

Class	Register Number	Name
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南洋女子中學校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2013
Secondary Three

BIOLOGY

Paper 1

Multiple Choice

Tuesday

8 October 2013

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.

This document consists of **15** printed pages.

Setter: DN, LCP, BK & ST

NANYANG GIRLS' HIGH SCHOOL

[Turn over

- 1 The endoplasmic reticulum consists of a network of cisternae that extends through the cytoplasm of a cell.

Which characteristics are true for rough endoplasmic reticulum and smooth endoplasmic reticulum?

- I composed of a phospholipid bilayer
- II continuous with the nuclear envelope
- III involved in synthesis of lipids and steroids
- IV involved in synthesis of polypeptides

	rough endoplasmic reticulum	smooth endoplasmic reticulum
A	I and II	III and IV
B	II and IV	I and III
C	I and III	I and II
D	III and IV	II and IV

- 2 The table below shows the results of glucose concentrations in various organelles in a plant cell before and after exposure to sunlight. Which organelle is most likely to be the chloroplast?

organelle	concentration before exposure / mol dm ⁻³	concentration after exposure / mol dm ⁻³
A	20	24
B	87	19
C	95	97
D	21	105

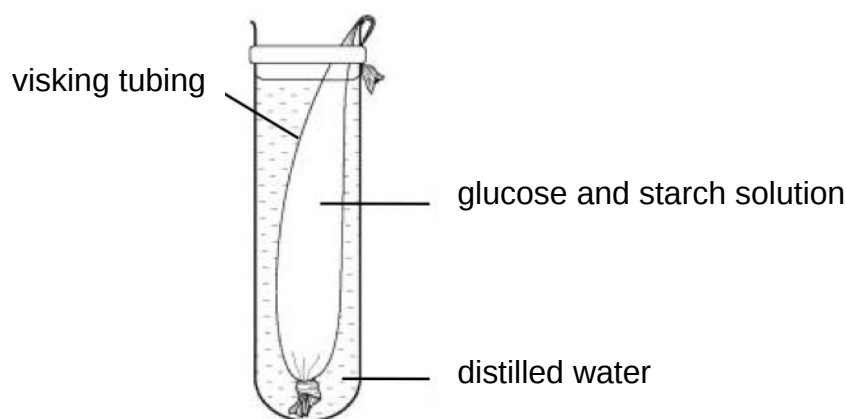
- 3 While on a trip to a desert, David was bitten by a rattlesnake. He nearly died from haemolysis, the breakage of red blood cells. The following table shows the concentration of three enzymes found in the venom.

enzyme	Concentration / mg dm ⁻³
carbohydrase	68
phospholipase	56
carbonic anhydrase	15

Which of these enzymes might have been responsible for the haemolysis?

- A Carbohydrase
- B Phospholipase
- C Carbohydrase and carbonic anhydrase
- D Phospholipase and carbonic anhydrase

- 4 The figure shows an experiment using a selectively permeable membrane.

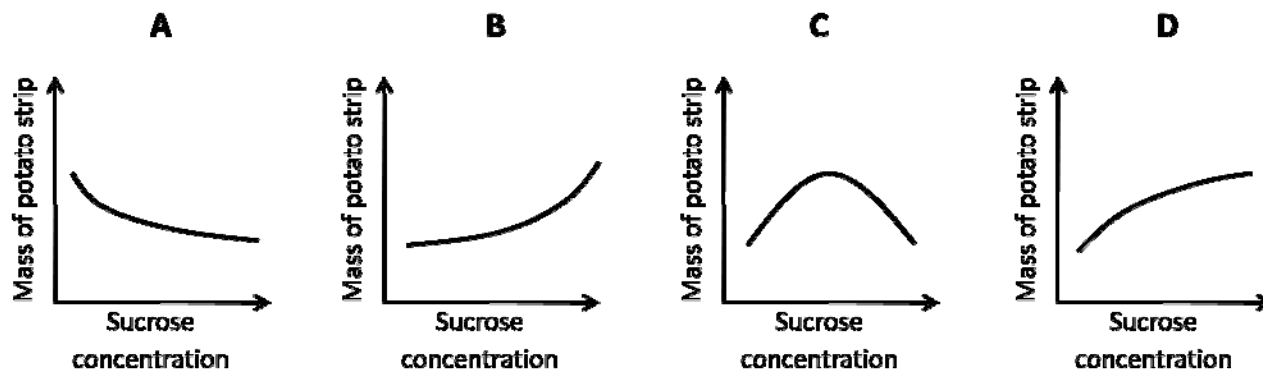


The concentrations of glucose and starch in the visking tubing were tested after 20 minutes. Which of the following shows the results of the experiment?

	glucose concentration / mol dm^{-3}	starch concentration / mol dm^{-3}
A	increased	unchanged
B	decreased	unchanged
C	increased	decreased
D	decreased	decreased

- 5 Strips of potatoes were placed in varying concentrations of sucrose solutions for 20 minutes.

