

**PROPOSED GUIDE TO S.4 BIOLOGY TEST****MILLENIUM SCIENCE CAFE****S.4 BIOLOGY DECEMBER ASSESSMENT TEST ONE 2022**

TIME: 90 MINUTES

INSTRUCTIONS: Attempt all questions.

**SECTION A**

1. The chamber of the herbivore stomach from which food is returned to the mouth for re-chewing is called

A. Omasum      B. Abomasum      C. Rumen      D. Reticulum

C

2. In a certain organism the bile duct was blocked so that the flow of bile was cut off. Which of the following would happen as a result of the above?

A. Storage of glycogen in the liver would not be possible  
 B. The hepatic portal vein would no longer carry food  
 C. Digestion of fats and oils would not proceed normally  
 D. The absorption of digested food would be decreased.

C

3. The table below shows a student's results in an experiment to determine the amount of ascorbic acid.

Contents in four different fruit juices F, G, H and I using 0.15% DCPIP

Fruit juice	% Ascorbic acid	No. of drops needed to decolorize cm <sup>3</sup> of DCPIP
F	0.20	21
G	0.60	7
H	N	30
I	0.30	14

C

From the results, what is the ascorbic acid content of fruit juice H given as n?

A. 0.36%      B. 2.57%      C. 0.14%      D. 0.63%

4. Although saliva is swallowed together with food, digestion of starch which is started in the mouth does not continue in the stomach for long. This is because

A. In the stomach there is mostly absorption of food  
 B. The temperature of the stomach is not suitable for action of enzymes in the saliva.  
 C. Gastric juice in the stomach deactivate the enzymes in the saliva  
 D. In the stomach there is only churning of food and digestion.

C

5. A healthy potted bean plant was kept in a dark room for about 48 hours with one of its leaves partly enclosed in a flask containing sodium hydroxide. Then the whole plant was left in bright sunlight for a few hours. The leaf which was partly enclosed in the flask was tested for starch. the colour of the part of leaf enclosed within the flask was

A. Blue-black      B. Green      C. Colourless      D. Yellow-brown

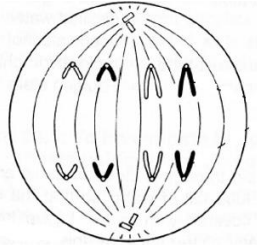
D

6. A man's urine gave a positive test with Benedict's solution. What is the best deduction about this man?

A. He had been eating a lot of sugar  
 B. There was too much insulin in his blood  
 C. He was suffering from diabetes

C

- D. There was too much glycogen in his blood
7. Lack of calcium in the human diet causes
- A. Anaemia                      B. Goiter                      C. Scurvy                      D. Rickets
8. Which one of the following human characteristics exhibits discontinuous variation?
- A. Height                      B. Blood groups                      C. Weight                      D. Skin colour
9. What stage of cell division is represented in the figure 2 below?



- A. Anaphase
- B. Prophase
- C. Metaphase
- D. Telophase

10. When preparing to test for starch in a leaf, the leaf is boiled in alcohol in order to
- A. Burst chloroplasts
- B. Remove coloured material in a leaf
- C. Quicken the reactions of starch with Iodine.
- D. Soften the leaf
11. Which one of the following statements is **NOT** correct about photosynthesis?
- A. Water is required
- B. Sugar is produced
- C. oxygen is a by-product
- D. Carbon dioxide is produced
12. The hardest part of the tooth is;
- A. Enamel                      B. Dentine                      C. Pulp cavity                      D. Gum
13. What is the main function of the phloem in green plants?
- A. Transporting water.
- B. Supporting the plant.
- C. Transporting mineral salts.
- D. Transporting manufactured food.
14. Photosynthesis is said to have a pair of raw materials, a pair of conditions and a pair of products. Which of those is the correct set?
- A. Carbon dioxide and light, oxygen and sugar, water and chlorophyll
- B. Water and Carbon dioxide, light and Chlorophyll, Oxygen and Sugars
- C. Water and light, Carbon dioxide and Chlorophyll, sugars and oxygen.
- D. Sugars and chlorophyll, water and oxygen, Carbon dioxide and Light.
15. Which one of the following is the correct sequence of events that occur during mitosis?
- A. Prophase, metaphase, anaphase and telophase.
- B. Prophase, anaphase, metaphase and telophase.
- C. Metaphase, anaphase, telophase and prophase.
- D. Telophase, anaphase, metaphase and prophase.

## SECTION B

### 1. (a) What you understand by the terms:

#### (i) Continuous variation

(01 mark)

*It is a type of variation where there are intermediates and no clear cut in a character possessed by organisms of the same species ✓.*

**(ii) Discontinuous variation****(01 mark)**

It is a type of variation where there is clear cut and no intermediates in a character possessed by organisms of the same species ✓.

