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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2016
Secondary Three

BIOLOGY

Paper 1

Monday

Additional materials: Multiple Choice Answer Sheet

Multiple Choice

3 October 2016

45 minutes

0845 - 0930

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write your name, register number and class in the spaces at the top of this page.

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 shade your choice in **pencil** on the separate Answer Sheet.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

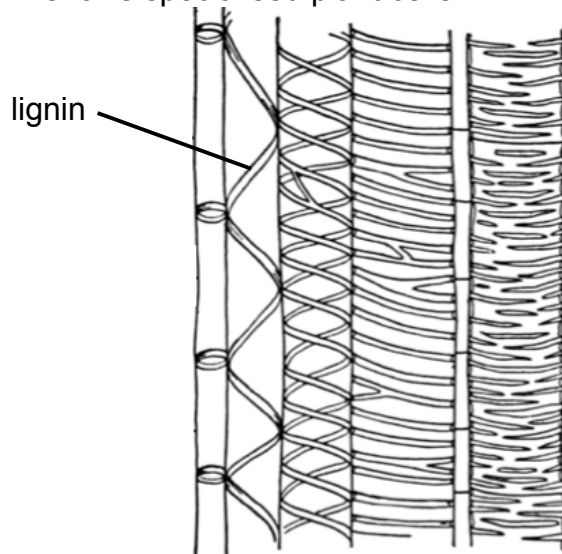
Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

1 Which row correctly identifies the organelles?

	transports protein	stores substances	makes proteins	releases energy
A	vacuole	mitochondrion	ribosome	rough endoplasmic reticulum
B	vacuole	rough endoplasmic reticulum	ribosome	mitochondrion
C	rough endoplasmic reticulum	ribosome	vacuole	mitochondrion
D	rough endoplasmic reticulum	vacuole	ribosome	mitochondrion

2 The diagram shows specialised plant cells.

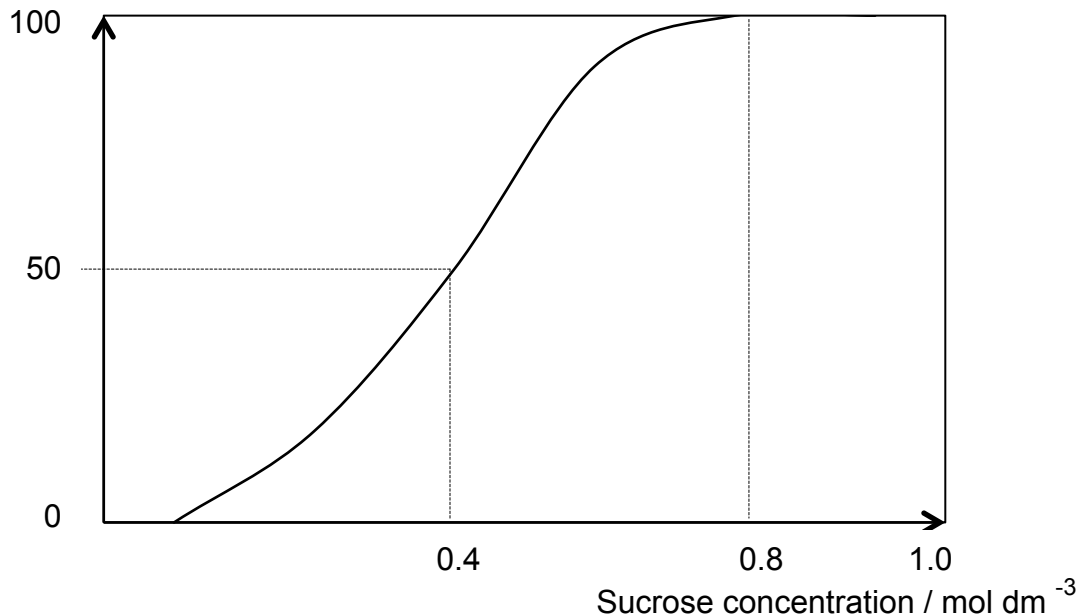


What is the purpose of increasing lignin deposit in xylem vessels from the left to the right?

- A** Xylem vessels are dying hence more lignin is deposited.
- B** Xylem vessels are getting bigger hence need more support.
- C** Xylem vessels are getting older hence more lignin is deposited.
- D** Xylem vessels are losing more water hence need more waterproofing.

