

Class	Register Number	Name
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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2012
Secondary Three

BIOLOGY

Paper 1

Multiple Choice

Friday

12 October 2012

45 minutes

0800 - 0845

Additional materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST**Do not open this booklet until you are told to do so.**

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and register number on the Multiple Choice Answer Sheet provided.

There are **thirty** questions in this paper. Answer **all** questions. For each question there are four possible answers, **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the answer sheet.

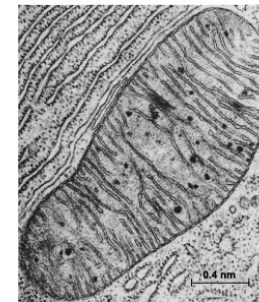
INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this booklet.

- 1 Which of the following shows the correct sequence of steps involved in the scientific method?
- A observation, hypothesis, experiment, absolute proof
B hypothesis, experiment, observation, conclusion
C experiment, observation, hypothesis, conclusion
D observation, hypothesis, experiment, conclusion
- 2 The table below shows the common name and scientific names of four animals found in the state of New York. Based on the information, which two animals are most closely related?

	Common name	Scientific name
i.	White perch	<i>Morone americana</i>
ii.	Grass pickerel	<i>Esox americanus</i>
iii.	Monkfish	<i>Lophius americanus</i>
iv.	Muskellunge	<i>Esox masquinongy</i>

- A i and ii
B ii and iii
C ii and iv
D i and iv
- 3 The electron micrograph shows an organelle found in a typical living cell.



Which of the following correctly states the function of the organelle?

- A Releases energy through aerobic respiration
B Traps light energy for photosynthesis
C Controls the movement of substances
D Repackages proteins for secretion

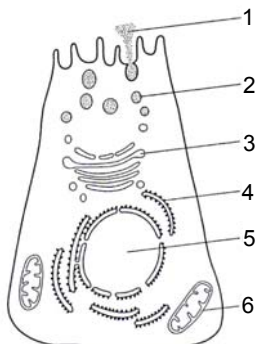
This document consists of 15 printed pages.

Setter: F-YYM, OC, AM

NANYANG GIRLS' HIGH SCHOOL

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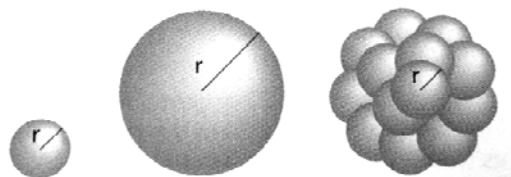
4 The figure below shows an animal cell.



Which of the following describes the functional relationship of the labeled structures?

- A 1 is synthesised by 2.
- B 2 contains substances produced by 3 and 4.
- C 3 contains substances produced by 6.
- D 4 controls the contents in 5.

5 The figure below shows some data about cell size.

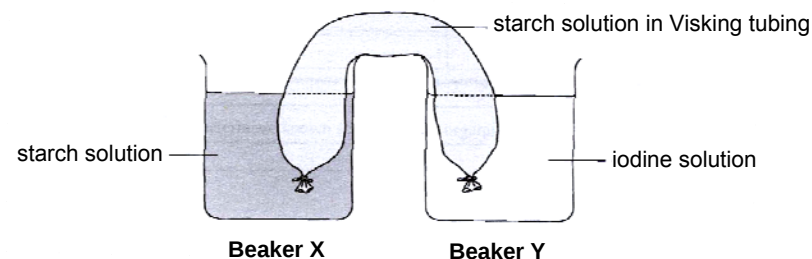


Radius	1.0	3.0	1.0
Surface area ($4\pi r^2$)	12.6	113.1	339.4
Volume ($\frac{4}{3}\pi r^3$)	4.2	113.1	113.1

Which of the following statements can be concluded based on the above data?

- A Large cells have high surface area to volume ratio.
- B For the same total volume, cells with smaller radius will have higher surface area to volume ratio.
- C When cells are enlarged, the increase in volume is equal to the increase in surface area.
- D Small cells transfer substances faster than big cells.

For questions 6 and 7, refer to the experimental set up below.