Which of the following graphs shows the results of this experiment?



- 6 The table shows the concentration of a hydrophilic substance inside and outside of four different cells.

cell	concentration inside cell / arbitrary units	concentration outside cell / arbitrary units
P	2	5
Q	7	2
R	5	12
S	10	2

Which of the following are the most likely processes for absorption of the substance into the cells?

	P	Q	R	S
A	simple diffusion	active transport	simple diffusion	active transport
B	active transport	simple diffusion	active transport	simple diffusion
C	active transport	facilitated diffusion	active transport	facilitated diffusion
D	facilitated diffusion	active transport	facilitated diffusion	active transport

- 7 A sample of food was mixed with water and tested for its contents. The results of the tests are shown in the table below.

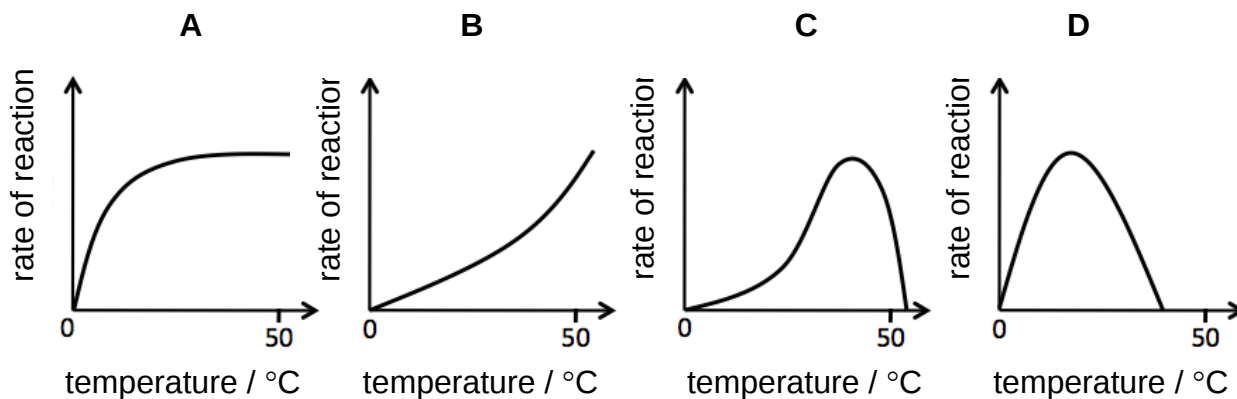
test	results
Biuret Test	Blue
Benedict's Test	Brick red precipitate
Iodine Test	Brown
Alcohol Emulsion Test	White emulsion

Which of the following can be concluded?

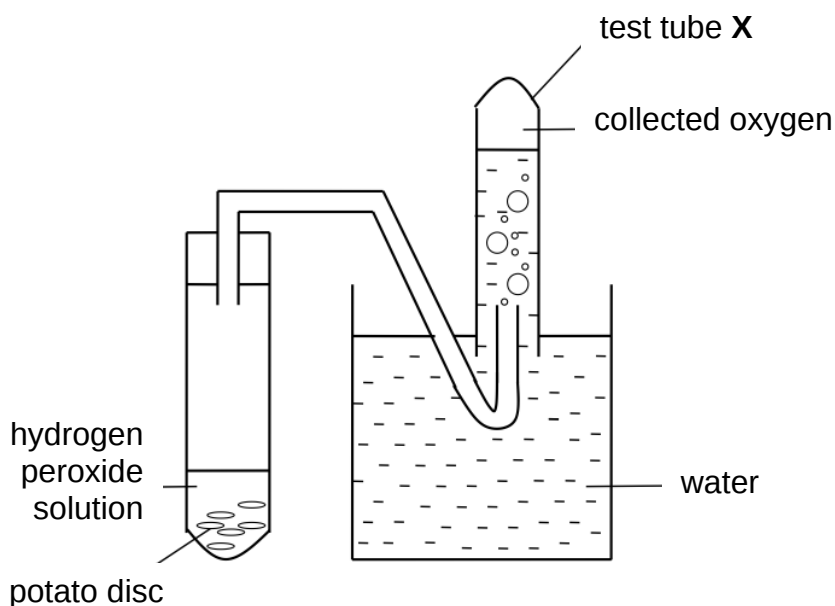
	protein	reducing sugar	starch	fats
A	absent	present	absent	present
B	present	absent	absent	present
C	absent	present	present	absent
D	present	absent	present	absent

- 8 5.0 cm³ of 0.01 % amylase solution was added to test tubes that each contain 1.0 cm³ of 1.0 % starch solution and shaken well. Each test tube was then subjected to different temperatures ranging from 0 °C to 50 °C.

