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Anglo - Chinese School
(Independent)



FINAL EXAMINATION 2023
YEAR TWO IP/SBGE

LIFE SCIENCES

Thurs 5 Oct 2023

1 hour 30 minutes

Additional material: Multiple Choice Answer Sheet
Soft pencil & eraser

READ THESE INSTRUCTIONS FIRST

Write your index number in the space provided at the top of the Question Paper.

Section A

Answer **all** questions on the Multiple Choice Answer Sheet (OTAS) provided.
Write and shade your index number on the Answer Sheet in the spaces provided.

Section B & Section C

Answer **all** questions in the spaces provided on the Question Paper.

At the end of the examination, submit the Multiple Choice Answer Sheet and the Question Paper **separately**.

INFORMATION FOR STUDENTS

Electronic calculators may be used.
The intended number of marks is given in brackets [] at the end of each question or part question.

Name of Parent / Guardian: _____

Signature & Date: _____

FOR EXAMINER'S USE	
Section A	/ 30
Section B	/ 30
Section C	/ 20
Total	/ 80

Section A (30 marks)

Answer **all** the questions on the Multiple Choice Answer Sheet (OTAS) provided.

1. **Figure 1** illustrates (a) the formation of a normal binding (b) a competitive inhibition of a substrate-enzyme reaction.

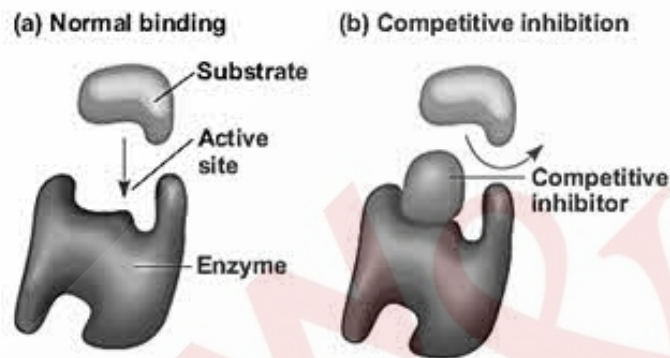


Figure 1

Which of the following statements is a **false** description of the processes shown in **Figure 1**?

- A. In normal binding, the substrate fits into the active site of the enzyme.
B. In normal binding, the substrate forms an enzyme-substrate complex.
C. In competitive inhibition, the inhibitor blocks the enzyme at the active site.
D. In competitive inhibition, the inhibitor does not fit into any part of the active site.
2. **Figure 2** shows the various modes of cellular transport through a cell membrane.

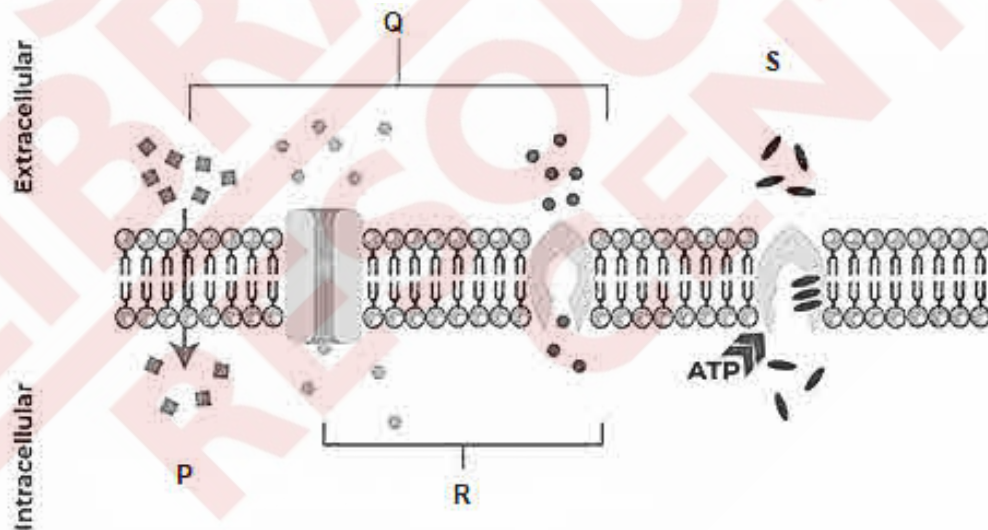


Figure 2

Which one of the following **accurately** identifies the various modes of cellular transport illustrated in **Figure 2** ?

