

S3 Final Examination (2023-2024)

Biology

(1 hour)

Date: 11th June 2024

Time: 10:15a.m. - 11:15a.m.

Instructions to students:

1. Write your name, class and class number on both the question paper and the answer sheets.
2. Answer ALL questions.
3. Write down all the answers on the answer sheets.
4. Hand in the question paper and the answer sheets at the end of the examination.
5. The total mark of this paper is 60.

I. Multiple Choice Questions (20 marks)

1 Which of the following substances present in faeces is a product of excretion?

- A undigested food
- B unabsorbed food
- C bile pigment
- D bacteria

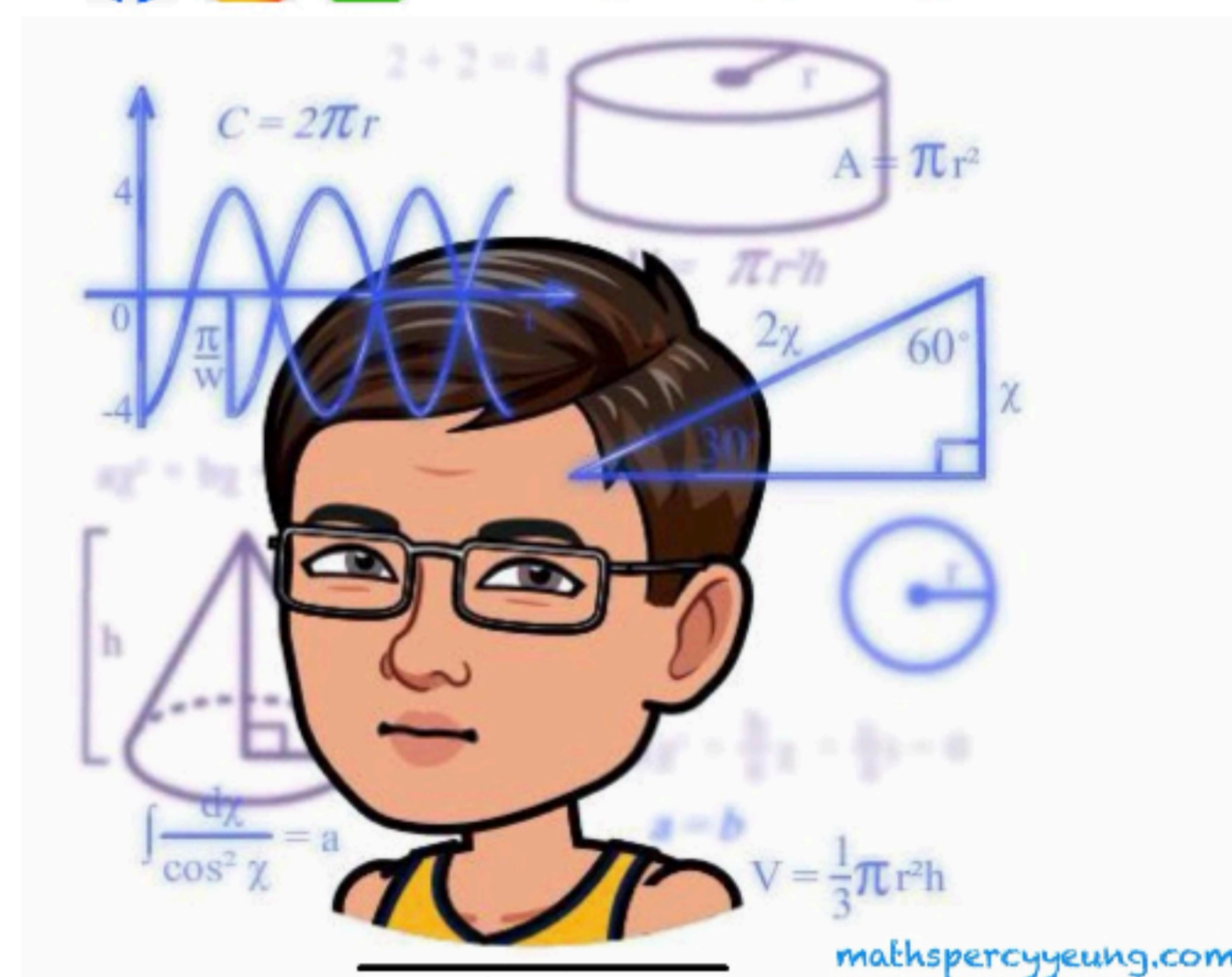
2 Photosynthesis in plants is an example of