Which of the following graphs show the results from the above experiment?



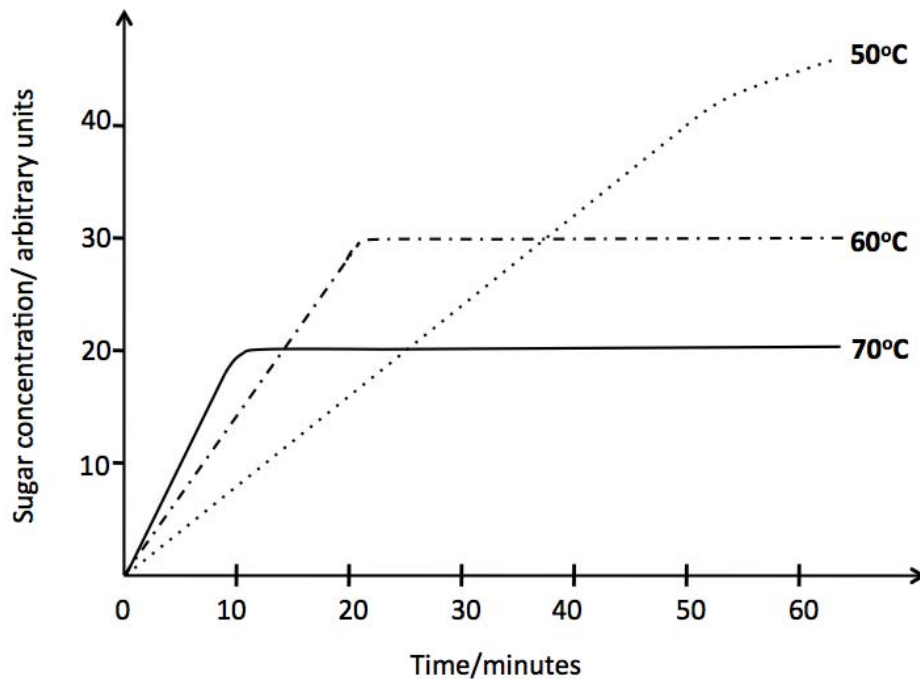
- 9 Potato cells contain an enzyme that breaks down hydrogen peroxide to water and oxygen. The figure below shows the experimental set-up used to conduct four different experiments to investigate between raw or boiled potato discs and level of water.



Which of the following shows the correct level of water in test tube X after 10 minutes?

	type of potato discs	level of water
A	boiled	decreased
B	boiled	increased
C	raw	decreased
D	raw	increased

- 10** In beer-making, enzymes present in malting barley hydrolyse starch into sugar. The graph below shows the production of sugar at three different temperatures over a one hour period. All other conditions were controlled.