	P	Q	R	S
A	Active Transport	Passive Transport	Simple Diffusion	Facilitated Diffusion
B	Facilitated Diffusion	Active Transport	Passive Transport	Simple Diffusion
C	Simple Diffusion	Facilitated Diffusion	Active Transport	Passive Transport
D	Simple Diffusion	Passive Transport	Facilitated Diffusion	Active Transport

3. Root hair cells are able to absorb substances from the soil via the various modes of cellular transport. Which of the following statements is **true**?
- A. Nitrates are absorbed through active transport.
 - B. Oxygen is absorbed through osmosis.
 - C. Phosphates are absorbed through diffusion.
 - D. Water is absorbed through active transport.

For questions **4** and **5**, refer to the information below.

An investigation was conducted to find out the effects of using a particular fertilizer on the number of leaves grown by plants. The fertilizer only contained nitrates and potassium salts. Plants in **Group 1** were grown in soil with the fertilizer, whereas those in **Group 2** were grown in soil without any fertilizer.

The results of the investigation are shown in **Figure 3** below.

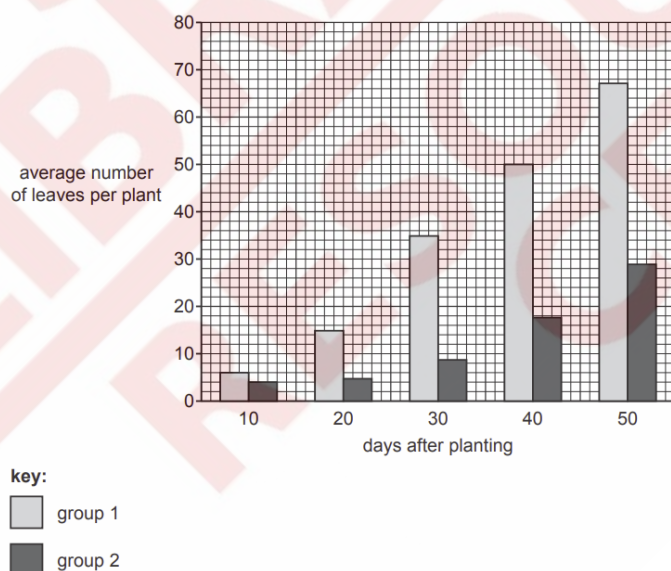


Figure 3

4. What deficiency symptom would the leaves of plants in **Group 1** show even though they were given the fertilizer mentioned above ?
- A. Burned margins and purplish veins
 - B. Interveinal chlorosis
 - C. Light green / yellow leaves
 - D. Older leaves appear black
5. Plants in **Group 2** have spindly, yellow stems and they exhibit stunted growth. Which one of the following can be added to the soil for **Group 2** plants to reduce these deficiency symptoms?
- A. Boron
 - B. Chloride
 - C. Nitrate
 - D. Phosphate

For Questions 6 & 7, refer to **Figure 4**.

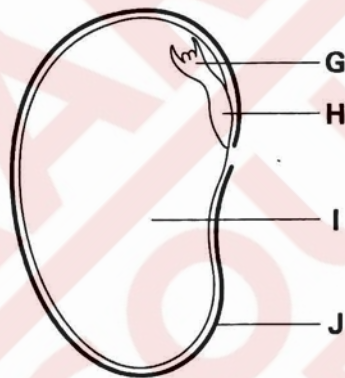


Figure 4

6. Which of the following options **correctly** states what happens when the seed shown in **Figure 4** was soaked in water for a suitable duration in preparation for germination?
- I. Food stored in part **I** dissolved in water.
 - II. Parts **G** and **H** could not grow after being soaked in water.
 - III. Part **J** was softened and fell off the seed.
 - IV. The seed should have been kept dry for successful germination.
- A. I & II only.
 - B. I & III only.
 - C. I, II & III only.
 - D. I, II, III & IV.

7. If conditions had been ideal for germination, which of the following statements is **incorrect** in describing the progress of the embryo in **Figure 4** if the seed undergoes epigeal germination?
- A. **H** grows downwards into the soil.
 - B. In **G**, the epicotyl grows rapidly before the hypocotyl.
 - C. **I** is pulled out of the soil.
 - D. **I** shrinks as the seedling continues to develop.
8. **Figure 5** shows an open hydroponic system.



