FUKIEN SECONDARY SCHOOL

S3 Final Examination (2020-2021)

Biology

(1 hour)

Date: 11th June 2021 Name: _____

Time: 10:00a.m. - 11:00a.m. Class: _____ No.: _____

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. A seed germinates and becomes a seedling in spring after a cold winter. Which of the following are involved in this phenomenon?
   (1) growth
   (2) reproduction
   (3) irritability
   A (1) and (2) only
   B (1) and (3) only
   C (2) and (3) only
   D (1), (2) and (3)

Directions: Questions 2 and 3 refer to the making of a traditional Chinese dessert, ginger milk curd. Its recipe is shown below.

Recipe:

1 Grind a ginger and obtain 15 cm^3 of raw ginger juice.

2 Boil milk to about 60 °C.

3 Pour 220 cm^3 of milk into the raw ginger juice.

4 Wait for the milk to solidify.

A student wondered if boiled ginger juice could be used instead of raw ginger juice. He followed the steps in the recipe using raw and boiled ginger juice respectively. The table below shows the results.

	Result
Raw ginger juice	The milk solidified
Boiled ginger juice	No solidification occurred

2. Which of the following correctly states the hypothesis of this experiment?

A Boiled ginger juice should not be used to make ginger milk curd.

B The substance responsible for solidification of milk is heat-sensitive.

C Temperature affects the solidification of milk.

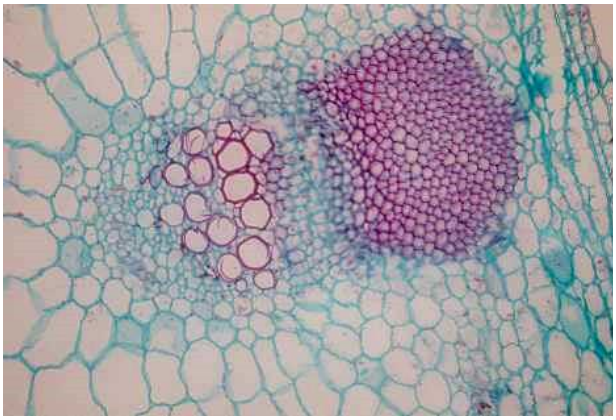
D Ginger juice is required for the solidification of milk.

3. Which of the following combinations correctly identifies the independent variable and controlled variable in this experiment?

	Independent variable	***Controlled variable***
A	Boil the ginger juice or not	Volume of the ginger juice
B	Temperature of the milk	Volume of the milk
C	Volume of the milk	Boil the ginger juice or not
D	Volume of the ginger juice	Volume of the milk

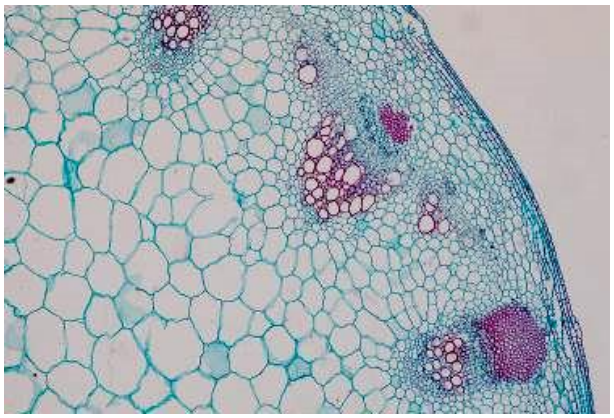
4. Photomicrographs I and II show the cross sections of the stem of a plant under different magnifications.

photomicrograph I



(×100)

photomicrograph II



(×40)

To obtain the view as shown in photomicrograph I, we should focus the specimen as shown in photomicrograph II first. This is because

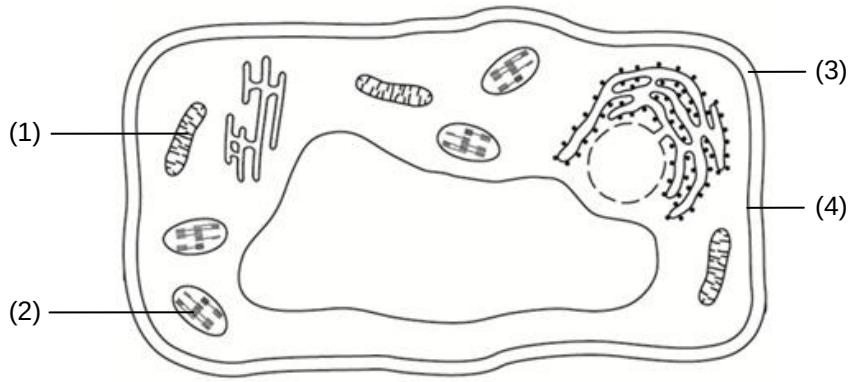
A the image in photomicrograph II is sharper.