- 3 Samples of fully turgid cells from a plant were placed in sucrose solutions of 0.4, 0.8 and 1.0 mol dm⁻³. The cells were left for one hour. The percentage of plasmolysed cells in each sample was recorded. The results are shown in the graph.

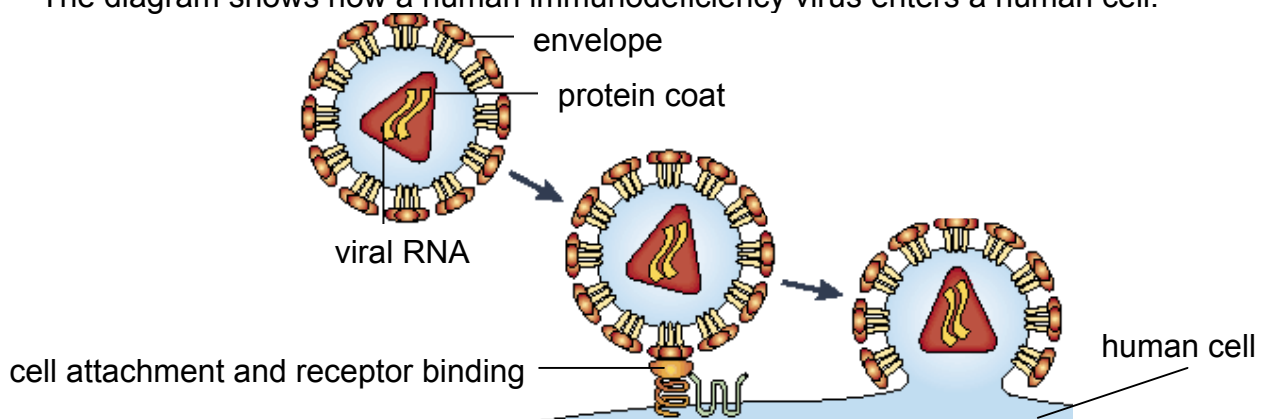
percentage of plasmolysed cells / %



Which row is true for all the cells in the sucrose concentration indicated after one hour?

	sucrose concentration in solution / mol dm ⁻³	sucrose concentration inside all the cells / mol dm ⁻³
A	0.4	0.4
B	0.4	0.8
C	0.8	0.8
D	0.8	1.0

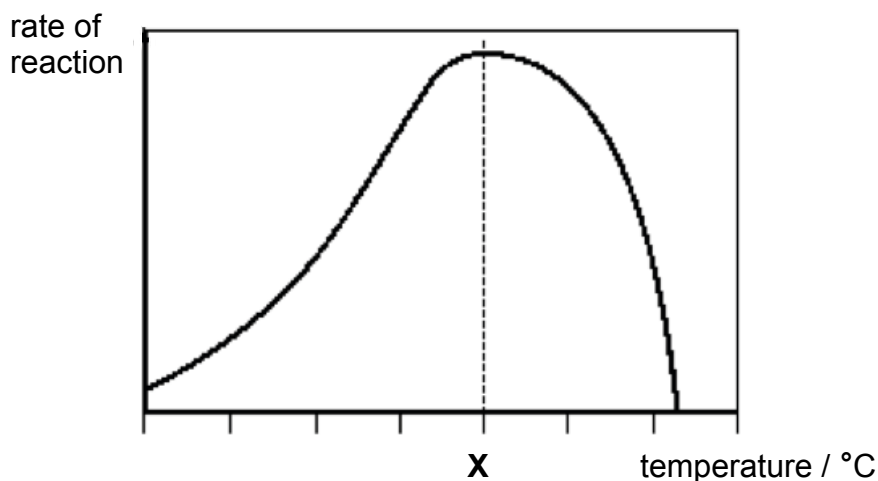
- 4 The diagram shows how a human immunodeficiency virus enters a human cell.



How is the virus transported across the cell membrane?

- A diffusion
- B endocytosis
- C exocytosis
- D facilitated diffusion

- 5 The graph shows the effect of temperature on an enzyme-catalysed reaction.