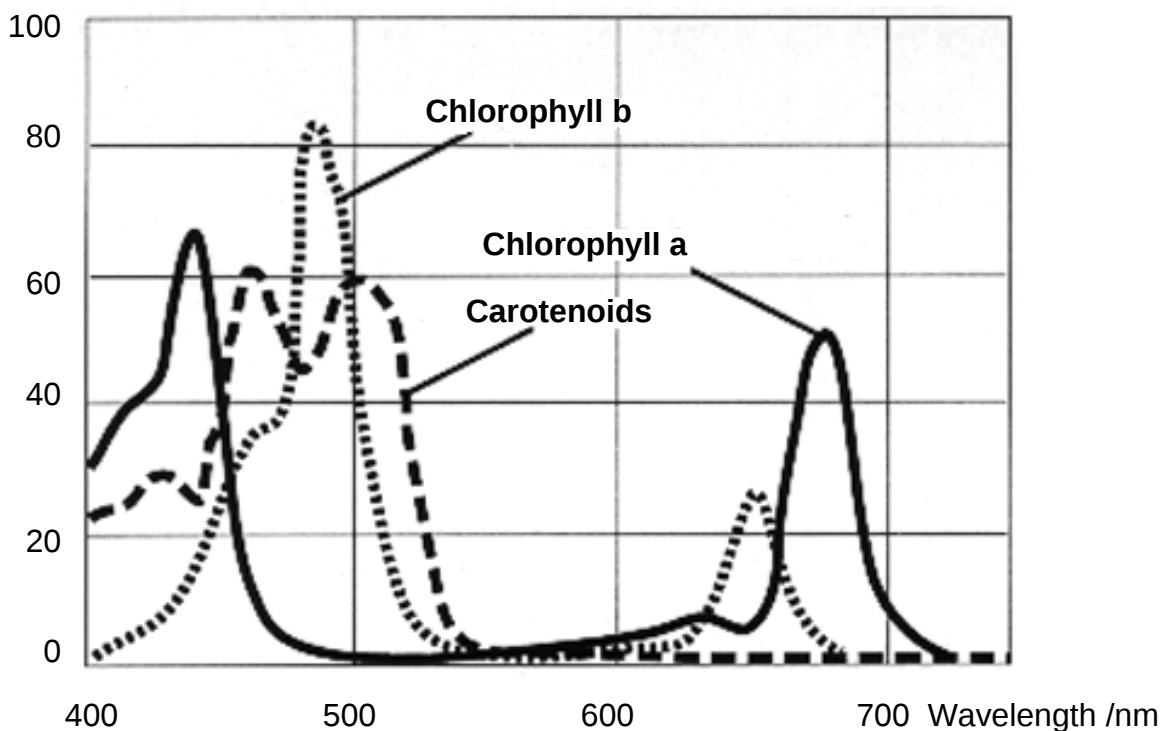
Which of the following best explains the graph above?

- A** Sugar is absent from the malting barley.
 - B** The optimum temperature for the enzymes is 50°C.
 - C** At 60°C, all the starch is hydrolysed within 20 minutes.
 - D** At 70°C, the enzymes are denatured before all the starch is hydrolysed.
- 11** Some plants live at the bottom of the oceans and make glucose using energy from chemicals in the hot water that comes out of hydrothermal vents. What is a distinguishing feature of these plants?
- A** They do not need to be green.
 - B** They do not need carbon dioxide.
 - C** Their enzymes are easily denatured by extreme pH.
 - D** Their enzymes are easily denatured by high temperature.

Different photosynthetic pigments absorb different wavelengths of light. A spectrophotometer is used to measure the absorption of different wavelengths of light by the different pigments. The resulting absorption spectrum is shown in the diagram below.

Use the figure to answer Questions 12 and 13.

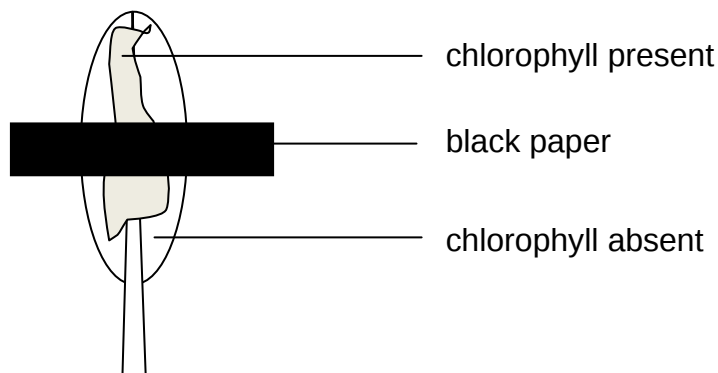
Absorption / %



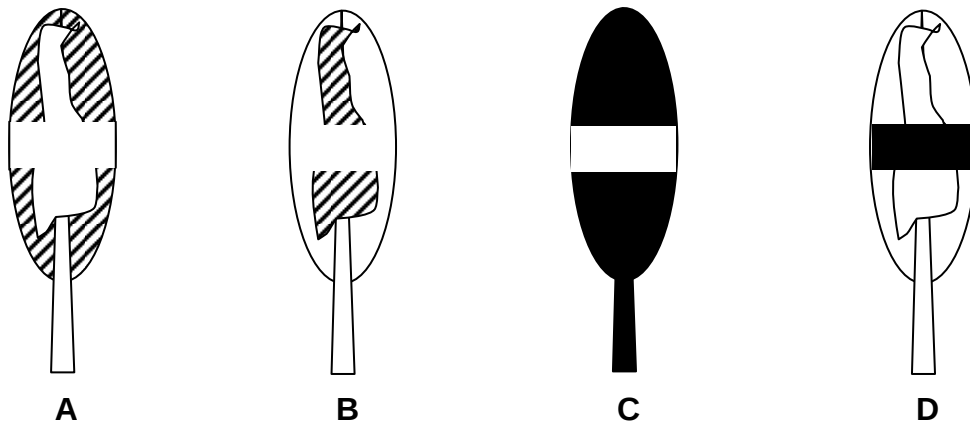
(Source from http://www.absoluteastronomy.com/topics/Photosynthetically_active_radiation)