B the image in photomicrograph II is brighter.

C the image in photomicrograph II has a larger field of view.

D the image in photomicrograph II is not inverted.

5. The diagram below shows a cell in a plant.



Which of the following structures may be ***absent*** from other living cells in the plant?

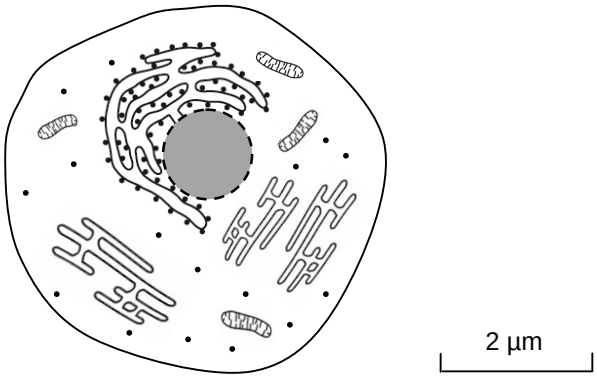
A (1)

B (2)

C (3)

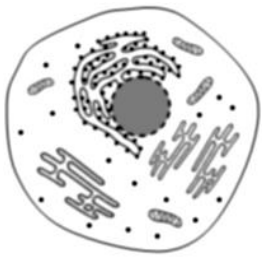
D (4)

6. The diagram below shows a drawing of a cell observed under an electron microscope.

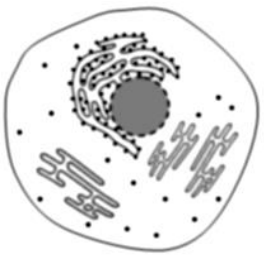


Which of the following diagrams shows the same cell observed at a magnification of x400 under a light microscope?

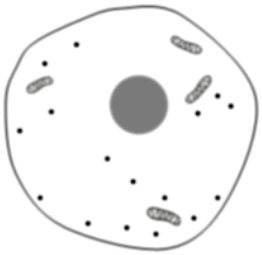
A



B



C



D

7. Cells that have a high level of metabolic activities most probably have more
   A nucleus.
   B cytoplasm.
   C mitochondria.
   D chloroplasts.

8. Which of the following is the fate of excess carbohydrates in the human body?
   A They are stored as glycogen in the liver or muscles, or as lipids under the skin.
   B They are stored as glycogen in the liver or muscles, or as proteins under the skin.
   C They are stored as proteins in the liver or muscles, or as lipids under the skin.
   D They are stored as lipids in the liver or muscles, or as glycogen under the skin.

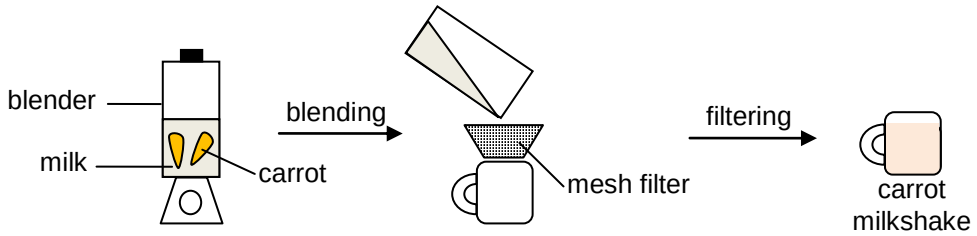
Directions: Questions 9 and 10 refer to the table below, which shows the percentages of different food substances in four foods (W, X, Y and Z).

Food	**Carbohydrates** (%)	**Proteins** (%)	**Lipids** (%)	**Water** (%)
W	28	5	55	12
X	12	20	5	63
Y	1	60	20	19
Z	70	2	12	16

9. Which of the foods provides the greatest amount of energy per gram?
   A W
   B X
   C Y
   D Z

10. Which of the foods is most likely to be pork?
   A W
   B X
   C Y
   D Z

11. A student prepares carrot milkshake by following the steps below.



Which of the following deficiency diseases can be prevented by drinking this carrot milkshake?
(1) night blindness
(2) rickets
(3) constipation
A (1) only
B (3) only
C (1) and (2) only
D (2) and (3) only

12. The photograph below shows a health supplement designed for pregnant women.

Which of the following is/are the possible benefit(s) of taking this supplement for pregnant women?