- A nutrition.
- B respiration.
- C ingestion.
- D assimilation.

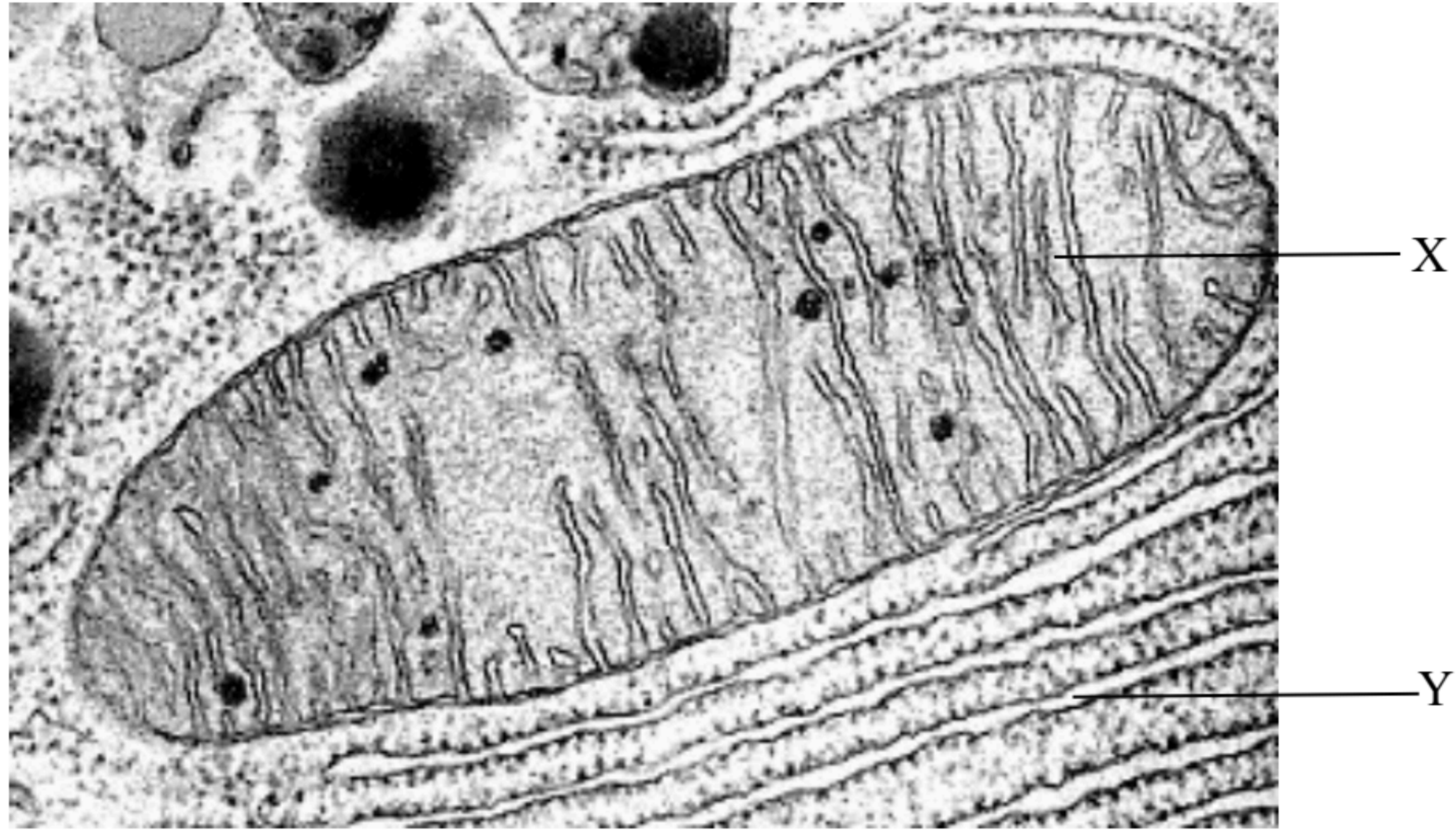
3 Which of the following statements about the cell theory is/are correct?