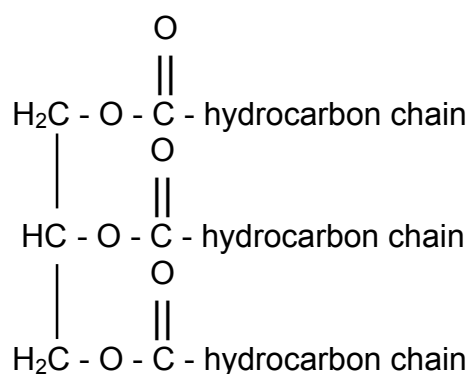
Which statement best describes what is happening at temperature X °C?

- A The activation energy of the reaction has been raised to a maximum.
 - B The kinetic energy of substrate molecules has reached a maximum.
 - C The number of denatured enzyme molecules is at a minimum.
 - D The number of enzyme-substrate complexes has reached a minimum.
- 6 Starch solution is mixed with fungal amylase at 22°C at pH 8. A sample is removed after five minutes and mixed with iodine solution. The mixture remained brown.

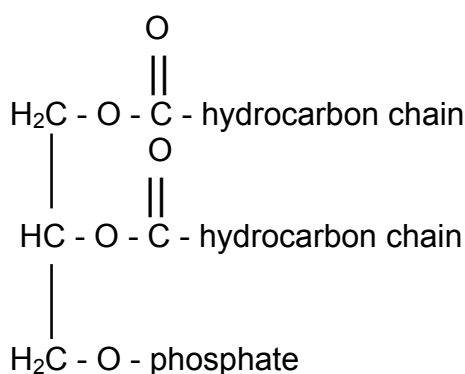
What is the most likely explanation for this observation?

- A The fungal amylase is not able to hydrolyse starch.
 - B The optimum temperature for fungal amylase is less than 22°C.
 - C The pH is too high to allow the reaction to proceed quickly.
 - D The starch has been completely hydrolysed to maltose.
- 7 Which statement about the primary structure of a protein is correct?
- A It is formed when amino acids link up in hydrolysis reactions.
 - B It is hydrogen bonded.
 - C It is made of carbon, hydrogen and oxygen only.
 - D It is unique to that protein.

8 The diagram shows the structure of two lipid molecules, P and Q.



P



Q

Which statements are correct?

- 1 Both molecules are formed using glycerol.
- 2 Both molecules are formed by condensation reactions.
- 3 The hydrocarbon chains of molecule P are always from saturated fatty acids.

- A** 1 and 2
B 1 and 3
C 2 and 3
D 1, 2 and 3

9 Two substances, X and Y, are analysed. The table shows the elements that each contains.

	carbon	hydrogen	oxygen	nitrogen	sulphur
X	+	+	+	-	-
Y	+	+	+	+	+

key

+ = present in substance

- = absent in substance

Which row correctly shows what X and Y are?

	X	Y
A	amino acid	carbohydrate
B	carbohydrate	fat
C	fat	amino acid
D	fat	carbohydrate

10 Which two regions of the light spectrum are most absorbed by chlorophyll during photosynthesis?

- A** blue and red
- B** green and red
- C** violet and blue
- D** violet and green

11 The diagram shows how one molecule of glucose is formed during photosynthesis.

light dependent stage

light energy $\longrightarrow$ chemical energy

water $\xrightarrow{\text{photolysis of water}}$ hydrogen ions + oxygen

light independent stage

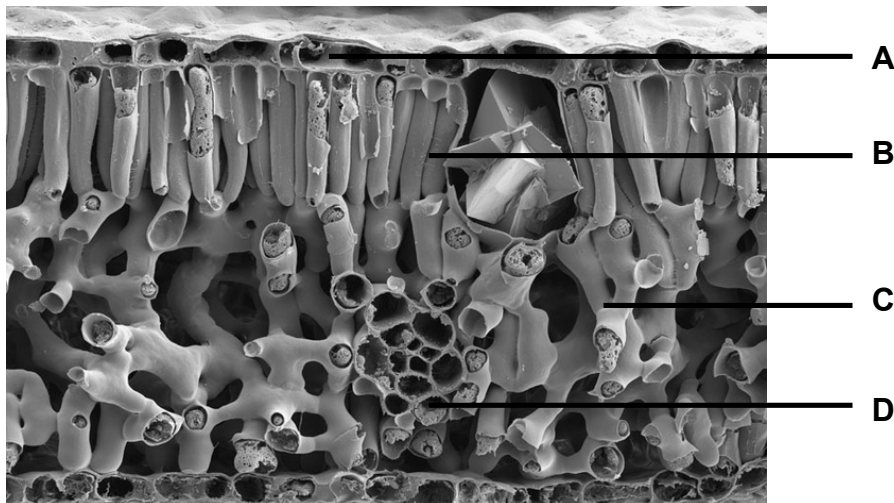
R $\xrightarrow{\text{enzyme-controlled reactions}}$ glucose + water

What is R?