- 12 Which of the following conclusions does **not** follow from the study of the absorption spectrum by different pigments?
- A Carotenoid has more than one absorption peak.
 - B Chlorophyll owes its colour to the absorption of green light.
 - C Wavelength of 480 nm is absorbed by chlorophyll b in a large quantity.
 - D Chlorophyll a, chlorophyll b and carotenoids broaden the spectrum of light that contributes energy for photosynthesis.
- 13 What is the most appropriate wavelength for photosynthesis?
- A 550 nm to 600 nm
 - B 600 nm to 650 nm
 - C 650 nm to 700 nm
 - D 700 nm to 750 nm

- 14** A variegated plant is destarched. One leaf is then partly covered with black paper strips on both sides and exposed to light for six hours.



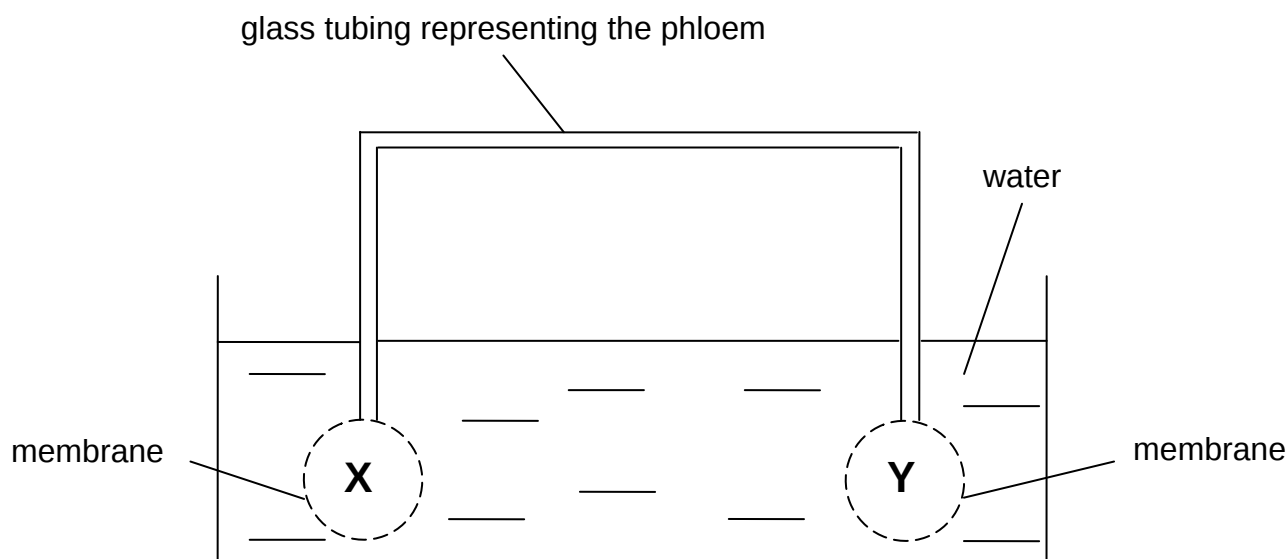
The leaf is then tested for starch. What is the result?



- 15** When trees are very tall, the liquid in the xylem can be under intense pressure that is many times that of the atmosphere around us.
Which process contributes most to the intense pressure in the xylem of very tall trees?
- A** osmosis
 - B** transpiration
 - C** capillary effect
 - D** root pressure
- 16** A scientist adds a water-soluble inhibitor of photosynthesis to the roots of a plant. However, photosynthesis in the leaves is not affected by addition of the inhibitor to the roots.
Which of the following best explains the result of the experiment?
- A** Root hair cells are not able to absorb the inhibitor.
 - B** Root cortex stores the inhibitor and allows only water to pass through.
 - C** Endodermis stops the inhibitor from crossing over from cortex into xylem.
 - D** Xylem vessels are not able to transport the inhibitor from root up to the leaves.

The figure shows the apparatus set up to demonstrate mass flow mechanism in the laboratory. The part **X** represents a leaf and contains a high concentration of sucrose solution. The part **Y** represents a root and contains a low concentration of sucrose solution. The rest of the vessel contains water.

Use the figure to answer Questions 17 and 18.