- (1) Some cells come from pre-existing cells and some come from inorganic materials.
- (2) The cells are the basic structural and functional unit of living organisms.
- (3) All organisms are made up of one or more cells.

- A (1) only
- B (3) only
- C (1) and (2) only
- D (2) and (3) only



Directions: Questions 4 to 6 refer to the diagram below, which shows some structure in a cell under the microscope.



- 4 What kind of microscope is used to take the above micrograph?
- A light microscope
 - B scanning electron microscope
 - C transmission electron microscope
 - D optical electron microscope
- 5 What is structure X?
- A cell
 - B mitochondrion
 - C smooth endoplasmic reticulum
 - D nucleus
- 6 What does structure Y produce?
- A amino acids
 - B DNA
 - C lipids
 - D protein

- 7 Which of the following has the highest level of body organization in the human body?
- A gastric juice
 - B enamel
 - C dentine
 - D stomach
- 8 The fine adjustment knob of a microscope can
- A adjust the brightness of the image.
 - B change the position of the specimen.
 - C adjust the focus.
 - D adjust the magnification rate.

Directions: Questions 9 and 10 refer to the following table, which shows the composition of 200 g of four kinds of food.

Food	Carbohydrate (g)	Protein (g)	Lipid (g)	Iron (mg)	Vitamin A (mg)	Vitamin C (mg)
P	30	80	30	1	0.21	0.3
Q	40	10	80	4	0.12	2.0
R	50	40	40	24	0.04	5.7
S	70	10	50	8	0.01	2.5

- 9 Which food has the highest energy value?
- A P
 - B Q
 - C R
 - D S
- 10 Deficiency of vitamin A may lead to
- (1) thickening of the cornea.
 - (2) poor vision in dim light.
 - (3) bleeding gums.
- A (2) only
 - B (1) and (2) only
 - C (1) and (3) only
 - D (2) and (3) only

- 11 Dietary fibre has no energy value to us because
- A cellulose cannot be broken down through respiration.
 - B dietary fibre is too tough to be chewed completely.
 - C cellulose has no energy value.
 - D we do not have enzymes to digest cellulose.
- 12 Which of the following is **NOT** a reducing sugar?
- A glucose
 - B galactose
 - C fructose
 - D sucrose

Directions: Questions 13 and 14 refer to the following table, which shows the daily nutritional requirements of different people.

Person	Energy (kJ)	Protein (g)	Calcium (mg)	Iron (mg)	Vitamins		
					A (μg)	C (mg)	D (μg)
P (male)	11000	80	1200	15	820	100	10
Q (male)	9000	60	800	12	800	100	10
R (female)	10000	60	1000	18	820	100	10
S (female)	8600	50	800	20	800	100	10
T (female)	12000	90	1000	25	1200	150	12

- 13 Which two are probably teenagers?
- A P and R
 - B P and S
 - C Q and R
 - D Q and S
- 14 T is probably
- A pregnant.
 - B suffering from kwashiorkor.
 - C obese.
 - D an elderly person.