- A** carbon dioxide
- B** nitrogen
- C** oxygen
- D** water

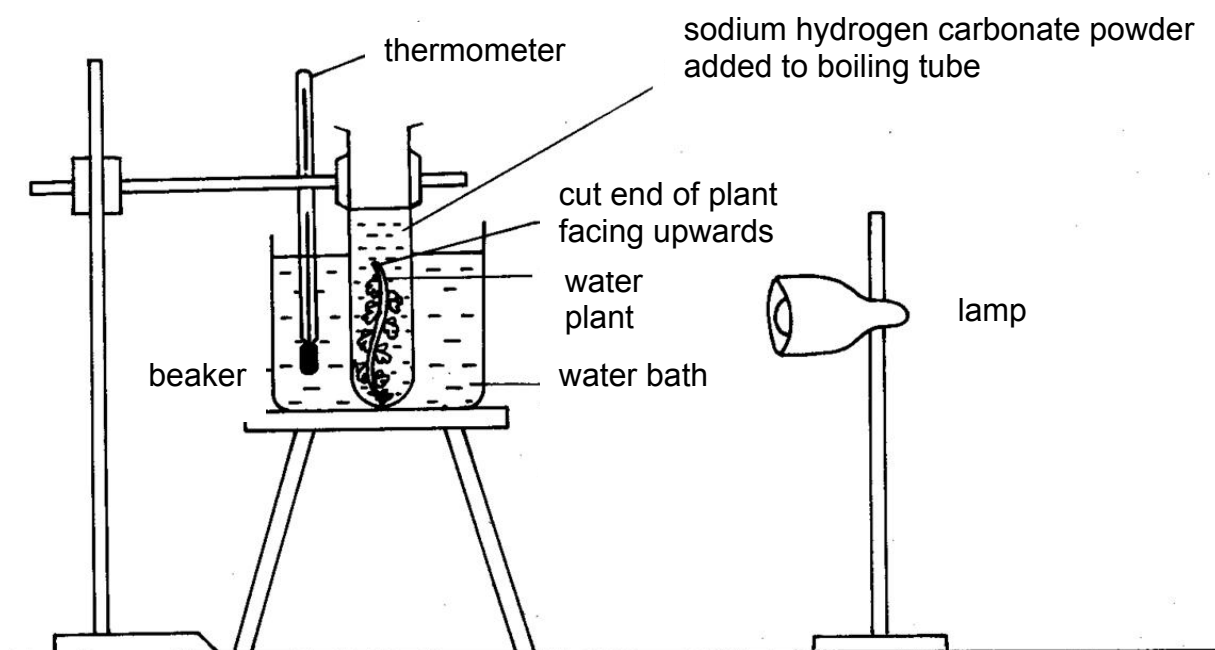
12 The photo shows a scanning electron micrograph of a transverse section of a leaf.

Which tissue, **A**, **B**, **C** or **D**, contains the highest concentration of amino acids?



(<https://s-media-cache-ak0.pinimg.com/736x/06/f4/ce/06f4ced8fe1247332260c05d342cdbec.jpg>)

