



**FACULTY OF SCIENCE: BOTANY AND PLANT BIOTECHNOLOGY**  
**LSFT0B1 EXAM (UNIT 1-6)**  
**NOVEMBER 2017**

**ASSESSOR:** Ms E PRETORIUS  
**INTERNAL MODERATOR** Dr A NEL  
**DURATION:** 3 HOURS  
**TOTAL MARKS:** 150

**NUMBER OF PAGES: 9 PAGES**

**Please read the following instructions carefully:**

1. Answer all the questions in the question paper.
2. Answer question 1 in CAPITAL LETTERS.
3. ALL of the questions in the test book.
4. Work neatly.
5. Read your questions carefully.
6. Good Luck.

**QUESTION 1**

[18]

**Choose the alternative that best completes the statement or answers the question. Only write down the correct CAPITAL letter next to the appropriate question number.**

1.1 The name of the enzyme digesting proteins, present in gastric juice is called, \_\_\_\_\_.

- |            |            |
|------------|------------|
| A. pepsin  | B. trypsin |
| C. amylase | D. lipase  |

1.2 The \_\_\_\_\_ conducts the chewed bolus of food from the pharynx to the stomach.

- |              |              |
|--------------|--------------|
| A. trachea   | B. esophagus |
| C. intestine | D. glottis   |

1.3 The accessory organs of digestion are \_\_\_\_\_.

- |                                     |                           |
|-------------------------------------|---------------------------|
| A. pancreas and liver               | B. stomach and duodenum   |
| C. pancreas, liver, and gallbladder | D. esophagus and duodenum |

- 1.4 How many times does the Krebs cycle turn per glucose molecule?
- A. Once.  
C. **Twice.**  
B. Three times.  
D. Five times.
- 1.5 Which of the following molecules is NOT formed as a result of the Krebs cycle during aerobic cellular respiration?
- A. Carbon dioxide  
C. ATP  
B. **Water.**  
D. FADH<sub>2</sub>
- 1.6 Which molecule is the final acceptor of electrons at the end of the electron transport system in aerobic cellular respiration?
- A. **Oxygen.**  
C. Carbon dioxide.  
B. Citrate.  
D. Pyruvate.
- 1.7 How is the bulk of carbon dioxide carried in blood?
- A. Chemically combined with the amino acids of hemoglobin as carbaminohemoglobin in the red blood cells.  
C. **As the bicarbonate ion in the plasma after first entering the red blood cells.**  
B. As carbonic acid in the plasma.  
D. Chemically combined with the heme portion of hemoglobin.
- 1.8 Which of the following provide the greatest surface area for gas exchange?
- A. Alveolar sacs.  
C. **Alveoli.**  
B. Respiratory bronchioles.  
D. Alveolar ducts.
- 1.9 Which of the choices below is not a factor that promotes oxygen binding to and dissociation from hemoglobin?
- A. Partial pressure of oxygen.  
C. Temperature.  
B. Partial pressure of carbon dioxide.  
D. **Number of red blood cells.**
- 1.10 Which biome is characterized by a layer of permafrost?
- a) Taiga.  
b) Savanna.  
c) Karoo.  
d) **Tundra.**
- 1.11 Biodiversity is greatest in which biome?
- a) Tundra.  
b) Grassland.  
c) **Tropical rainforest.**  
d) Dessert.
- 1.12 In which biome of Africa would you find lions, giraffes, and elephants?
- a) Dessert.  
b) Karoo.  
c) **Savanna.**  
d) Rainforest.
- 1.13 The phylum name to which humans belongs is
- a) megaloptera  
b) hominidae  
c) **chordata**  
d) mammalia
- 1.14 Number of kingdoms in which organisms are divided are
- a) **five.**  
b) seven.  
c) six.  
d) four.
- 1.15 Which one (1) of the following definitions covers the greater number of organisms?

- a) Class.
- b) Genus.

- c) Order.
- d) Family.

1.16 The earliest cellular life forms appear to have been

- a) viruses.
- b) bacteria.
- c) one-celled animals.
- d) one-celled plants.

1.17 What caused the change in the different era's and periods on the geological timescale?

- a) Climate change.
- b) Geological time.
- c) Increased levels of carbon dioxide.
- d) All of the above.