17 What is one essential property of the membranes surrounding part **X** and part **Y**?

- A** fully permeable
- B** non permeable
- C** selectively permeable
- D** semi permeable

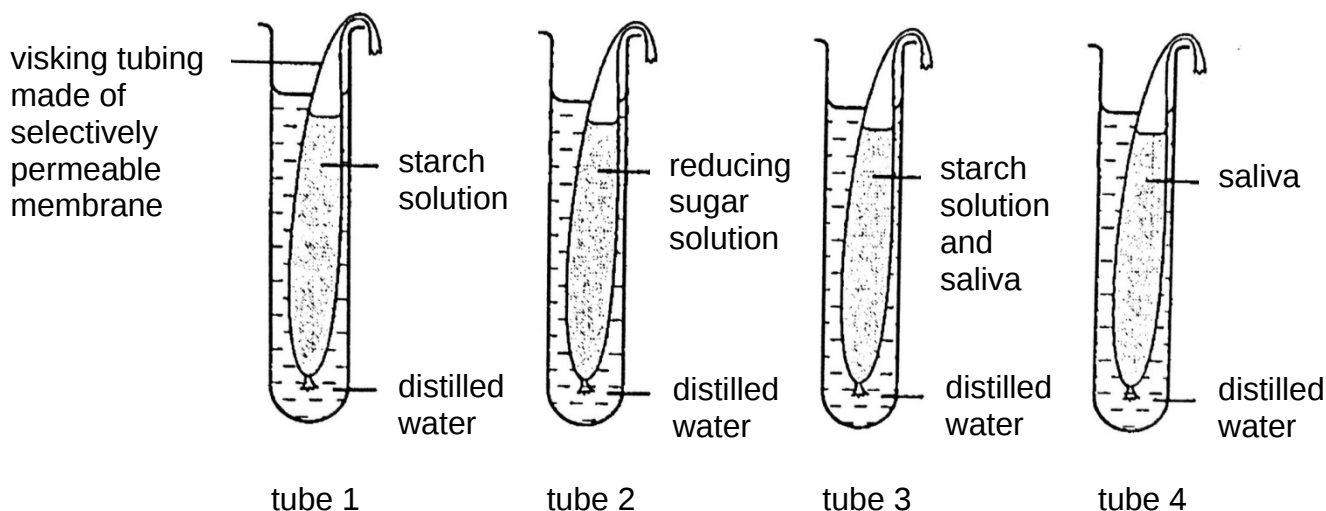
18 Which of the following is **one other** possible sink region that part **Y** could represent?

- A** leaf
- B** seed
- C** stem
- D** root

19 A man chewed on a piece of bread for 2 minutes, collected the chewed bread and ran a food test to test for its contents. Which of the following shows the results of the food test?

	Iodine Test	Benedict's Test	Biuret Test
A	blue black colouration formed	remained blue	remained blue
B	blue black colouration formed	remained blue	violet colouration observed
C	remained brown	brick red precipitate formed	remained blue
D	remained brown	brick red precipitate formed	violet colouration observed

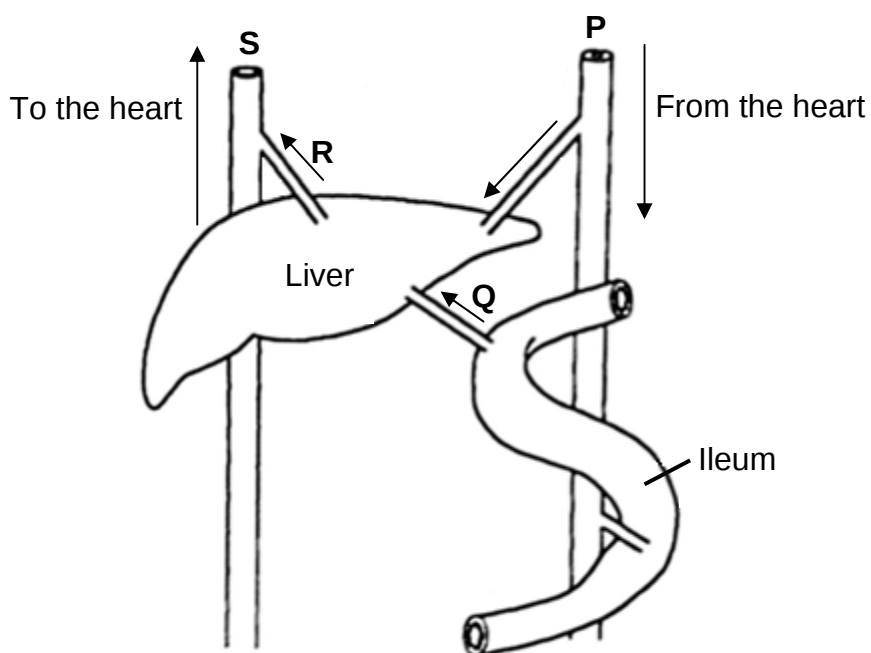
- 20** Four visking tubings made of selectively permeable membrane are placed in tubes as shown in the figure.