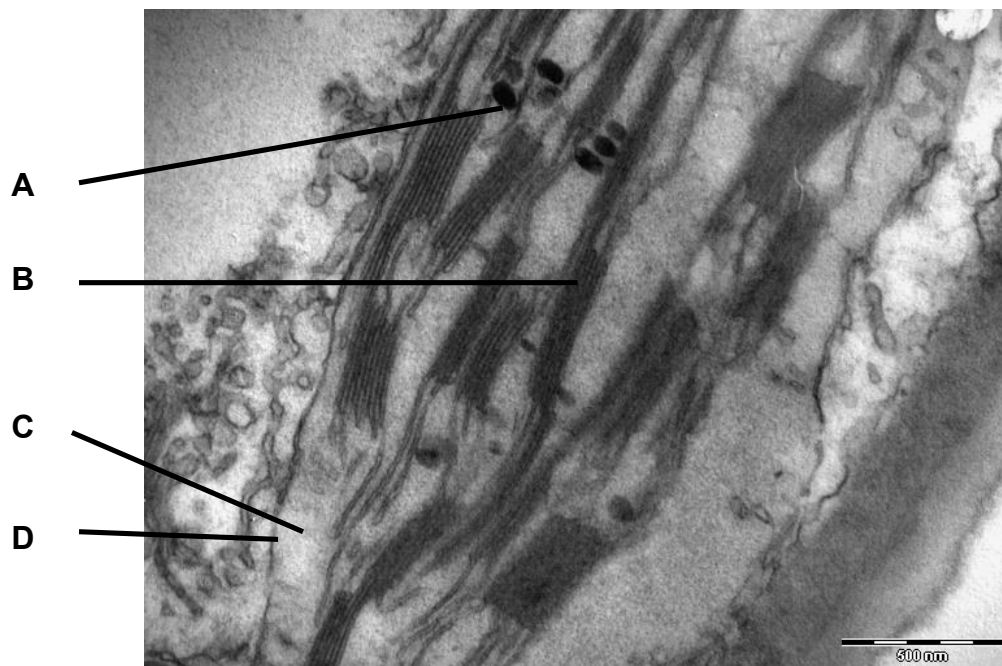
13 The diagram shows an investigation on the effect of different concentrations of carbon dioxide on the rate of photosynthesis.



Which is **not** a controlled variable in this investigation?

- A** length of water plant
- B** light intensity
- C** mass of sodium hydrogen carbonate powder
- D** temperature of water bath

- 14** The photo shows an electron micrograph of part of a chloroplast.
In which part of the chloroplast, **A**, **B**, **C** or **D**, does photolysis of water take place?



([https://commons.wikimedia.org/wiki/File:Chloroplast_30000x_\(3660656624\).jpg](https://commons.wikimedia.org/wiki/File:Chloroplast_30000x_(3660656624).jpg))

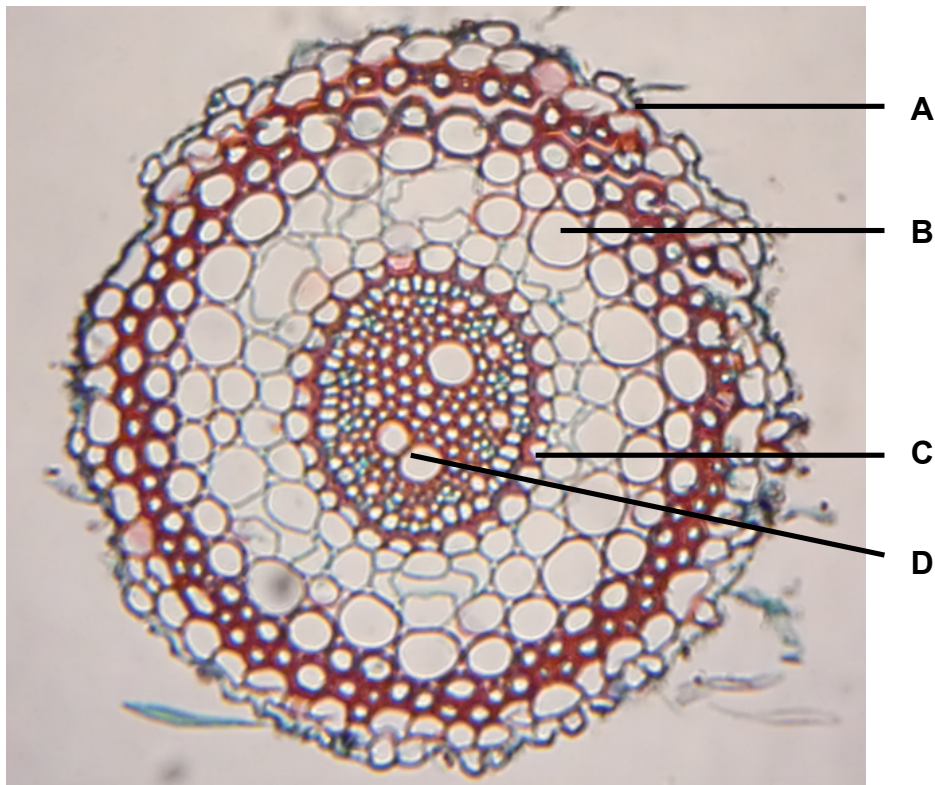
- 15** According to one hypothesis, the following steps, not in order, are involved in the opening of the stoma in sunlight.
- 1 Water from neighbouring epidermal cells enters guard cells by osmosis.
 - 2 The thicker cell walls of the guard cells facing the stoma causes the guard cells to curve more and pull stoma open.
 - 3 The guard cells photosynthesise, converting light energy to chemical energy.
 - 4 Water potential of the guard cells becomes more negative than surrounding cells.
 - 5 The chemical energy is used to pump potassium ions into the guard cells from neighbouring epidermal cells.
 - 6 The increase in turgidity of the guard cells causes them to be swollen.