1.18 Geological time scale is divided into different scales namely:

- a) Eon
- b) Era
- c) Epochs
- d) All of the above

## QUESTION 2

[18]

Give the correct biological term for each of the following statements. **Only write down the correct term next to the appropriate question number on the answer sheet.**

2.1 The name given to the solid food ball which passes down the oesophagus.

**Bolus**

2.2 The breakdown of excess amino acids in the liver.

**Deamination**

2.3 The ring of muscle which control the opening between the oesophagus and stomach.

**Cardiac valve / sphincter**

2.4 The proteins involved in oxidative phosphorylation.

**Cytochromes.**

2.5 The phase of cellular respiration whereby each six (6) Carbon molecule is turned into two (2) three (3) Carbon molecules.

**Glycolysis**

2.6 A molecule that is used by the body to provide energy in a living cell for various metabolic processes.

**Glucose**

2.7 The type of microscopic hairs found in the lining of the trachea.

**Cilia.**

2.8 The type of molecule that most carbon dioxide is transported throughout the body.

**Bicarbonate ions.**

2.9 The nerve carrying the impulse to the intercostal muscles to contract/relax.

**Intercostal nerve.**

2.10 The study of the interaction between organisms and the environment to ensure survival and reproduction

**Ecology.**

2.11 Pyramids that have more herbivores than producers.

**Inverted pyramid.**

2.12 The process during which some flowers open in high light intensity and some close in high light intensity.

**Floral initiation.**

2.13 The taxonomic rank that includes the level of family.

**Order.**

2.14 The kingdom to which multi cellular terrestrial organisms with chlorophyll belongs to.

**Plantae.**

2.15 Organisms in which the cells do not have a true nucleus, for example bacteria.

**Prokaryote**

2.16 Living fossil of the group that is ancestral to amphibians.

**Coelacanth.**

2.17 Fossilized bacteria.

**Stromatolites**

2.18 The Missing link between dinosaurs and birds.

**Archaeopteryx.****QUESTION 3****[12]**

Provide a short definition for each of the following:

3.1 Ileocaecal valve

A ring of muscle which control the opening between ileum and the colon.

3.2 Epiglottis

The flap-like structure that prevents food from entering the trachea.

3.3 Fermentation

The type of anaerobic respiration that occurs in yeast cells.

3.4 ATP

The chemical energy that is needed immediately for functions to take place in cells.

3.5 Phrenic nerve

The nerve carrying impulse from respiratory center to diaphragm to contract/relax.

3.6 Spirometer

The instrument used to determine how much air enters the lungs.

3.7 Biotic organisms

Living organisms, including animals, plants, fungi, bacteria, viruses ect.

3.8 Ecosystem

A biological community together with the abiotic environment, characterized by the flow of energy and the cycling of inorganic nutrients.

3.9 Biodiversity

Total number of species found in an area.

3.10 Biodegradable

Substances that can be broken down by these decomposers, which replace the useful elements back into the soil for plants to grow.

3.11 *Piece de resistance.*

*Australopithecus africanus* Mrs Ples (now believed to be a *Mister Ples*).

3.12 The law of superposition.

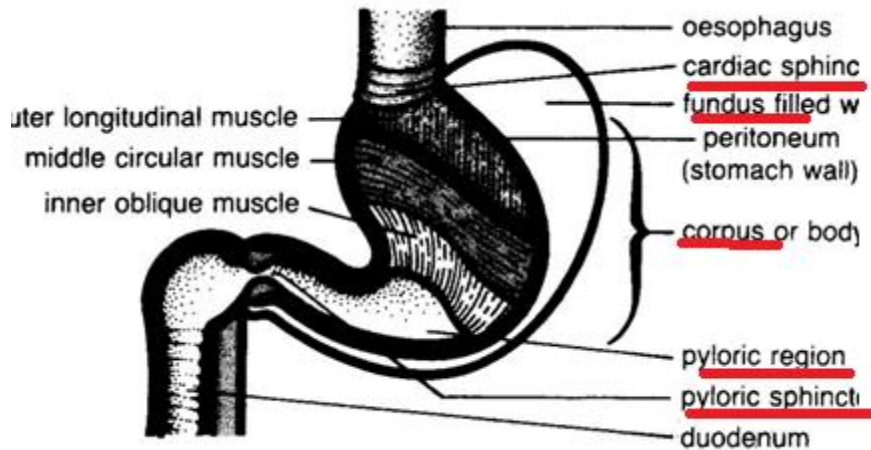
This law states that the older layer lies underneath the younger layer in undisturbed contexts.

#### QUESTION 4

[19]

4.1.1 Use a diagram to illustrate the different sections and both (2) valves of the organ where gastric juice is found? (6)

Cardiac sphincter/valve, fundus, corpus, pylorus (pyloric region), pyloric sphincter/valve.