6 What colours would you expect to observe in the respective solutions after four hours?

	Beaker X	Beaker Y	Visking tubing
A	Brown	Brown	Blue-black
B	Blue-black	Brown	Blue-black
C	Blue-black	Blue-black	Brown
D	Brown	Blue-black	Brown

7 The experiment was repeated with a fresh batch of solutions, and the solution in beaker Y was changed to pure water. The set up was left to stand for four hours. Which of the following observations is **false**?

- A The height of solutions in both beakers will be the same.
- B The visking tubing becomes larger and firmer.
- C A negative result is obtained when solution in Beaker X is subjected to the Benedict's Test.
- D Solution in Beaker Y remains colourless.

- 8 Substance X is a metabolic waste product produced by rat cells, and is usually transported out of the cells for excretion.

Potassium cyanide is a chemical that is known to interfere with the release of energy during respiration.

To identify whether the transport of Substance X is by active transport, which of the following experimental set-ups is suitable?

A

Sample	O ₂ treatment	Temp./ °C	Cyanide treatment
Rat 1	Present	30	Present
Rat 2	Present	30	Present
Rat 3	Present	30	Present
Rat 4	Absent	30	Absent
Rat 5	Absent	30	Absent
Rat 6	Absent	30	Absent

B

Sample	O ₂ treatment	Temp./ °C	Cyanide treatment
Rat 1	Present	30	Present
Rat 2	Present	40	Present
Rat 3	Present	50	Present
Rat 4	Absent	30	Absent
Rat 5	Absent	40	Absent
Rat 6	Absent	50	Absent

C

Sample	O ₂ treatment	Temp./ °C	Cyanide treatment
Rat 1	Present	30	Present
Rat 2	Present	30	Present
Rat 3	Present	30	Present
Rat 4	Present	30	Absent
Rat 5	Present	30	Absent
Rat 6	Present	30	Absent

D

Sample	O ₂ treatment	Temp./ °C	Cyanide treatment
Rat 1	Present	30	Present
Rat 2	Present	30	Present
Rat 3	Present	30	Present
Rat 4	Present	100	Absent
Rat 5	Present	100	Absent
Rat 6	Present	100	Absent

- 9 Which chemical test shows the presence of an enzyme in a biological washing powder?

- A** Benedict's test
B Biuret's test
C Ethanol emulsion test
D Iodine solution test

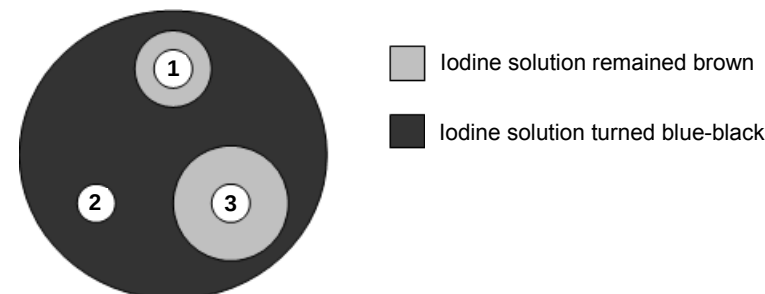
- 10 The table below shows the chemical formulae and some properties of three food molecules.

Food	X	Y	Z
Formula	C ₂₄ H ₄₄ O ₆	C ₁₂ H ₂₂ O ₁₁	C ₂₀ H ₃₂ O ₁₁ N ₁₀
Solubility in water	No	Yes	Yes
Energy value in kJ/g	38	16	17

Identify the classes of food represented by X, Y and Z.

- | | X | Y | Z |
|----------|---------------|---------------|---------------|
| A | Carbohydrates | Fats | Proteins |
| B | Carbohydrates | Proteins | Fats |
| C | Fats | Carbohydrates | Proteins |
| D | Fats | Proteins | Carbohydrates |

- 11 Three wells were cut in agar jelly which contained starch. A different solution was placed in each well. One day later, the jelly was flooded with iodine solution. The figure below shows the final appearance of the jelly.



