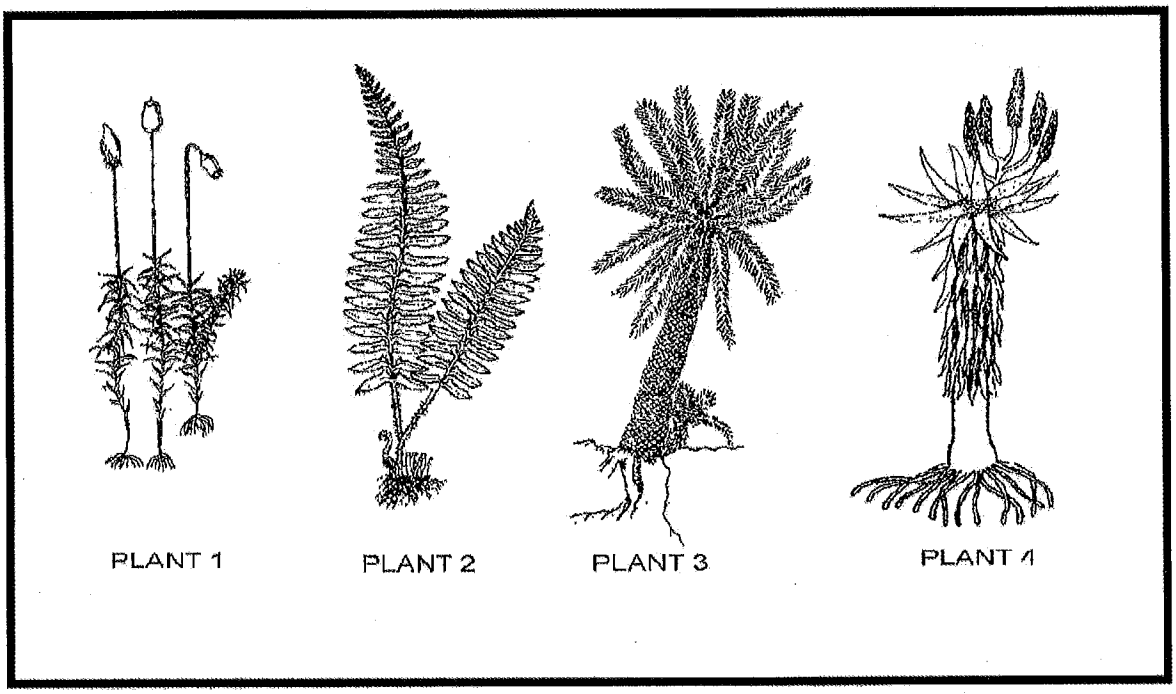
(10)

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 1.3.7) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 A class of spermatophytes with a vascular system, seeds and no flowers	A: Gymnospermae B: Angiospermae
1.3.2 Phylum containing organisms that are triploblastic	A: Platyhelminthes B: Annelida
1.3.3 Site of Kreb's cycle	A: Ribosome B: Leucoplast
1.3.4 The digestive juice that enters the duodenum through a duct	A: Pancreatic juice B: Gastric juice
1.3.5 Some are autotrophic while others are heterotrophic	A: Bacteria B: Protists
1.3.6 A product which is formed during the making of beer	A: Alcohol B: Carbon Dioxide
1.3.7 Produced during anaerobic respiration in muscle cells	A: Oxygen B: Lactic acid

(7x 2 = 14)

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



1.4.1 Identify the plant groups **1** to **4** shown above. (4)

1.4.2 The following table shows a comparison of various evolutionary developments of plants (1 – 4). Complete the table by writing the missing characteristic next to the appropriate letter (A-F) in the answer book.