4.1.3 Discuss the method of fat absorption from the sections mentioned in 4.1.1. (6 x ½ = 3)

- Fatty acids (insoluble) (½) combine with bile salts (½)
- To form fatty acid-bile salt complex which is (soluble) in water. (½)
- This complex plus glycerol (½) component of fat → absorbed by columnar epithelial cells of villi.
- Inside villus → fatty acids freed from the bile salts (½) & recombine with glycerol to form tiny fat globules. (½)

4.2 Discuss the process of deamination and provide the organ responsible for this process. (7)

Liver breaks down surplus amino acids ✓ through process of deamination.

Change amino acid into ammonia. ✓

2 x ammonia molecules ✓ combine with 1 molecule of CO<sub>2</sub> ✓ to form urea ✓ & water. ✓

Urea conveyed to kidneys for excretion. ✓

4.3 Provide three (3) adaptations of the small intestine for absorption of nutrients. (3)

Any 3:

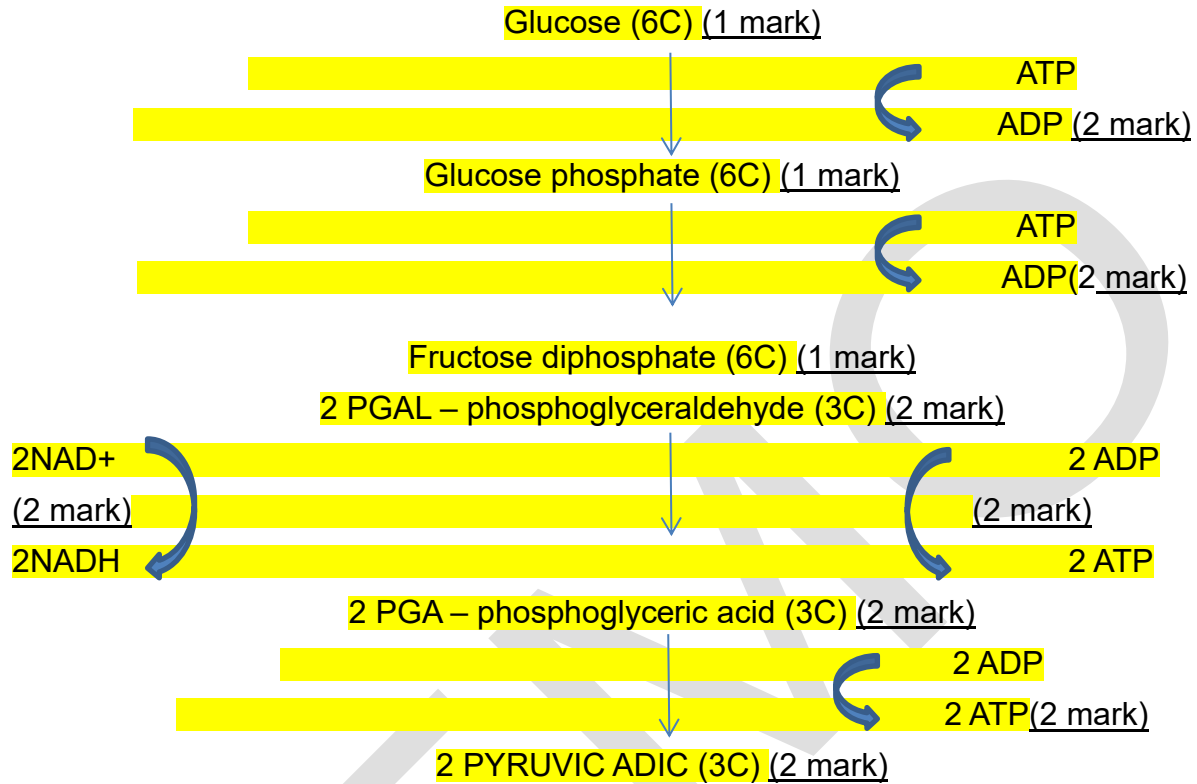
- The absorptive surface area is increased by:
  - The great length of the small intestine (6-7m)
  - The circular folds of the mucosa lining of the small intestine.
  - The millions of villi lining the folds.
- The chyme is pushed along very slowly through the small intestine, allowing time for absorption to take place.