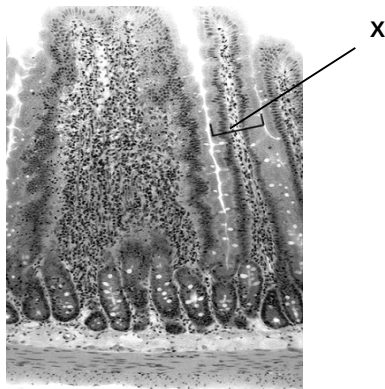
Which solutions would have given the results indicated?

- | | Well 1 | Well 2 | Well 3 |
|----------|---------------------|---------------------|---------------------|
| A | amylase + weak acid | water | amylase |
| B | water | boiled amylase | amylase |
| C | boiled amylase | amylase + weak acid | amylase |
| D | boiled amylase | amylase | amylase + weak acid |

12 Which function of the liver is correctly paired with the chemical involved?

	Function	Chemical
A	deamination	glycogen
B	detoxification	alcohol
C	emulsification	urea
D	storage	amino acids

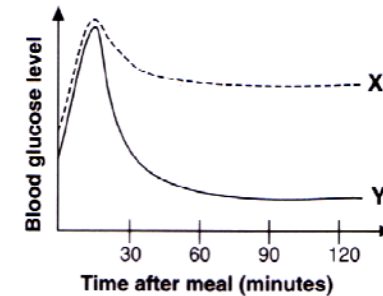
13 The photomicrograph below shows part of an alimentary canal.



Which of the following statement(s) is/are **true**?

- i X helps in peristaltic movement in the body.
 - ii X takes part in active transport of nutrients.
 - iii X is found in the colon.
 - iv X has a large surface area to volume ratio.
- A iii only
B i and iii only
C ii and iv only
D i, ii and iii only

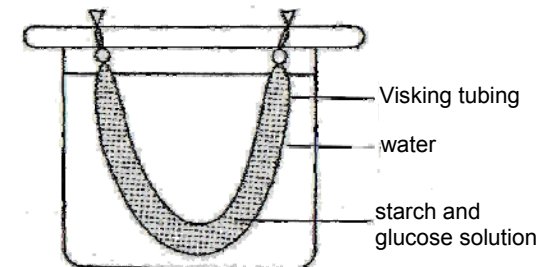
14 The graph shows the blood glucose level of two persons X and Y after eating identical meals. One of them has a disorder.



Who is the normal person and what is the cause of the disorder in the other person?

	Normal person	Cause of disorder
A	X	Over-secretion of insulin
B	X	Under-secretion of insulin
C	Y	Over-secretion of insulin
D	Y	Under-secretion of insulin

15 The following diagram is a model of part of the human alimentary canal.



What does the water outside the Visking tubing represent?

- A saliva in the mouth
B chyme in the stomach
C blood surrounding the stomach
D blood surrounding the ileum

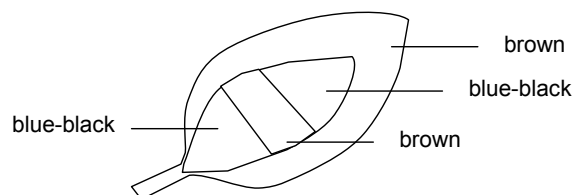
16 Which statements describe the fate of glucose after photosynthesis?

- i Glucose is converted to starch for storage.
- ii Glucose is converted to sucrose for transport.
- iii Glucose is converted to fatty acids.
- iv Glucose is used for respiration.

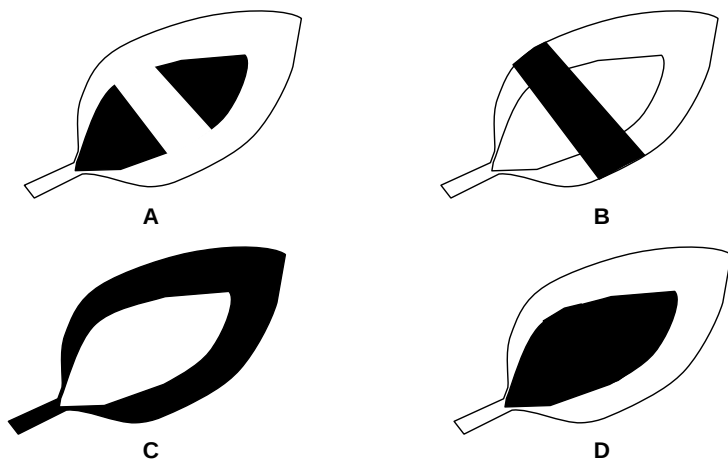
- A ii and iii only
- B ii and iv only
- C i, iii and iv only
- D i, ii, iii and iv