	Vascular tissue	**Roots, stem and leaves**	**Reproductive structures**	**Water in reproduction**
PLANT 1	**A**	**C**	Spores	Water needed for reproduction
PLANT 2	Xylem and phloem present	True roots, stems and leaves	**D**	Water needed for reproduction
PLANT 3	Xylem and phloem present	True roots, stem and leaves	**E**	No water needed for reproduction
PLANT 4	**B**	True roots, stem and leaves	Stamens and pistils found in flowers; seeds enclosed in a fruit.	**F**

(6)

(10)

TOTAL MARKS: 50

SECTION B

QUESTION 2

2.1 Study the extract about malaria below and the answer questions that follow.

Half of the world's population at risk of malaria

Every minute of the day, one child dies from malaria somewhere in the world. In South Africa the incidence of malaria has been less than 10 000 cases per year.

Malaria is a parasitic disease that occurs mainly in tropical and subtropical regions. It is transmitted in humans through the bite of a female mosquito of the *Anopheles* species, which is the vector for the parasite.

The most effective way of managing malaria is to destroy its vector. An insecticide which has been successful to date is DDT. The inner walls of the house are sprayed with DDT so that the mosquitoes die if they sit on or near them. However, the use of DDT has been banned since 1972.

2.1.1 To which group of micro-organisms does the malaria parasite belong? (1)

2.1.2 Describe how the malaria parasite is passed from one human to another. (2)

2.1.3 Mention TWO symptoms of malaria in the human body. (2)

2.1.4 State ONE way in which an outbreak of malaria can be effectively managed. (1)

2.1.5 State TWO ways in which you can protect yourself from being infected with malaria. (2)

2.1.6 Explain why a person with malaria cannot be treated by using an antibiotic. (2)

2.1.7 Suggest ONE way in which the data about the number of malaria cases may have been collected. (1)

2.1.8 Suggest TWO ways in which an increase in the number of malaria infections would affect the South African economy. (2)
(13)

2.2 Grade 11 learners wanted to investigate the growth of bacteria on culture plates. The culture plates contained different nutrients as shown in the table below.

Culture plate number	Nutrient A	Nutrient B	Nutrient C
1	✓	✓	
2		✓	✓
3	✓	✓	✓
4	✓		✓

They used a sterile needle to place the bacteria on each plate. After a few days they counted the number of colonies on each culture plate. The results are shown in the table below.

Culture plate number	Number of bacterial colonies
1	10
2	9
3	50
4	2

2.2.1 Formulate a hypothesis for the investigation. (3)

2.2.2 In which plate were the most colonies found? (1)

2.2.3 Suggest why most colonies were found in the plate mentioned in your answer in Question 2.2.2. (1)

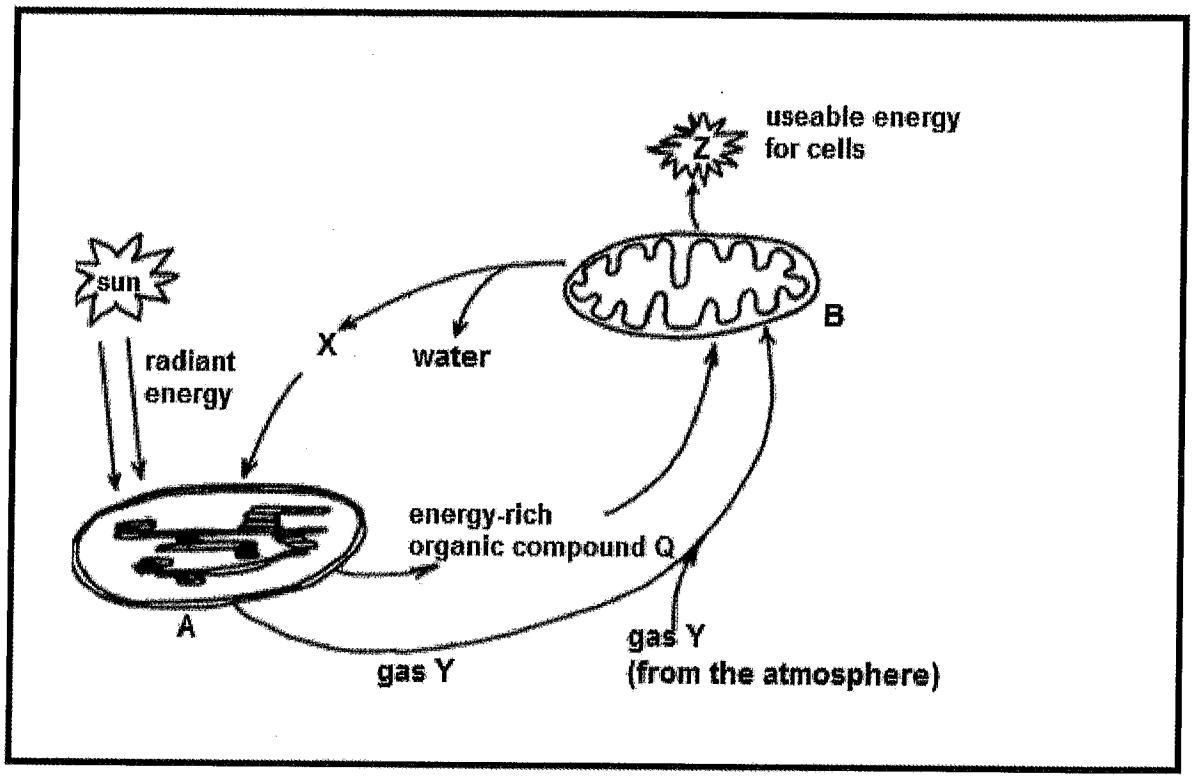
2.2.4 According to these results, which is the most important nutrient for bacterial growth? (1)