Which is the correct sequence for the opening of the stoma in sunlight?

- A** 1 → 4 → 6 → 3 → 5 → 2
B 1 → 6 → 4 → 3 → 5 → 2
C 3 → 5 → 1 → 4 → 6 → 2
D 3 → 5 → 4 → 1 → 6 → 2

16 The diagram shows a cross section of a root.

Which tissue, **A**, **B**, **C** or **D**, regulates the ion concentration entering the xylem?

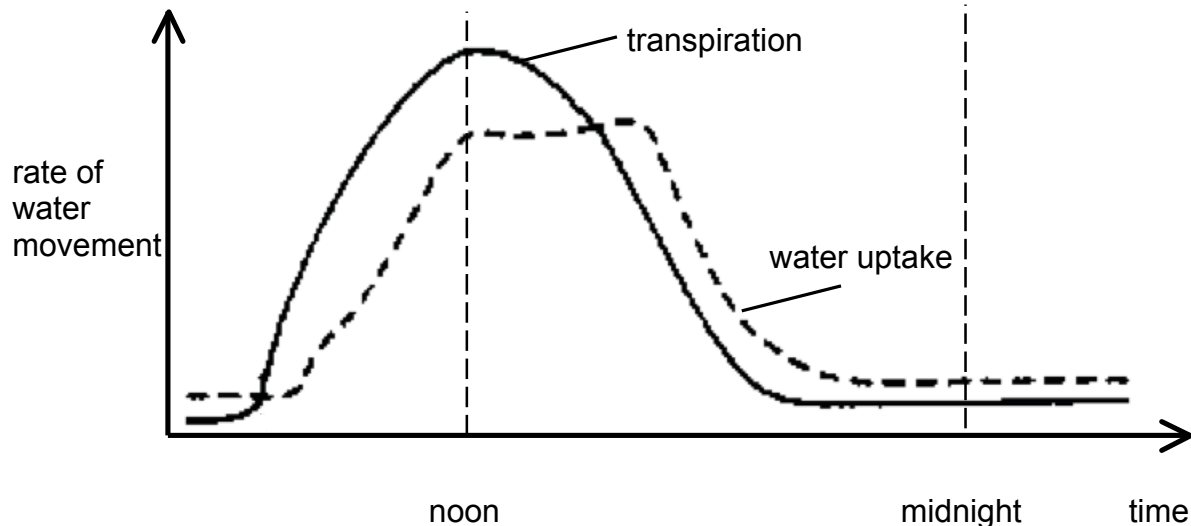


(<https://commons.wikimedia.org/wiki/File:TritiumRootCross.png>)

17 Which biological process relies on the adhesive and cohesive properties of water?

- A** entry of water into root hair cell
- B** exit of water from blood capillary into tissue fluid
- C** transport of ions in a mammal
- D** water movement in the transpiration stream

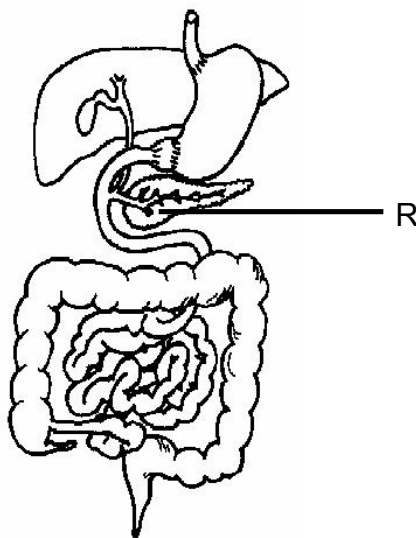
18 The graph shows rate of transpiration and rate of water uptake by a herbaceous plant.