17 A plant with variegated leaves was destarched, and its leaves were partially covered with black paper. Variegated leaves are leaves that have areas of dark green and areas of light green.

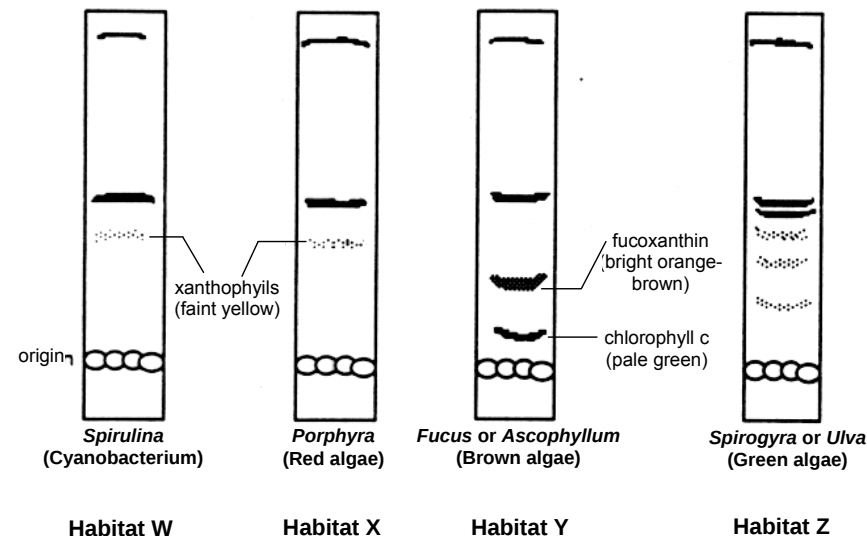
After a day, the leaves were tested for starch. The results are shown below.



Which of the following shows the most likely position and shape of the black paper?



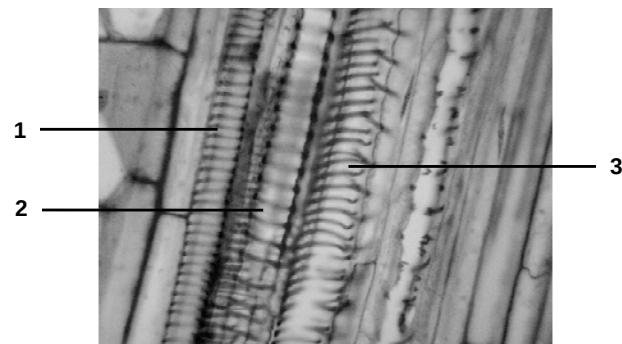
18 The following figure shows the separation of some photosynthetic pigments of different organisms by thin-layer chromatography. The different organisms were taken from four different habitats.



Which of the following can be inferred from the figure?

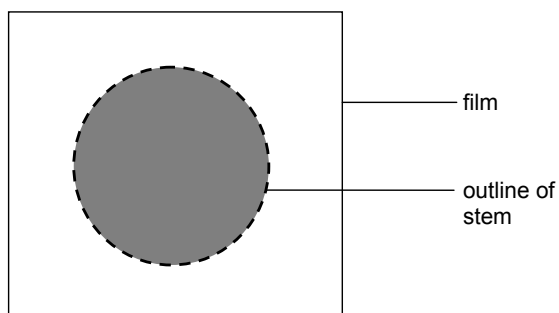
- A *Spirulina* may be able to thrive in **Habitat X**.
- B *Fucus* can photosynthesize optimally in **Habitat W**.
- C The *Porphyra* population will exceed the *Fucus* population if placed in **Habitat Y**.
- D *Spirulina* may be able to thrive better than *Spirogyra* in **Habitat Z**.