15 Which of the following is a correct match of the food substance and its major food source?

	Food substance	Major food source
A	starch	milk
B	iron	beef
C	starch	butter
D	dietary fibre	cheese

16 The table below lists the dental formulae for some animals.

Animal	Dental formula
P	$\frac{3142}{3143}$
Q	$\frac{0033}{3133}$
R	$\frac{2033}{1023}$
S	$\frac{1003}{1003}$

Which of the following animals has only two canines?

- A** animal P
- B** animal Q
- C** animal R
- D** animal S

17 Which of the following is a correct match of the type of tooth and its function?

Type of tooth	Function
A canine	crushing food
B incisor	tearing flesh
C premolar	cutting food
D molar	grinding food

18 Which of the following require enzyme?

- (1) hydrolysis of starch to maltose
 - (2) condensation of amino acids to peptides
 - (3) emulsification of fat to oil droplets
- A** (1) and (2) only
 - B** (1) and (3) only
 - C** (2) and (3) only
 - D** (1), (2), and (3)

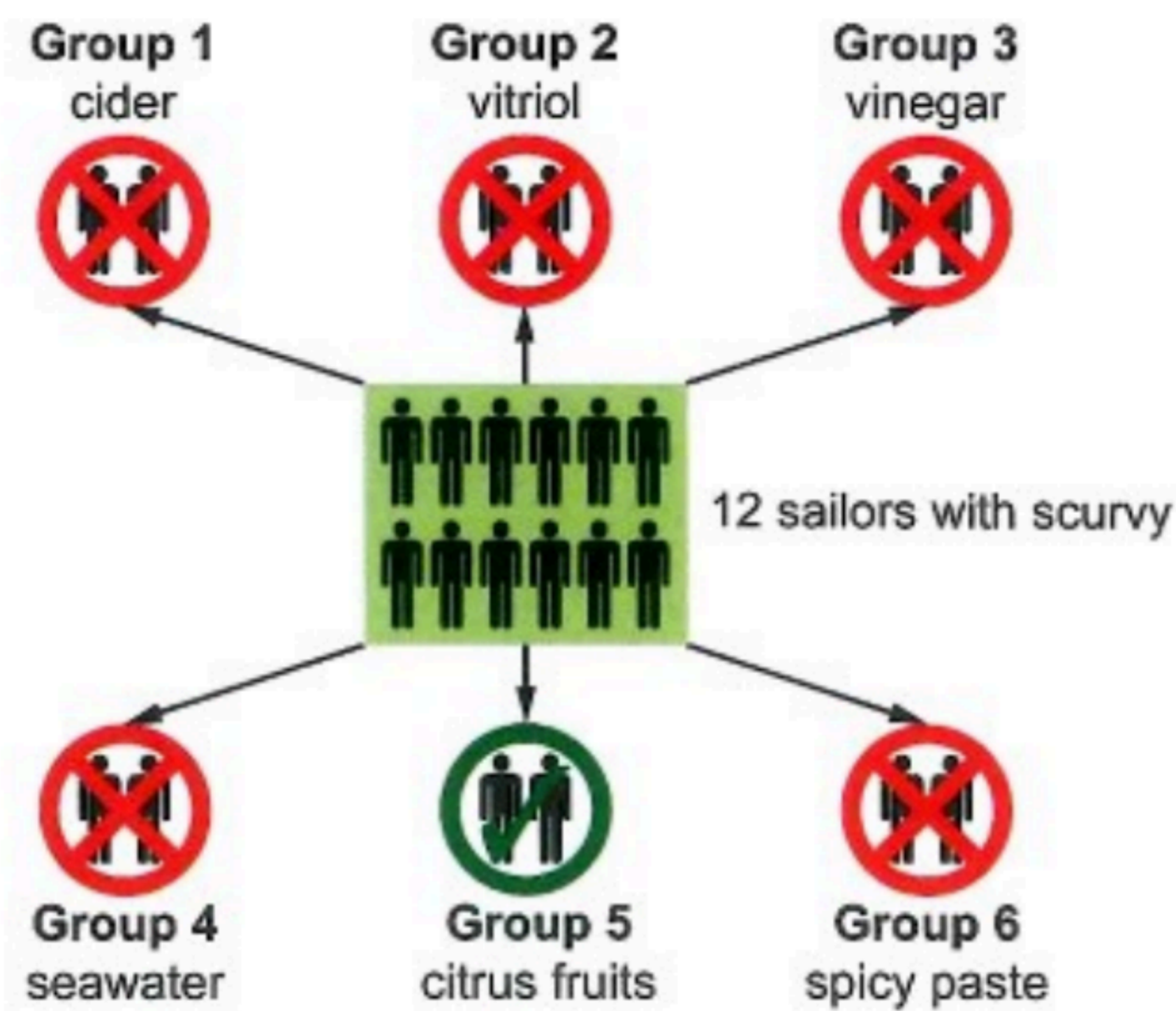
- 19 Peristalsis
- A only takes place in the oesophagus.
 - B is a kind of chemical digestion.
 - C requires irritability to carry out.
 - D does not facilitate digestion.
- 20 Which of the following digestive juice does not contain enzyme?
- A saliva
 - B bile
 - C pancreatic juice
 - D gastric juice