2.2.5 Mention TWO factors that learners should keep constant in their investigation. (2)

2.2.6 Draw a bar-graph to show the learners' results. (7)

(15)

2.3 The diagram below represents the physiological processes that take place in the leaf of a green plant. Study the diagram and answer the questions that follow.



2.3.1 Name the organelles represented by **A** and **B**. (2)

2.3.2 Identify gases **X** and **Y**. (2)

2.3.3 Give ONE example of the energy–rich organic compound **Q**. (1)

2.3.4 In what form does the useable energy, **Z**, occur in cells? (1)

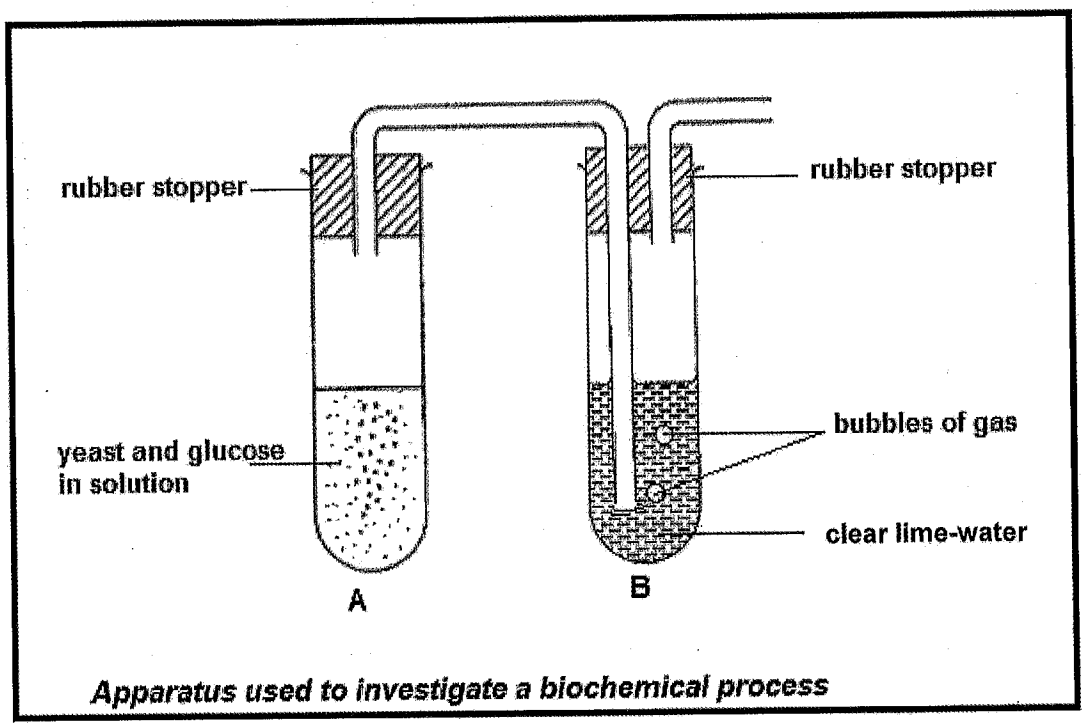
2.3.5 Explain why an increase in the concentration of Gas **X** may not necessarily lead to an increase in the process that takes place in organelle **A** (4)