Figure 5

- Which of the following is the **most significant reason** if the seedling does not grow well in the set up?
- A. Instead of a sponge, the seedling should be supported by a growth medium.
 - B. There should be at least 2 seedlings in the set up, instead of only one.
 - C. The transparent container encourages algal growth in the nutrient solution.
 - D. There is no air stone in the nutrient solution.
9. Which of the following are **advantages** of the aeroponics system?
- I. The plants are not affected by diseases.
 - II. The plant roots are not waterlogged as they are well aerated.
 - III. There is no need for checking and monitoring of the system.
 - IV. It is possible to cool the solution economically for growing temperate crops.
- A. I & III only
 - B. II & IV only
 - C. I, II & III only
 - D. I, III & IV only

10. **Figure 6** shows structures found in the walls of xylem vessels.

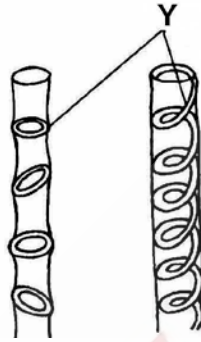


Figure 6

State the name and function of the structures labelled Y.

	name	function
A	lamina	waterproofing the walls
B	lignin	strengthening the walls
C	perforations	allowing water to flow out of the walls
D	pits	connecting to the phloem

11. **Figure 7** shows an experiment conducted on a plant.

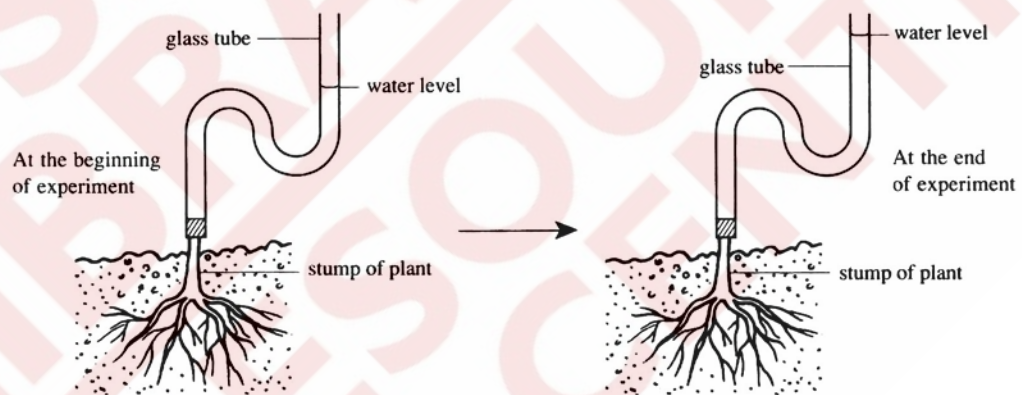


Figure 7

A healthy plant is cut off as shown, leaving only the roots and stump of the plant in the soil. The glass tube attached to the stump shows the water level at the beginning and end of the experiment. What does this experiment demonstrate?

- A. active transport
- B. capillary action
- C. root pressure
- D. transpiration

For Questions 12 & 13, refer to Figure 8.

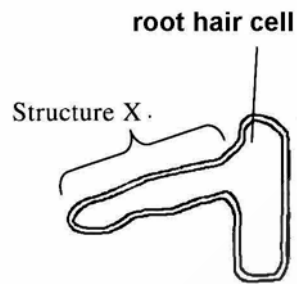


Figure 8

12. Name the structure X in Figure 8.
- A. root hair
 - B. root protrusion
 - C. root vacuole
 - D. root zone
13. Which of the following statements about the root hair cell is **incorrect**?
- A. It absorbs water and mineral salts from the soil.
 - B. It contains a large plant vacuole.
 - C. The cell sap in the vacuole has a low water potential.
 - D. The root hair cell is dead as there is no protoplasm in it.
14. Which of the following statements illustrate the importance of a double circulation in humans?
- I. Blood flows faster in the pulmonary circuit than in the systemic circuit.
 - II. Carbon dioxide diffuses efficiently into the air sacs of the lungs.
 - III. Nutrients are delivered to the body tissues quickly.
 - IV. Oxygen is delivered to the body tissues efficiently.
- A. I & II only
 - B. I & III only
 - C. II & III only
 - D. II, III & IV only

For questions **15** and **16**, refer to the photomicrograph in **Figure 9** below which shows components of human blood.