End of Section I

II. Structured Questions (40 marks)

- 1 Scurvy is a disease that has been documented since 1550 BC. However, an effective treatment for scurvy was not discovered until the 18th century when James Lind (1716-1794), a doctor of the British Royal Navy, conducted a controlled study.

Lind observed that many sailors suffered from scurvy during long voyages but they got better when they returned to land and ate fresh fruits. While at sea in 1747, he selected 6 groups consisting of 12 sailors, all suffering from scurvy at a similar stage, and provided each group with a different supplement in addition to the same basic diet. He found that only the group who ate oranges and lemons (citrus fruits) recovered.

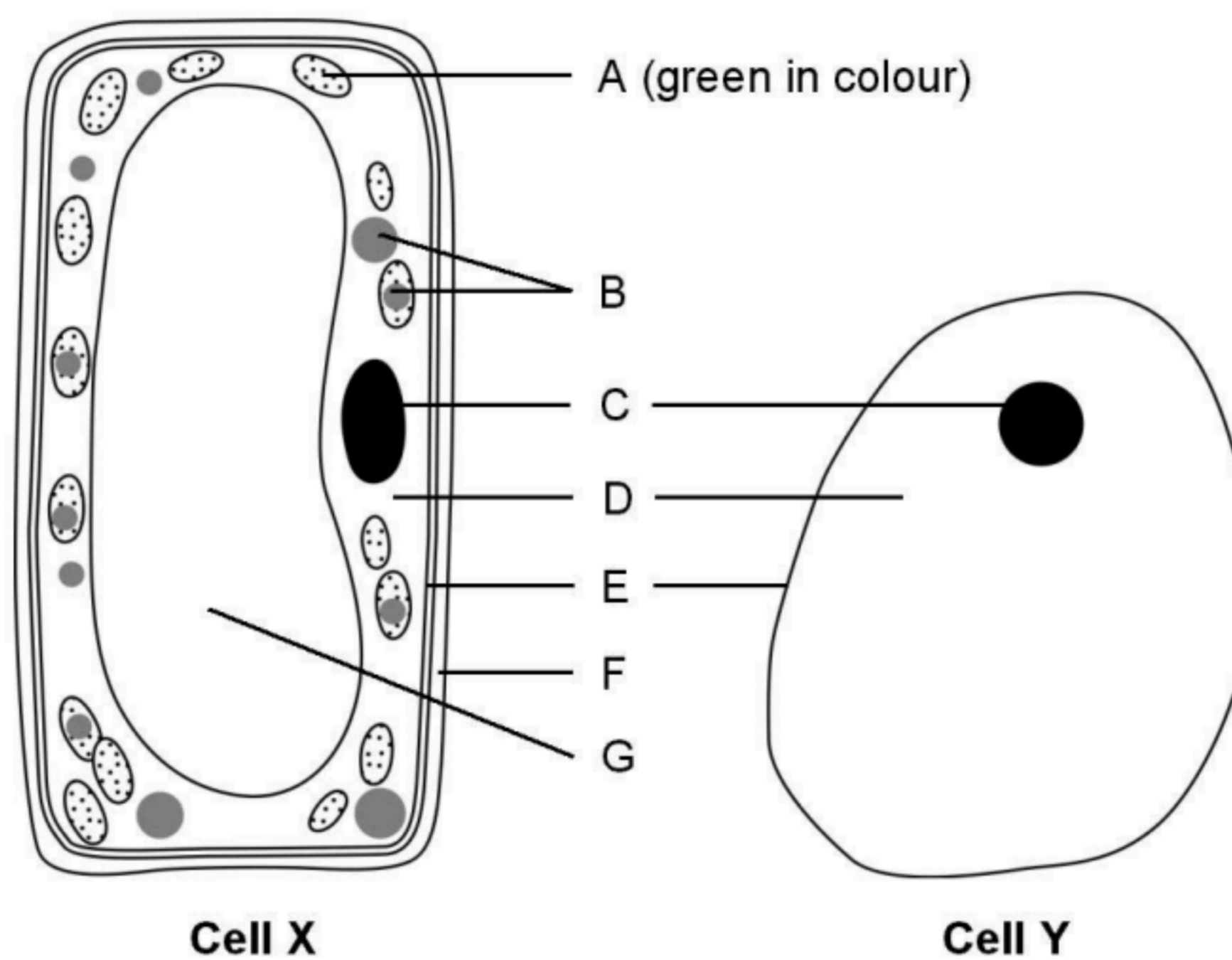


- What conclusion can be drawn from Lind's study? (1 mark)
- What is the independent variable in Lind's study? (1 mark)
- What is the dependent variable in Lind's study? (1 mark)
- Identify **THREE** controlled variables in Lind's study that are mentioned in the question. (3 marks)
- Lind published his findings about scurvy in 1753, but the findings were not adopted by the Royal Navy until 40 years later. Suggest **TWO** possible reasons why his findings were not accepted by the science community sooner. (2 marks)
- Now we know that citrus fruits are rich in vitamin C. How can we test for the presence of vitamin C in different food? (2 marks)

- 2 Rickets is a deficiency disease that affects the skeleton and teeth. One of the primary cause of rickets is a deficiency in vitamin D. The majority of cases occur in children suffering from severe malnutrition.
- Explain how a deficiency in vitamin D causes rickets. (2 marks)
 - Suggest a food that is rich in vitamin D. (1 mark)
 - Suggest how the body can obtain vitamin D other than from diet or dietary supplements. (1 mark)
- 3 Fill in the blanks in the table below to show the definition of the vital functions of living things. (5 marks)