2.3.6 Explain how the processes taking place in organelles **A** and **B** help to maintain a constant composition of gases in the atmosphere. (2)
(12)

Total Question 2: [40]

QUESTION 3

3.1 Study the diagram below showing an investigation carried out at room temperature.



Apparatus used to investigate a biochemical process

3.1.1 What is the aim of the above investigation? (2)

3.1.2 Name:

(i) The biochemical process that is taking place in tube **A** (1)
(ii) The gas in tube **B** in the form of bubbles (1)

3.1.3 State ONE function of the rubber stopper in tube **A**. (1)

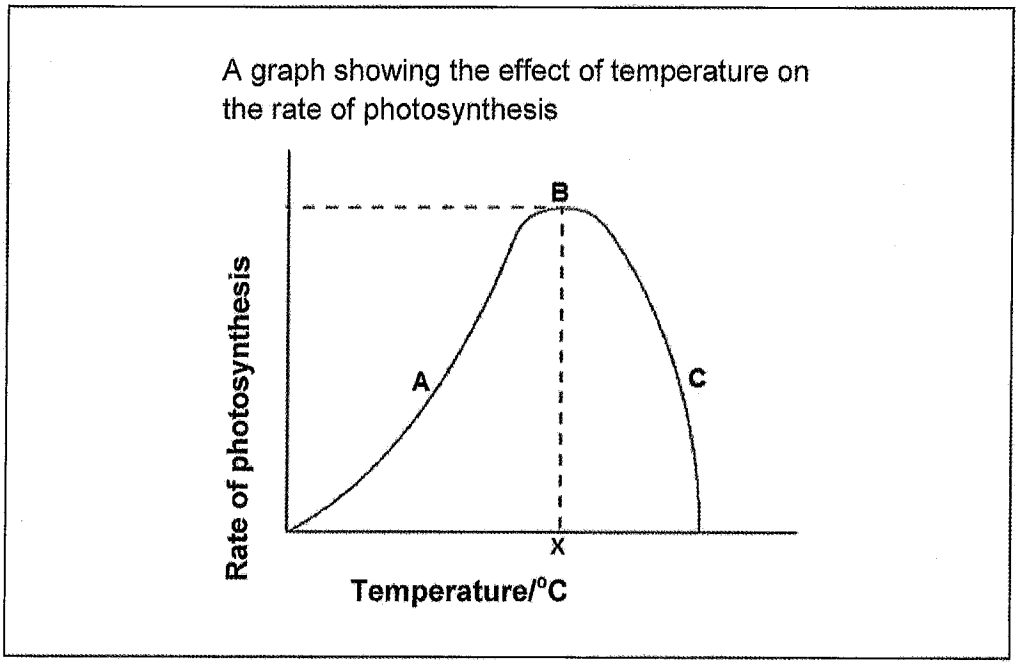
3.1.4 Suggest a suitable control for the above investigation. (1)

3.1.5 Name the group of micro-organisms to which the yeast belongs. (1)

3.1.6 List TWO ways in which the process illustrated in the diagram is economically important. (2)

3.1.7 Explain how the results of the above investigation would differ if the apparatus were to be kept at a temperature a few degrees higher. (3)
(12)

3.2 Study the graph below and answer the questions that follow.



3.2.1 Name the tissue in a leaf that is mainly responsible for photosynthesis. (1)

3.2.2 Use the information in the graph to state a general trend about the effect of temperature on the rate of photosynthesis. (3)