Which statement is **not** correct?

- A** At midnight, plant cells will be fully turgid.
- B** At noon, plant cells will be fully turgid.
- C** Rate of transpiration is highest near noon.
- D** Transpiration drives water uptake between noon and midnight.

19 The diagram shows the human digestive system.



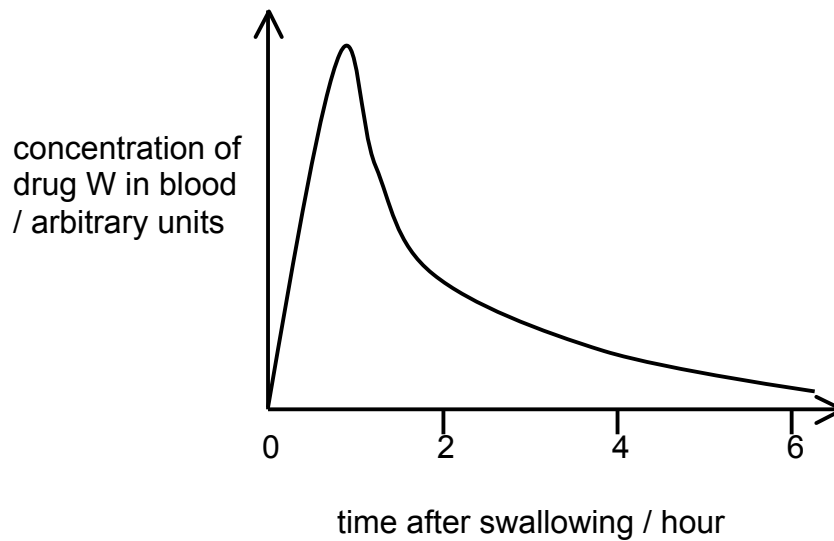
(http://wikieducator.org/Digestive_System_Worksheet)

Which of the following are produced by structure R?

- 1 amylase
- 2 lipase
- 3 pepsin
- 4 insulin

- A** 1 and 2 only
- B** 1, 2 and 3 only
- C** 1, 2 and 4 only
- D** 2, 3, and 4 only

Questions 20 and 21 refer to the graph below. The graph shows how the concentration of drug W in a person's blood varies with time, after it has been swallowed.



20 Which part of the human alimentary canal is drug W most likely to be absorbed?

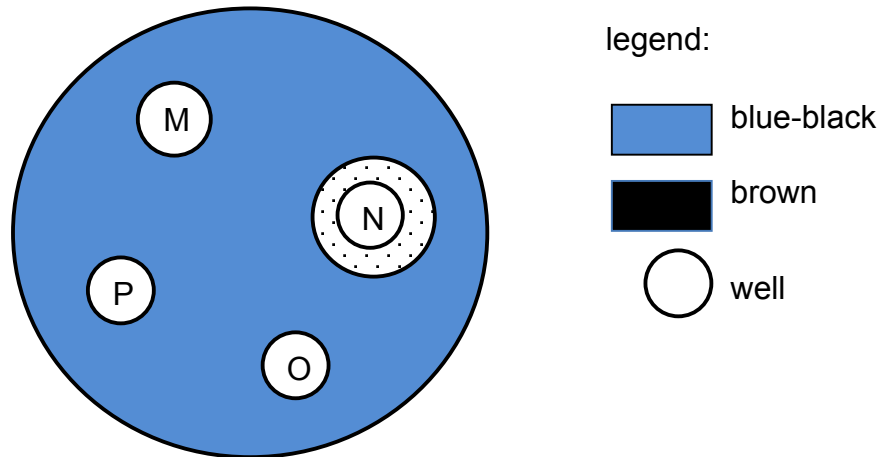
- A** colon
- B** ileum
- C** oesophagus
- D** stomach

21 Which of the following would most likely be a feature of drug W?

- A** It is resistant to the action of pepsin.
- B** It is not resistant to acid.
- C** It is made up of large, insoluble molecules.
- D** It is coated with a chemical that sticks to mucus.