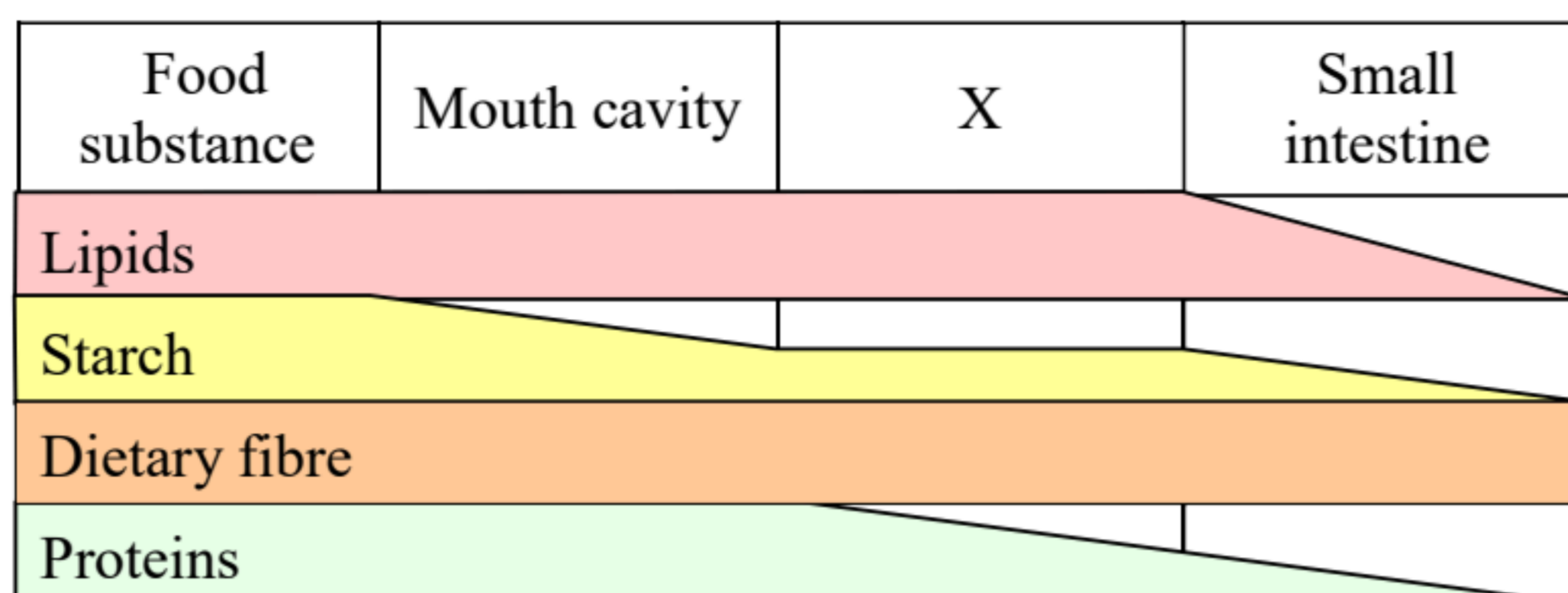
Vital function	Definition
____ (a) ____	Organisms break down food to release energy.
Reproduction	Organisms produce ____ (b) ____.
____ (c) ____	Organisms detect and respond to stimuli.
Growth	Organisms increase in ____ (d) ____ and ____ (e) ____.

- 4 The diagrams below show two cells, X and Y.



- Which cell, X or Y, is a plant cell? Based on the diagrams, give **TWO** reasons to support your answer. (3 marks)
- State the function of structure A and its importance to cell X. (2 marks)
- State the function of structure F. (1 mark)
- Name the material that is present in structure C which is needed in the controlling of all activities inside the cell. (1 mark)

- 5 The diagram below shows the changes in the amounts of different food substances as they pass along the human alimentary canal. The band width represents the amount of food substance remaining.



- a i** Which food substance remains undigested as it passes along the alimentary canal? (1 mark)
- ii** Suggest **ONE** food that is rich in the food substance in your answer for **a i**. (1 mark)
- b** Name X and state your reason. (2 marks)
- c** State **ONE** reason to explain why the amount of starch decreases as the food substances pass along the mouth cavity. (2 marks)
- d** The enzymes that are responsible for the digestion of protein found in X is different from those that are found in the small intestine. State **TWO** differences between these two kinds of enzymes. (2 marks)

6 The food label below indicates the nutrition facts of food A:

Nutrition facts	
Serving size: 50g	
	per 100g
Energy	340kcal
Total lipids	25g
Saturated fat	15g
Trans fat	2g
Total carbohydrates	30g
Dietary fiber	0g
Sugars	10g
Proteins	5g

- a** How much energy will food A provide after eating one serving of it? (1 mark)
- b** Food A does not contain dietary fiber. State the role of dietary fiber in helping the human body to pass faeces. (2 marks)
- c** Based on the lipid content of food A, state and explain what health risk it will cause if someone eats too much of it. (2 marks)
- d** State the function of protein in our diet. (1 mark)

End of Paper