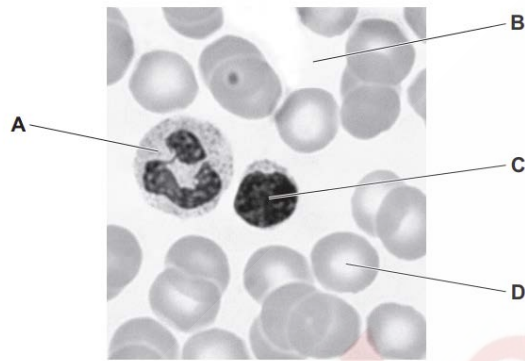


Figure 9

15. Identify component **B**.

- A. Blood
- B. Lymph
- C. Plasma
- D. Tissue fluid

16. Which of the following statements are **false** for components **A** and **C**?

They

- I. are more in numbers compared to component **D**.
- II. have a large or multilobed nucleus.
- III. help to transport antibodies in the blood.
- IV. protect the body against invasive pathogens.

- A. I & II only
- B. I & III only
- C. II & III only
- D. II & IV only

17. Which process is slower than normal in a person with very few platelets?

- A. Antibody formation
- B. Blood clotting
- C. Oxygen transport
- D. Phagocytosis

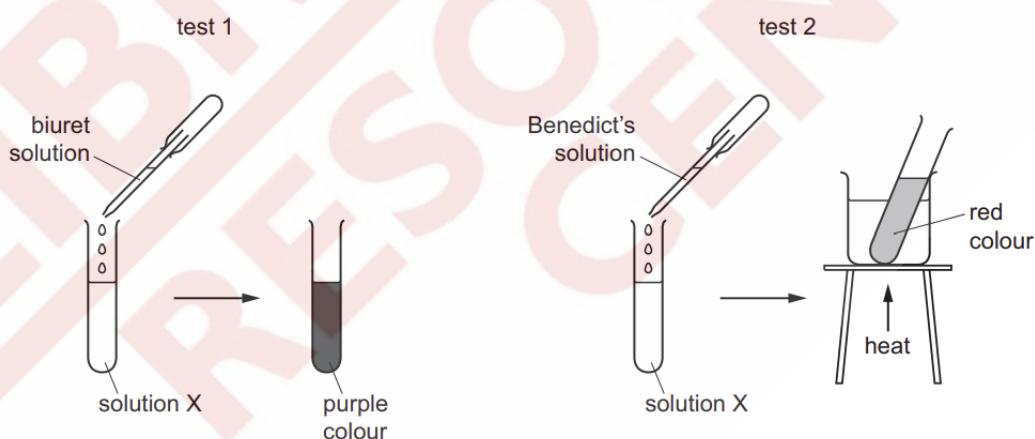
18. Which of the following is **not** an adaptation of the human red blood cell to its function?

- A. Absence of nucleus.
- B. Biconcave in shape.
- C. Presence of hemoglobin.
- D. Small in size.

19. What is the dietary importance of fibre in humans?
- For the growth and repair of cells.
 - To help food move through the intestines.
 - To maintain strong bones and teeth.
 - To provide energy.
20. Which of the following is **not** true about water?
- A medium to transport nutrients and waste.
 - Essential part of protoplasm.
 - Major constituent of digestive juices.
 - Solvent for salts and fats.
21. Which one of the following **correctly** matches the nutrients to the reasons why they are needed?

	Vitamin D	Fats
A.	Bone growth	Insulation
B.	Hemoglobin production	Transport of nutrients
C.	Insulation	Hemoglobin production
D.	Transport of nutrients	Bone growth

22. **Figure 10** below shows two food tests being carried out on solution X.



* (Note: In test 1, Biuret solution contains sodium hydroxide and a few drops of copper sulfate solution)

Figure 10

Which nutrients are present in solution X?

- proteins and starch
- proteins and reducing sugar
- reducing sugar and fats
- reducing sugar and starch

For Questions 23, 24 & 25, refer to **Figure 11** which shows part of the human digestive system.