- 19 The photomicrograph shows a longitudinal section of a stem.



Which tissue is adapted to transport nitrates, phosphates and potassium ions?

- A 1, 2 and 3
B 1, 2 only
C 1, 3 only
D 2, 3 only
- 20 A dicotyledonous plant was exposed to radioactive carbon dioxide ($^{14}\text{CO}_2$). After some time, its stem was cut and placed on x-ray film. The results are shown below.



What inference can be drawn from the results?

- A The xylem transports radioactive water.
B The phloem transports food substances.
C The sample could have been contaminated.
D The vascular bundle occupies the entire stem.

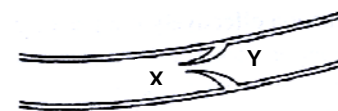
- 21 Which component of blood produces thrombokinase required for blood clotting?

- A White blood cells
B Red blood cells
C Platelets
D Plasma

- 22 A person with blood group A needs a blood transfusion. Which of the following correctly shows the outcome of receiving blood from various donors?

	Blood group AB	Blood group B	Blood group O
A	No agglutination	Agglutination	No agglutination
B	No agglutination	No agglutination	Agglutination
C	Agglutination	Agglutination	No agglutination
D	Agglutination	No agglutination	Agglutination

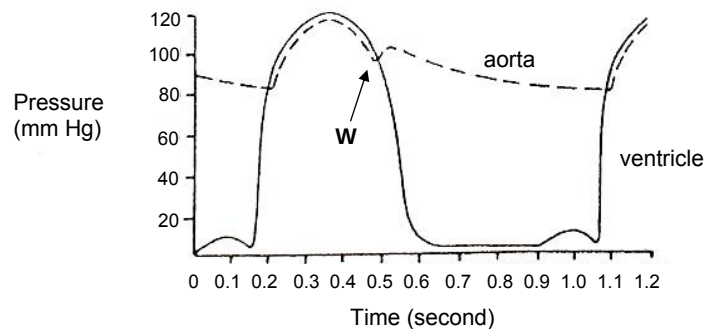
- 23 The figure below shows a valve in a section through a vein.



Which of the following statements is correct?

- A The opening and closing of the valve is due to the relaxation and contraction of the muscles along the walls.
B The valve is forced open when the blood pressure in Y is greater than in X.
C The purpose of the valve is to prevent backflow of blood from Y to X.
D The elastic wall causes the valve to close in between heart beats.

For questions 24 and 25, refer to the graph below that shows the pressure changes in the left side of the heart of a person at rest.



- 24 A heartbeat consists of two sounds. The second sound of a heartbeat was heard at **W**. The second sound was most probably caused by _____.

A closing of the atrio-ventricular valve
B opening of the atrio-ventricular valve
C closing of the semi-lunar valve
D opening of the semi-lunar valve

- 25 The heart rate of the person at rest is _____ heartbeats/min.

A 55
B 67
C 86
D 100

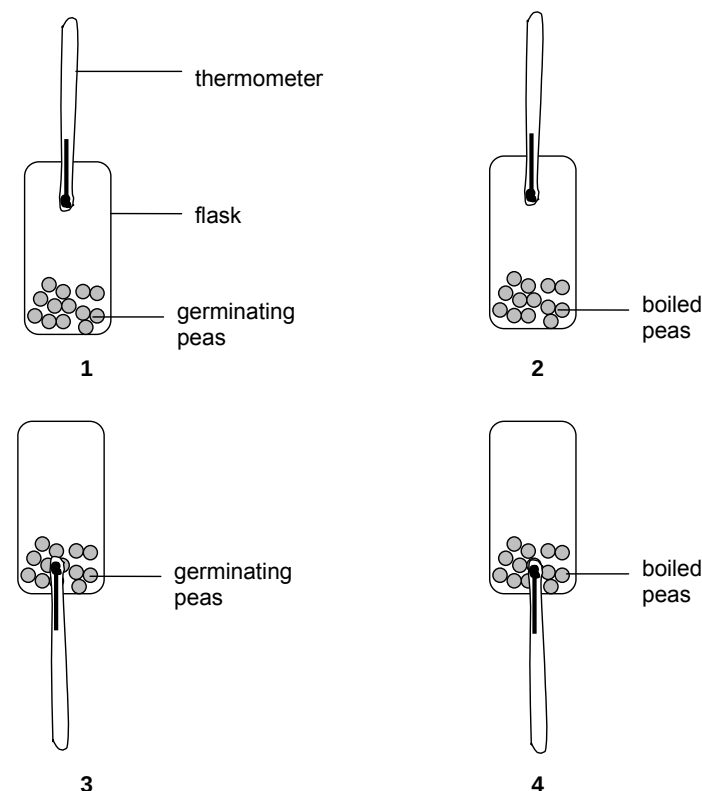
- 26 Carbonic anhydrase catalyses the following reaction in a red blood cell:

A Carbonate $\rightarrow$ carbon dioxide + proton
B Bicarbonate + proton $\rightarrow$ carbon dioxide
C Carbon dioxide + water $\rightarrow$ glucose + energy
D Carbon dioxide + water $\rightarrow$ carbonic acid

- 27 Shushan is a member of the choir. She often has to sing long notes. State the processes that occur to allow her to sing a long note.

	External intercostals	Internal intercostals	Volume in chest cavity	Pressure in lungs
A	Contract	Relax	Increase	Increase
B	Contract	Contract	Decrease	Decrease
C	Relax	Relax	Increase	Decrease
D	Relax	Contract	Decrease	Increase

- 28 A student wanted to find out if respiration produces heat. Which of the following pair of set-ups is most appropriate?

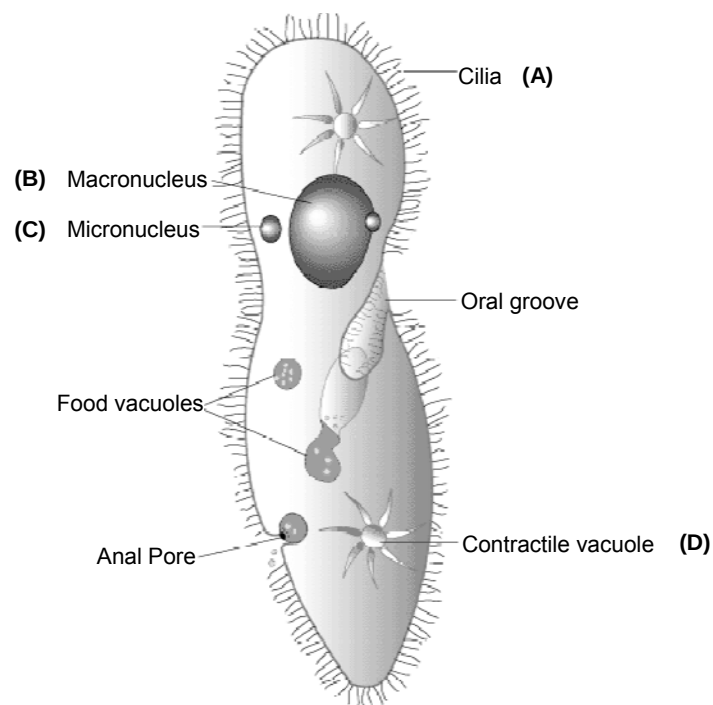


A 1 and 2
B 1 and 3
C 2 and 3
D 3 and 4

- 29 Some yeast, bread flour, sugar and water were mixed to form a dough. The dough was covered with a cloth, and began to expand over time.
Which of the following statements best explains why the dough expanded?

- A Anaerobic respiration of yeast produced carbon dioxide.
- B Yeast mitochondria expired aerobically.
- C Aerobic respiration by bacteria in flour produced gas.
- D Yeast produced lactic acid, which caused expansion.

- 30 The figure below shows a single-celled organism, *Paramecium*.



Which structure is likely to pass food particles in wave-like motion towards the oral groove for feeding?

END OF PAPER