**QUESTION 5****[17]**

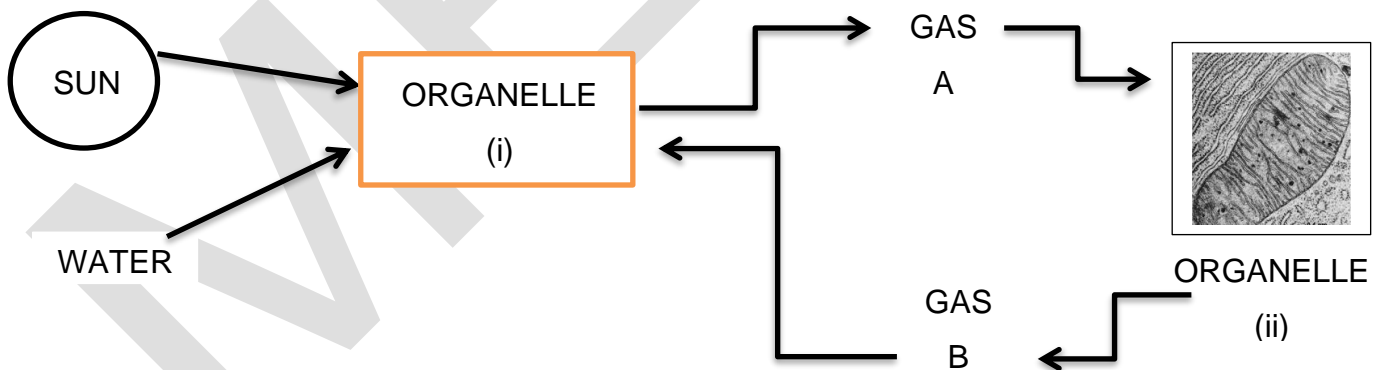
5.1 Provide the diagrammatic representation of the first phase of cellular respiration **AND STATE WHERE IN THE CELL DOES THIS PHASE TAKE PLACE.**

Cytoplasm of plant/animal cells.

(20 x ½ = 10)



5.2 Two (2) organelles in the green parts of plants are responsible for different but closely related processes. Study the diagram below and then answer the questions that follow.



5.2.1 Name the organelles marked (i) and (ii) in the diagram above.

(2)

(i) – Chloroplast and (ii) – Mitochondrion

5.2.2 Name the gases indicated by (A) and (B) in the diagram above.

(2)

(A) – Oxygen and (B) – Carbon dioxide

5.2.3 Name the processes that takes place in organelle (i) and organelle (ii) respectively.

(2)

(i) – Photosynthesis and (ii) – Cellular respiration

5.2.4 How many end product molecules will be formed during the process in organelle (ii)?

(1)

34-38 Energy (ATP molecules)

**QUESTION 6****[17]**

6.1 Discuss the function of the respiratory center. (8)

Respiratory center = Medulla oblongata ✓ → controls breathing. ✓

Respiratory center sends impulse through phrenic nerve ✓ → diaphragm ✓ to contract / relax. ✓

Respiratory center sends impulse through intercostal nerve ✓ → intercostal muscles ✓ to contract / relax. ✓

6.2 Provide a detailed discussion on how carbon dioxide is transported through the blood. (7)

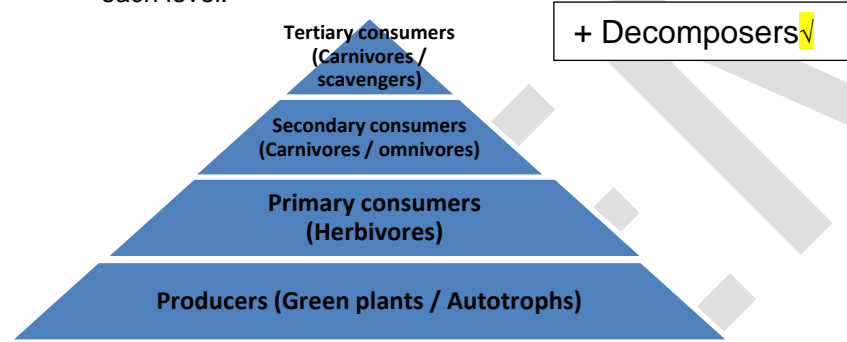
- Most CO<sub>2</sub> is transported as bicarbonate ions ✓ (HCO<sub>3</sub><sup>-</sup>) ✓
- CO<sub>2</sub> binds with water to form carbonic acid ✓ (H<sub>2</sub>CO<sub>3</sub>) ✓
- Then carbonic acid dissociates to form hydrogen and bicarbonate ions. ✓
- A small amount of carbon dioxide is transported by the Hemoglobin molecules (carbaminohemoglobin HbCO<sub>2</sub>). ✓