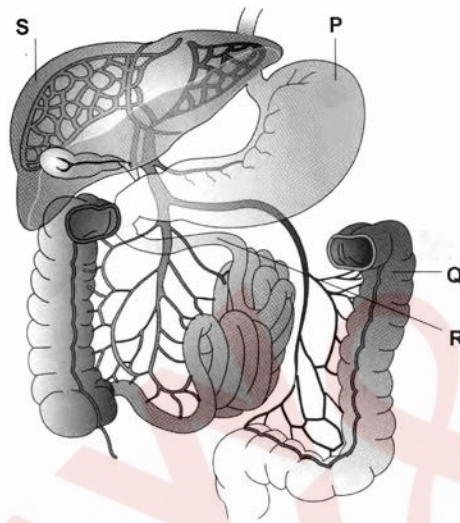


Figure 11

23. Which of the following labelled parts in **Figure 11** contains an acidic medium?
- A. P
 - B. Q
 - C. R
 - D. S
24. In which of the following labelled parts in **Figure 11** is enzymatic digestion **completed**?
- A. P
 - B. Q
 - C. R
 - D. S
25. Where is bile produced in the human body?
- A. P
 - B. Q
 - C. R
 - D. S
26. What is the final product of carbohydrate digestion in the human digestive system?
- A. amino acids
 - B. fatty acids
 - C. glycerol
 - D. simple sugars

For Questions 27 & 28, refer to **Figure 12** which shows a developing human fetus.

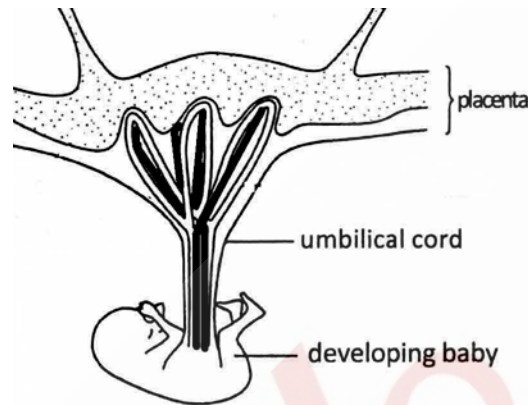


Figure 12

27. Which of the following statements about the umbilical cord is **correct**?
- A. The umbilical artery in the umbilical cord transports oxygenated blood to the fetus.
 - B. The umbilical vein in the umbilical cord transports deoxygenated blood from the fetus.
 - C. There are two umbilical arteries and one umbilical vein in the umbilical cord.
 - D. The umbilical cord is not needed once the fetus reaches six months in its development.
28. Which of the following components is **not** part of the placenta?
- A. amniotic sac
 - B. embryonic blood vessels
 - C. embryonic villi
 - D. maternal blood space
29. Which of the following is **not** a mechanical method of contraception?
- A. condom
 - B. contraceptive pill
 - C. diaphragm
 - D. intra-uterine device
30. Which of the following statements about Sexually Transmitted Infections are **true**?
- I. AIDS can be spread by blood transfusion from an infected donor.
 - II. All Sexually Transmitted Infections are caused by viruses.
 - III. Gonorrhea can cause sterility in severe cases.
 - IV. Syphilis in the early stages can be cured with penicillin.
- A. I & II only
 - B. I & III only
 - C. I, II & III only
 - D. I, III & IV only

Section A

1. D	2. D	3. A	4. D	5. C	6. B	7. B	8. C	9. B	10. B
11. C	12. A	13. D	14. D	15. C	16. B	17. B	18. D	19. B	20. D
21. A	22. B	23. A	24. C	25. D	26. D	27. C	28. A	29. B	30. D

Section B

1a. C, H, O b. $36^{\circ}\text{C}(\pm 1)$ c. Amylase denatured, unable to bind / fit with starch to be broken down to maltose/reducing sugars.

2ai. – 1.0 mm ii. greater than 0.6 mol per dm^3 but less than 0.8 mol per dm^3

b. The highest water potential gradient exists between the potato cells/tissues/cell sap of that potato cylinder and the water it is immersed in / highest water potential in water, hence more water diffuses into the potato.

3a. Nutrient Film Technique

b. To better aerate the solution as the air stone breaks up the air bubbles and enables them to dissolve faster.

c. the pump must not fail, as even a short period of the pump not functioning can cause plant death/ not suitable for plants with large tap-root systems as the roots clog up the trough and impede the flow of nutrients

4a. D: xylem E: phloem

b. X: stoma, (presence of) light

5a. Needed for the formation of intercellular substances / Necessary for maintaining healthy epithelial tissues

b. Enough/Sufficient Calcium *the question stem does not state Vit D, so can't expect that in answer!

c. Nutritional anaemia

6ai. A ii. C

(b)(i) To prevent backflow of blood from the pulmonary artery back to the right ventricle.

b)(ii) to prevent the mixing / separate flow of oxygenated and deoxygenated blood OR to enable two blood flow circuits, pulmonary and systemic circulation