**(iii) Meiosis****(01 mark)**

It is the process by which a cell divides giving rise to four daughter cells each containing half the number of chromosomes for that of the parent cell ✓.

**(iv) Mitosis****(01 mark)**

It is the process by which a cell divides giving rise to two daughter cells each containing the same number of chromosomes as the parent cell. ✓

**(b) Where do meiosis and mitosis occur?****(02 marks)**

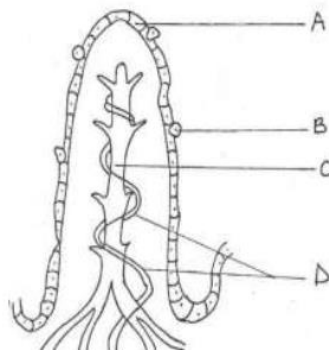
	<b>Mitosis</b>	<b>Meiosis</b>
<i>In plants</i>	<i>Meristematic cells</i> ✓	<i>Anthers</i> ✓ <i>and Ovaries</i> ✓ (gamete-producing cells)
<i>In animals</i>	<i>Somatic cells</i> ✓	<i>Testes</i> ✓ <i>and ovaries</i> ✓ (gamete-producing cells)

**(c) Give two examples of characters which exhibit;****(i) Continuous variation****(02 marks)**

*Body height* ✓, *Body size* ✓, *Skin colour* ✓, *Body mass* ✓,

**(ii) Discontinuous variation****(02 marks)**

*Eye colour* ✓, *Blood groups* ✓, *Tongue rolling* ✓, *Sex* ✓

**2. The diagram below shows the structure of a villus. Use it to answer the question that follow.****(a) Name the parts labeled A-D****(02 marks)**

**A** Epithelial cell ✓    **B** Goblet cell (Mucus secreting cell) ✓    **C** Lacteal ✓    **D** Blood capillary ✓

**(b) What food substance enter****(02 marks)**

**(i)** **A?** Amino acids, ✓ Glucose ✓, Vitamins ✓, Water ✓, Fructose ✓, Galactose ✓, Mineral ions ✓

**(ii)** **C?** Fatty acids ✓ & Glycerol ✓

**(c) State two factors that make a villus an effective absorbing structure.****(02 marks)**

- Has a lacteal for absorption of lipids (fatty acids & Glycerol) into the lymphatic system ✓
- Has a dense network of blood capillary to carry away the absorbed food. ✓
- Has thin epithelium to shorten the diffusion distance for faster absorption of food ✓
- Has Goblet cells which secrete mucus which reduces friction and allows smooth flow of digested food during absorption. ✓
- Has numerous mitochondria to provide enough energy needed for the active absorption of some food materials into bloodstream. ✓

(d) Give the blood vessel into which structure b (i) carries its contents

(01 mark)

Hepatic portal vein. ✓

(e) Which part of the alimentary canal has the highest number of the structure above?(01 mk)

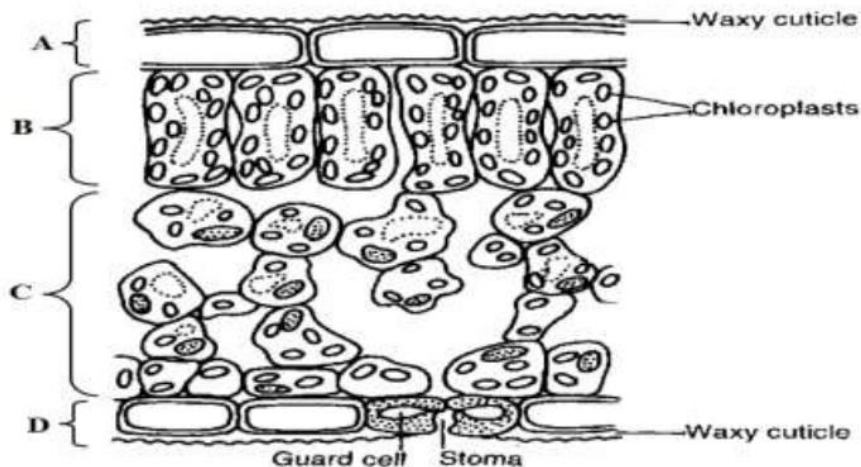
Ileum ✓

(f) State four adaptations of the part of the alimentary canal in the figure above to its functions.