(1) To replace the nutrients lost during menstruation
(2) To help protect them from diseases
(3) To provide nutrients for the formation of foetal red blood cells

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

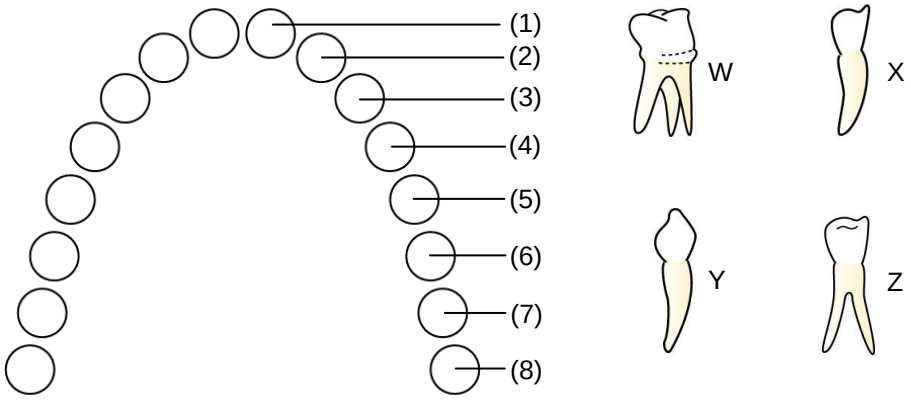
13. Obesity can increase the risk of

A stroke.
B rickets.
C scurvy.
D anaemia.

14. Which of the following statements about nutrition in humans is ***incorrect***?

A Nutrition in humans takes place in the digestive system.
B Digestion of food starts in the mouth cavity.
C Assimilation of food refers to the uptake of food molecules into the blood.
D Egestion refers to the removal of undigested and unabsorbed materials from the body.

Directions: Questions 15 and 16 refer to the diagrams below, which show four types of teeth and the position of permanent teeth in the jaw of humans.



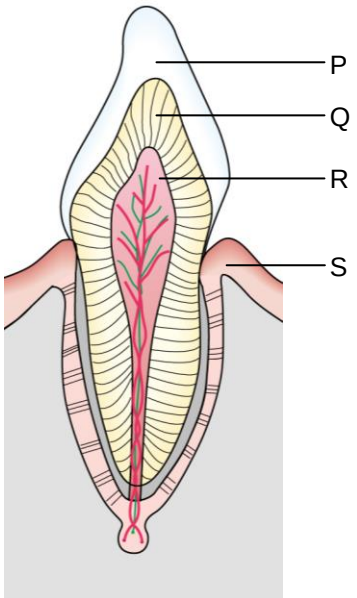
15. Which of the following combinations correctly shows the position of the four types of teeth?

	W	X	Y	Z
A	(6)	(5)	(2)	(1)
B	(6)	(2)	(3)	(5)
C	(7)	(3)	(4)	(6)
D	(8)	(2)	(3)	(6)

16. Which type of teeth is ***absent*** in the milk teeth?

A W
B X
C Y
D Z

Directions: Questions 17 and 18 refer to the diagram below, which shows the longitudinal section of a tooth.



17. Which labelled parts are rich in calcium salts?

A P and Q only
B Q and R only
C P and R only
D R and S only

18. Which of the following combinations of the structures and their descriptions is ***incorrect***?

	Structure	**Description**
A	P	It is the hardest part of the tooth.
B	S	It fixes the tooth to the jawbone.
C	R	It contains nerve fibres for sensations.
D	Q	It supplies nutrients to the tooth.

19. Which of the following actions help(s) move food through the alimentary canal?

(1) contraction of cardiac sphincter
(2) movement of villi
(3) peristalsis

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

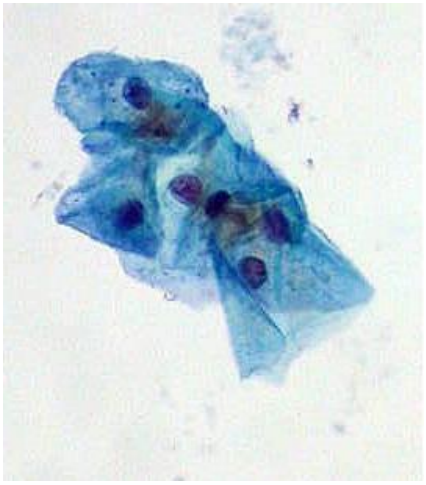
20. Which of the following substances can emulsify lipids into small droplets?