3.2.3 Name THREE other environmental factors apart from temperature that can affect the rate of photosynthesis. (3)

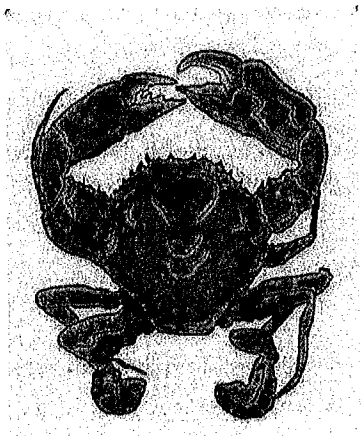
3.2.4 State TWO reasons why the process of photosynthesis is biologically important. (2)

3.2.5 One of the ways to determine if photosynthesis has occurred in a plant is to test for the presence of starch in the leaves of the plant. Describe the procedure used to test the leaves for the presence of starch. (5)

3.2.6 'The dark phase of photosynthesis is dependent on the light phase'.

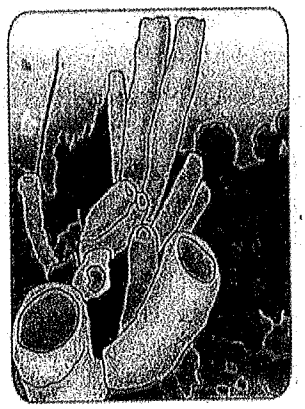
Explain the above statement. (3)
(17)

3.3 Study the diagram, representing three animals and answer the questions that follow.



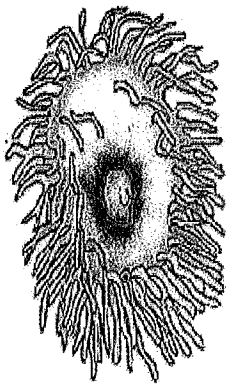
A

Arthropoda



B

Porifera



C

Cnidaria

3.3.1 State the type of symmetry of animal **B**? (1)

3.3.2 Which of the animals (**A-C**) do not possess a through-gut? (2)

3.3.3 State whether each of organisms **A** and **C** are diploblastic or triploblastic. (2)

3.3.4 Explain how cephalisation and symmetry, as it relates to each of the following animals, is appropriate to the mode of life of:

(i) Organism **A** (3)
(ii) Organism **C** (3)

(11)

Total Question 3: (40)

SECTION C

QUESTION 4

Describe the mechanical and chemical digestion of carbohydrates.

Also describe the homeostatic control of glucose concentration of the blood in a normal healthy person.

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

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

TOTAL SECTION C: 20
GRAND TOTAL: 150

Basic Education

KwaZulu-Natal Department of Basic Education

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LIFE SCIENCES

GRADE 11

MEMORANDUM

JUNE 2014

NATIONAL SENIOR CERTIFICATE

GRADE 11

MARKS : 150

TIME : 2½ hours

This memorandum consists of 7 pages.

SECTION A

QUESTION 1

1.1

1.1.1 D ✓✓
1.1.2 B✓✓
1.1.3 C✓✓
1.1.4 D✓✓
1.1.5 C✓✓
1.1.6 B✓✓
1.1.7 B✓✓
1.1.8 B✓✓

(8 x 2 = 16)

1.2

1.2.1 Immunity✓
1.2.2 Thallus✓
1.2.3 Egestion✓/Defecation✓
1.2.4 Stroma✓
1.2.5 Epiglottis✓
1.2.6 Sporophyte✓
1.2.7 Oxidative Phosphorylation✓
1.2.8 Cephalisation✓
1.2.9 Seed banks✓
1.2.10 Glycolysis

(10)

1.3

1.3.1 A only✓✓
1.3.2 Both A and B✓✓
1.3.3 None✓✓
1.3.4 A only✓✓
1.3.5 Both A and B✓✓
1.3.6 Both A and B✓✓
1.3.7 B only✓✓

(7 x 2 = 14)