(04 marks)

- Has a lacteal for absorption of lipids into the lymphatic system ✓
- Has a dense network of blood capillary to carry away the absorbed food ✓
- Has thin epithelium to shorten the diffusion distance for faster absorption of food ✓
- Has Goblet cells which secrete mucus which reduces friction. ✓
- Has numerous villi to increase surface area for maximum and faster absorption of digested food. ✓
- Has highly folded membranes to provide a larger surface area for maximum absorption of digested food. ✓
- Has numerous mitochondria to provide enough energy needed for the active absorption of some food materials into bloodstream. ✓

3. The diagram below shows a cross section of a typical leaf



(a) Name the layer labeled A to D

(02 marks)

A Upper epidermis/ upper epidermal layer ✓

C Spongy mesophyll layer ✓

B Palisade mesophyll layer ✓

D Lower epidermis/Lower epidermal layer ✓

(b) Which of these layers has the highest rate of photosynthesis? Give a reason for your answer.

(02 marks)

*Layer B (Palisade mesophyll layer) ✓*

**Reason :** *Cells in Layer B have numerous chloroplasts ✓*

(c) **Give three differences between layers B and C.** (03 marks)

Layer b	Layer c
<i>Has regularly shaped cells</i>	<i>Has irregularly shaped cells ✓</i>
<i>The cells are tightly packed together</i>	<i>The cells are loosely packed together ✓</i>
<i>Cells have relatively many chloroplasts</i>	<i>Cells have relatively few chloroplasts ✓</i>
<i>Has little &amp; smaller air spaces</i>	<i>Has many &amp; larger air spaces ✓</i>

(d) **Using evidence from the diagram, describe how the structure of a leaf is suited for photosynthesis.** (04 marks)

- ✓ *Has palisade mesophyll cells which are closely packed together to provide a large surface area for maximum sunlight absorption ✓*
- ✓ *Has a pair of Guard cells which control the opening and closure of the stoma allowing entry and exist of gases in and out of the leaf ✓*
- ✓ *The palisade and spongy mesophyll cells have numerous chloroplasts containing a lot of chlorophyll for maximum sunlight absorption ✓*
- ✓ *The spongy mesophyll cells are loosely packed together with numerous large air spaces for maximum exchange of gases (oxygen and Carbon dioxide) in & of the cells ✓*
- ✓ *Has a stoma in the lower epidermis, an opening through which gases enter and leave the leaf ✓*
- ✓ *Has a waxy cuticle which is water proof to prevent water loss from the leaf by transpiration ✓*

(e) **What is the importance of wax on layer (a)?** (01 mark)

*Prevents water loss from the leaf by transpiration ✓*

4. (a) **What is transpiration?** (01 mark)

*This the process by which plants loss water inform water vapour mainly through the leaves to the atmosphere. ✓*

(b) **State any four factors affecting the rate of transpiration.** (02 marks)

- |   |  |
|---|--|
| <i>Light intensity ✓</i>                | <i>Number of stomata on a leaf ✓</i>   |
| <i>Temperature ✓</i>                    | <i>Leaf size ✓</i>                     |
| <i>Humidity ✓</i>                       | <i>Number of leaves on a plant ✓</i>   |
| <i>Atmospheric pressure ✓</i>           | <i>Thickness of the waxy cuticle ✓</i> |
| <i>Air movement (windy/still air) ✓</i> |  |

(c) **Give two advantages and 2 disadvantages of transpiration to plants?** (04 marks)

#### Advantages

- ✓ *Cools the plants ✓*
- ✓ *Facilitates absorption of water by the plant roots from the soil ✓*
- ✓ *Facilitates uptake of water from the roots to the leaves ✓*
- ✓ *Results into turgidity of herbaceous plants thus providing support ✓*

**Disadvantages**

- *Wilting* ✓
- *Drying up of the plant* ✓
- *Death of the plants* ✓

**(d) Describe the adaptations of Xerophytes to living in extremely dry conditions (05 marks)**

- ✓ *Thick waxy cuticle that is water proof to prevent water loss from the leaves* ✓
- ✓ *Have their leaves reduced into spines to reduce the surface area over which transpiration occurs* ✓
- ✓ *Some plants roll their leaves to reduce the surface area over which transpiration occurs thus reducing transpiration* ✓
- ✓ *Their leaves have fewer stomata on the upper surface and many on the lower surface to reduce on the water loss by transpiration* ✓
- ✓ *Some have reversed stomatal rhythm of opening & closure (i.e they open their stomata at night and close them during day) to reduce water loss by transpiration* ✓
- ✓ *Some plant leaves have hairy lamina to reduce water loss by transpiration* ✓
- ✓ *Some plants shed off their leaves so as to reduce the surface area over which transpiration occurs* ✓

**END!!!!**

***“What men have done, men can do”***