6.3 What is emphysema and what is the main cause of this specific disease? (2)

- Alveoli burst and fuse into enlarged air spaces. – Surface area for gas exchange is reduced. ✓
- Smoking cigarettes. ✓

**QUESTION 7****[17]**

7.1 Make use of a pyramid to explain the different trophic levels and state what type of animals can be found at each level. (8 x ½ + 1 = 5)



7.2 Discuss the flow of energy taking place in an ecosystem. (6)

- Energy flow begins when producers absorb solar energy for the process of photosynthesis. ✓
- Energy flows through an ecosystem via photosynthesis because as organic nutrients pass from one component of the ecosystem to another, such as when an herbivore eats a plant or a carnivore eats an herbivore, only a portion of the original amount of energy is transferred. ✓
- Eventually the energy dissipates into the environment as heat. ✓
- Only about 10% of the food energy taken in by an herbivore is passed on to carnivores. ✓
- A large portion goes to detritus feeders (decomposers) via defecation, excretion and death, and a large portion is used for cellular respiration. (✓✓)

7.3 Provide three (3) examples of how animals are adapted to temperature changes. (6)

1. **Body covering:** Thick fur, feathers & layers of body fat □ help mammals / birds to keep warm. ✓
2. **Migration of birds:** some birds fly to warmer parts of world during the cold months. ✓
3. **Aestivation:** During the hot dry summer months (summer sleep). ✓

**QUESTION 8****[15]**

8.1 The following names of some southern African organism are correctly spelt. However, some of the names have mistakes in the way that they are typed.

8.1.1 Decide which names need to be rewritten to follow the correct pattern of the binomial system.

**Write down only the correctly written name next to the original wrong name.**

(4)

*Panthera Leo* (Lion)  
*Rhinoceros unicornis* (Rhino)  
*Homo sapiens* (Human)  
*Hieraatus Spilogaster* (Eagle)  
*struthio Camelus* (Ostrich)  
*Solanum tuberosum* (Potato)  
*Daucus carota* (Carrot)

<b>WRONG</b>	<b>CORRECT (must be underlined, Genus start with capital, species, lower case letter.)</b>
<i>Panthera Leo</i>	<i>Panthera leo</i>
<i>Rhinoceros unicornis</i>	<i>Rhinoceros unicornis</i>
<i>struthio Camelus</i>	<i>Struthio camelus</i>
<i>Solanum tuberosum</i>	<i>Solanum tuberosum</i>

8.1.2 What is the correct pattern to write a scientific name in?

(3)

Genus name begins with capital letter

Species name begins with lower case letter.

Both names are always italicized (typed) or underlined (written)

8.2 Write down an example of each of the following terms.

(5)

- 8.2.1 Monera Bacteria  
 8.2.2 Plantae Any plant  
 8.2.3 Protista Amoeba, Euglena  
 8.2.4 Anamalia Any animal  
 8.2.5 Fungi Yeast

8.3 What was each of the following scientist's contribution to the modern classification system?

(3)

8.3.1 Ernest Haeckel.

Proposed adding a third kingdom = Protista

8.3.2 Robert H. Whittaker.

Whittaker proposed five kingdoms.

8.3.3 Aristotle.

Formulated 2 kingdom system = Plantae & Animalia.

**QUESTION 9****[17]**

9.1.1 Discuss relative dating of fossils.

(5)

- The science determining the relative order of past events, ✓ without necessarily determining their absolute age. ✓
- Determines which fossils are older or younger. ✓
- Easy to determine based on which geological deposit they come from ✓ and the Law of Superposition ✓

9.1.2 Name one (1) other process that could be used to determine the date of fossils.

(1)

Absolute dating. ✓

9.2 Explain the law of superposition.

(4)

Older layer lies ✓ underneath the younger layer in undisturbed contexts. ✓

Deeper layers are older ✓ than fossils from layers closer to the surface of the earth. ✓



9.2 Identify the different scales that the Geological time scale is divided into. (1)

If all four is listed – one mark.

Eon, Era, Periods, Epochs.

9.5 Discuss Sterkfontein's first piece de resistance: the *Australopithecus africanus* (6)

- Mrs Ples ✓ (now believed to be a Mister Ples), ✓
- dating back 2.5-million years ✓, found by Robert Broom in 1947. ✓
- The fossil provided proof that *Australopithecus* could be classified as a member of the Hominidae ✓ (the family of humans) and
- established Africa as the Cradle of Humankind. ✓

**TOTAL 150**