After 20 minutes at 35°C, a sample of water from each tube, outside the bag, is boiled with Benedict's solution. Which of the following shows the results of the experiment?

	tube 1	tube 2	tube 3	tube 4
A	brick red precipitate formed	remained blue	remained blue	brick red precipitate formed
B	brick red precipitate formed	brick red precipitate formed	remained blue	brick red precipitate formed
C	remained blue	remained blue	brick red precipitate formed	remained blue
D	remained blue	brick red precipitate formed	brick red precipitate formed	remained blue

The figure shows part of the circulatory system. Use the figure to answer Questions **21** and **22**.



- 21** Which of the following represents the correct amount of glucose in **P**, **Q**, **R** and **S** after a meal?

amount of glucose / mg per 100 ml of blood				
	P	Q	R	S
A	75	158	85	83
B	75	158	158	83
C	75	158	158	158
D	158	85	83	75

- 22** Which of the following represents the correct amount of glucose in **P**, **Q**, **R** and **S** for a person with liver failure?

amount of glucose / mg per 100 ml of blood				
	P	Q	R	S
A	75	158	85	83
B	75	158	158	83
C	75	158	158	158
D	158	85	83	75

- 23** Mr Wee is injured in a car accident. He bled profusely, became unconscious and is sent to the nearest hospital. A blood test is performed and the results are shown below.

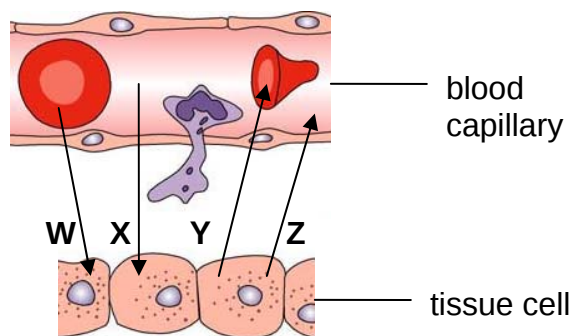
	test blood			
	A	B	AB	O
serum from Mr Wee's blood	+	+	+	-

+ refers to agglutination
 - refers to no agglutination

Which of the following is a safe donation of blood type to Mr Wee?

	donor blood type
A	A
B	B
C	AB
D	O

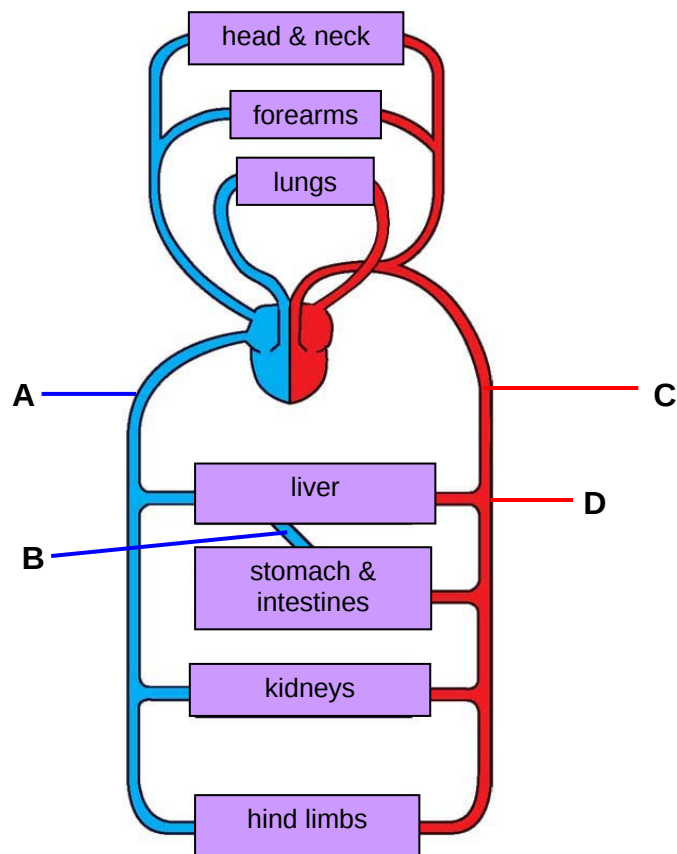
- 24** The figure shows the exchange of materials between tissue cells and the blood capillaries.