A lipases
B sodium hydrogencarbonate
C bile pigments
D bile salts

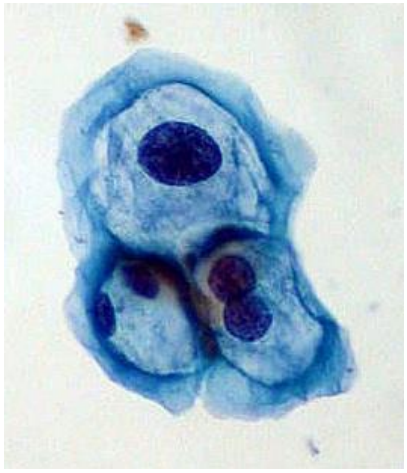
End of Section I

II. Structured Questions (40 marks)

1. In a Pap test, cells from the cervix are removed by a doctor. The cells are then stained with a blue dye and examined under a light microscope to check for any abnormality that may lead to cervical cancer. The photomicrographs below show some normal and abnormal cells of the cervix.



Normal cells (×900)



Abnormal cells (×900)

a Give ***one*** advantage of using a light microscope over an electron microscope in examining cells in a Pap test. (1 mark)

b How are the abnormal cells different from the normal cells? State ***two*** differences observed in the photomicrographs. (2 marks)

c State the significance of staining the cells. (1 mark)

2. The table below shows the amounts of food substances in 100 g of three foods (X, Y and Z).

Food	**Vitamin** (μg)			**Water** (g)	**Dietary fibre** (g)
	A	**C**	**D**		
X	995	0	125	0	0
Y	420	0	0	0	0
Z	20	100	0	30	30

a A 15-year-old young boy needs a lot of proteins for growth. In addition to proteins, which vitamin does he require in greater quantity for his growth? Which food in the above table is the most suitable to be a source of this vitamin? (2 marks)

b Peter suffers from constipation. Which food in the above table is the best for him? Explain your choice. (3 marks)

c State ***two*** eye problems that are caused by the deficiency in vitamin A. (2 marks)

d Name ***one*** disease that is caused by the deficiency in vitamin C. What is the function of vitamin C? (2 marks)

3. Daniel carried out an experiment to study the diets of two bats. He suspected that one bat fed on blood and the other fed on fruit juice. He took some food samples from their stomachs and performed several food tests.

	Food sample from bat P	**Food sample from bat Q**
Using protein test paper	Positive	Negative
Benedict's test	Positive	Positive
Using DCPIP solution	Negative	Positive

a What is the change of Benedict's solution when the test gives positive result? (2 marks)

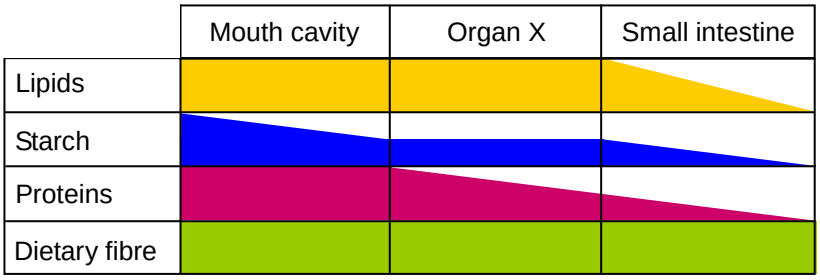
b What is the change of DCPIP solution when the test gives positive result ? (2 marks)

c **i** What food substances are found in food sample from bat P? (2 marks)

ii What food substances are found in food sample from bat Q? (2 marks)

iii What conclusion about the diet of bat Q could he draw from the results of the food tests? (1 mark)

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



a Identify organ X. Explain your answer. (2 marks)

b Describe what happens to the lipids and proteins in the small intestine. (5 marks)

c **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 stated in **c i**. (1 mark)

d What happens to vitamins and minerals in our alimentary canal after they are ingested? (1 mark)

5. In 1822, Alexis St Martin survived a gunshot but his body was left with a permanent hole which led to the inside of his stomach. Through this hole, Dr William Beaumont performed a number of experiments to study digestion in the stomach. Below are some of his experiments on St Martin.

Experiments	**Type of food**	**Place of digestion**	**Time for food to be completely digested**
I	A piece of cabbage	Stomach of St Martin.	No digestion
II	A chunk of corned beef	Stomach of St Martin.	2 hours
III	A chunk of corned beef	A test tube with gastric juice and incubated it at 37 ℃	10 hours

a **i** What is the independent variable of performing experiments I and II? (1 mark)

ii What is the independent variable of performing experiments II and III? (1 mark)

b Explain the result of experiment I. (2 marks)

c State ***two*** controlled variables in experiments II and III. (2 marks)

d Explain the difference in the results of experiments II and III. (2 marks)

End of Paper