1.4

1.4.1 Plant 1- Bryophyta✓
Plant 2- Pteridophyta✓
Plant 3- Gymnosperm✓
Plant 4- Angiosperm✓

(4)

1.4.2 A- Poorly developed, no xylem and phloem✓
B- Xylem and phloem present✓
C- No true root, stem or leaves/The plant body is a thallus✓
D- Spores✓
E- Male and female cones with exposed seeds✓
F- No water needed for fertilisation✓

(6)
(10)

TOTAL MARKS: 50

SECTION B

QUESTION 2

2.1

2.1.1 Protista ✓ (1)

2.1.2 - A female Anopheles mosquito bites✓ an infected person
- The parasite is sucked in ✓and develops further in the vector
- and the mosquito bites another person✓ transferring the parasite any (2)

2.1.3

- High fever and chills✓
- Sweating ✓
- Liver discomfort✓
- Nausea/ Vomiting✓ any (2)

Mark first TWO only

2.1.4 The most effective way of managing malaria is to destroy its vector.✓ (1)

Mark first ONE only

2.1.5 - Take anti-malarial drugs✓
- Use insect repellents on exposed skin✓
- Sleep under bed-nets✓ any (2)

Mark first TWO only

2.1.6 Antibiotics can only be used to treat diseases caused by bacteria✓ and the malaria is transmitted by a protist.✓ (2)

2.1.7 From hospital/clinic records✓ (1)

2.1.8 - More money used in health care✓
- Decreases productivity/the work force of the country✓ (2)

Mark first TWO only

(13)

2.2

2.2.1 Bacteria✓ need all three nutrients ✓ in the culture medium for optimal growth.✓

OR

No nutrients✓ in the culture medium are needed by bacteria✓ for optimal growth✓

OR

Only nutrient A✓/B/C is needed by the bacteria✓ for optimal growth✓ (3)

2.2.2 Plate 3✓ (1)

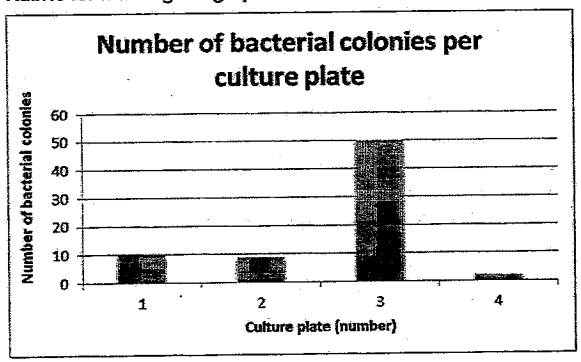
2.2.3 Plate 3 contains all three nutrients. ✓ (1)

2.2.4 Nutrient B ✓ (1)

2.2.5 - Temperature of the culture plates✓
- The amount of oxygen available✓
- Size of culture plate✓ any (2)

2.2.6

Rubric for marking the graph



Title of the graph	1
Correct scale for X-axis	1
Correct label for X-axis	1
Correct scale for Y-axis	1
Correct label for Y-axis	1
Plotting of bars	1: 1 – 2 bars correct 2: 3 – 4 bars correct

(7)

(15)

2.3

2.3.1 A - Chloroplast✓
B - Mitochondrion✓ (2)

2.3.2 X- Carbon dioxide✓
Y- Oxygen✓ (2)

2.3.3 Glucose✓ (1)

2.3.4 ATP✓ (1)

2.3.5

- Other requirements✓ of the process taking place in organelle A
- may be in short supply✓/limiting
- A large increase in the concentration of gas A could also affect the pH✓ of the cell
- which may not be optimum for the enzymes✓ controlling the process (4)

2.3.6 - Whilst organelle B releases and thus increases the amount of carbon dioxide✓ into the atmosphere
- Organelle A uses carbon dioxide and thus reduces the amount of carbon dioxide✓ in the atmosphere

OR
- Whilst organelle B uses and thus decreases the amount of oxygen✓ in the atmosphere
- Organelle A releases and thus increases the amount of oxygen✓ in the atmosphere (2)