What do the arrows **W**, **X**, **Y** and **Z** represent?

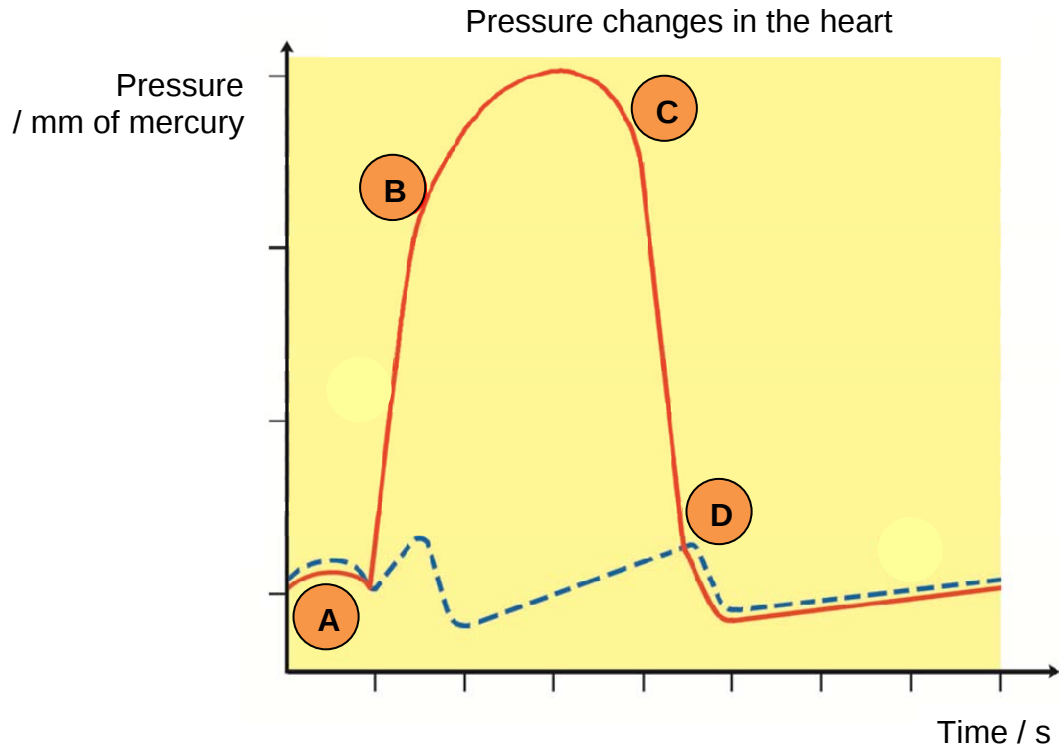
	W	X	Y	Z
A	glucose	urea	carbon dioxide	oxygen
B	oxygen	glucose	carbon dioxide	urea
C	oxygen	urea	water	carbon dioxide
D	water	carbon dioxide	oxygen	glucose

25 The figure shows the main blood vessels in the body.



Which blood vessel has the thickest walls to withstand blood pumped at high pressure?

26 The graph shows the different stages in the cardiac cycle.



Which of the stages show ventricles contract until semi-lunar valves open?

- 27** What is the percentage of oxygen in expired air when a person is sleeping?
- A** 4.0 %
 - B** 12.0 %
 - C** 16.4 %
 - D** 21.0 %
- 28** Which of the following statement is false?
- A** Tar induces cancer in the lungs.
 - B** Tar paralyses the cilia lining the air passages.
 - C** Carbon dioxide causes the release of adrenaline.
 - D** Carbon monoxide damages the lining of the blood vessels.
- 29** Which of the following respiratory systems is **not** closely associated with a blood supply?
- A** Fish gills
 - B** Vertebrate lungs
 - C** Outer skin of earthworm
 - D** Tracheal systems of insects
- 30** Which of the following reactions is common in erythrocytes travelling through pulmonary capillaries? (Hb = haemoglobin)
- A** $\text{Hb} + 4 \text{O}_2 \rightarrow \text{Hb}(\text{O}_2)_4$
 - B** $\text{Hb}(\text{O}_2)_4 \rightarrow \text{Hb} + 4 \text{O}_2$
 - C** $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$
 - D** $\text{H}_2\text{CO}_3 \rightarrow \text{H}^+ + \text{HCO}_3^-$

End of paper