(12)

Total Question 2: [40]

QUESTION 3

3.1

3.1.1 To determine whether CO_2 is given off✓ during anaerobic respiration✓/ alcoholic fermentation (2)

3.1.2

(i) Anaerobic respiration/fermentation✓

(ii) Carbon dioxide✓ (2)

3.1.3 - Prevents atmospheric air from entering/escaping the test tube✓
- Make test tube airtight✓ any (1)

3.1.4 Omit the yeast✓ (1)

3.1.5 Fungi✓ (1)

3.1.6 - Beer/wine making/produce alcohol✓
- Baking/to form CO_2✓ (2)

Mark first TWO only

3.1.7 - More bubbles will form✓/Bubbles will form more quickly
- since a higher temperature increases enzyme activity✓
- thus increasing the rate of respiration✓/the process in tube A (3)

(12)

3.2

3.2.1 Mesophyll✓ (1)

3.2.2 As the temperature increases,
- there is an initial increase✓ in the rate of photosynthesis at A
- Up to an optimum level✓ in B
- Beyond this level, at C the rate of photosynthesis decreases✓ (3)

3.2.3 - Light✓
- Carbon dioxide✓
- Water✓ (3)

Mark first THREE only

3.2.4 - Release of oxygen into the atmosphere✓
- Uptake of carbon dioxide from the atmosphere✓
- Food production✓/energy trapping any (2)

Mark first TWO only

3.2.5 - Boil leaf in water✓
- Boil leaf in alcohol indirectly✓
- Rinse in water✓
- Pour a few drops of iodine solution onto the leaf✓
- Observe any colour changes✓/Blue-black colour indicates starch (5)

3.2.6 The dark phase requires both ATP✓
and energized hydrogen✓,
both of which are products of the light phase✓ (3)

(17)

3.3

3.3.1 B - asymmetrical✓ (1)

3.3.2 B✓ and C✓ (2)

3.3.3 A - triploblastic✓
C - diploblastic✓ (2)

3.3.4 (i)
- Organism A has bilateral symmetry✓
- with cephalisation✓
- allowing for more efficient forward movement✓ (3)

(ii)
- Organism C has radial symmetry✓
- with no cephalisation✓
- It is able to react to stimuli all around its body✓
- whilst anchored in one place✓ any (3)

(11)

Total Question 3: (40)

SECTION C

QUESTION 4

Mechanical breakdown
Carbohydrates broken down to a smaller size✓
by the teeth✓
and stomach✓ which grinds the food
to become a liquid called chyme✓ max (3)

Chemical Digestion
Carbohydrases✓ in the
saliva✓,
pancreatic juice✓
and intestinal juice✓
break down the polysaccharides✓
to disaccharides✓
and eventually to monosaccharides✓
in an alkaline medium.✓ max (6)

Homeostatic control of glucose
When blood sugar level is higher than normal✓,
the hormone insulin is secreted. ✓
Release of hormone insulin reduces the level of glucose ✓ in two ways.
Firstly, it increases the rate at which glucose is absorbed ✓ by the cells of the liver and muscles.
Secondly, it stimulates the conversion of glucose into glycogen✓
and fat in the liver and muscles✓.

When blood sugar level is lower than normal, ✓
the hormone glucagon ✓ is secreted.
Glucagon stimulates conversion of stored glycogen in the liver, into glucose.✓
This glucose is released into the blood✓
in order to raise the level of glucose back to normal level. ✓
max (8)

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

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Elaboration	Mark
Relevance (R)	Only mechanical and chemical digestion of carbohydrates is mentioned. No other hormone except insulin and glucagon are mentioned	1
Logical sequence (L)	Digestion describe in the correct sequence AND each hormone named is linked to its correct role in homeostasis	1
Comprehensive (C)	Both mechanical and chemical digestion is mentioned and both hormones mentioned with their roles in homeostasis.	1

TOTAL SECTION C: (20)
GRAND TOTAL: 150