Questions 22 and 23 refer to the diagram below.

An agar containing starch was made with four wells, M, N, O and P, in it. A different solution was placed in each well and two hours later, the agar was flooded with solution X. The diagram shows the final colour of the jelly.



22 What is solution X?

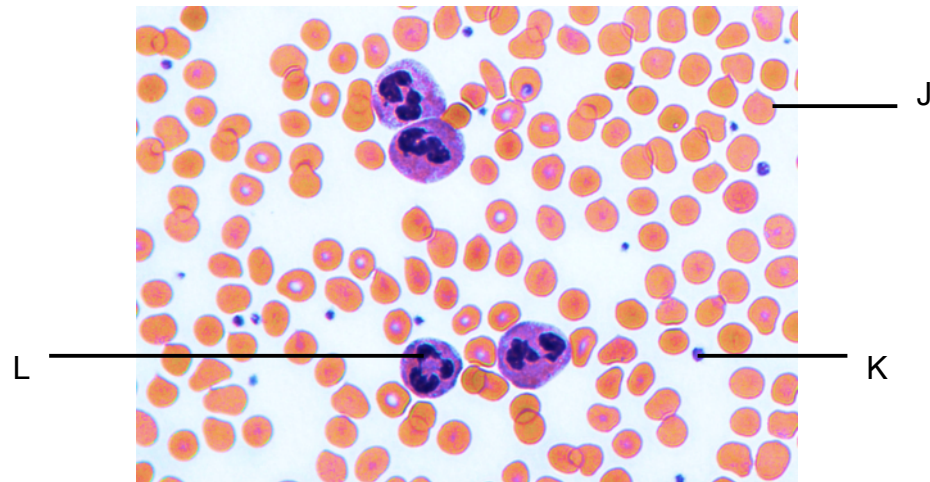
- A** Benedict's solution
- B** biuret solution
- C** ethanol
- D** iodine solution

23 What are the possible solutions that could have been placed in well N?

- 1 bile
- 2 gastric juice
- 3 pancreatic juice
- 4 saliva

- A** 1 and 3 only
- B** 2 and 3 only
- C** 2 and 4 only
- D** 3 and 4 only

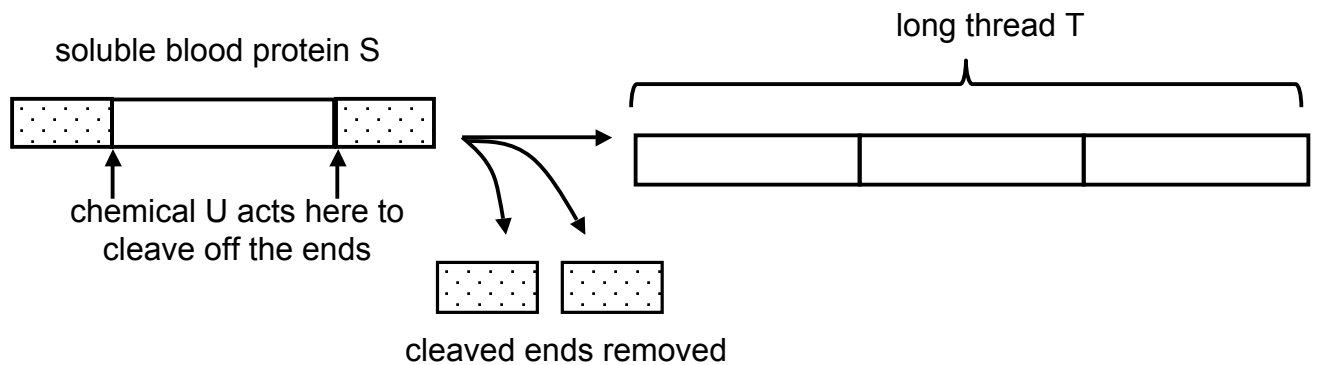
24 The diagram shows a blood smear.



Which row correctly identifies the labelled blood cells?

	J	K	L
A	erythrocyte	leucocyte	platelet
B	erythrocyte	platelet	leucocyte
C	leucocyte	erythrocyte	platelet
D	platelet	leucocyte	erythrocyte

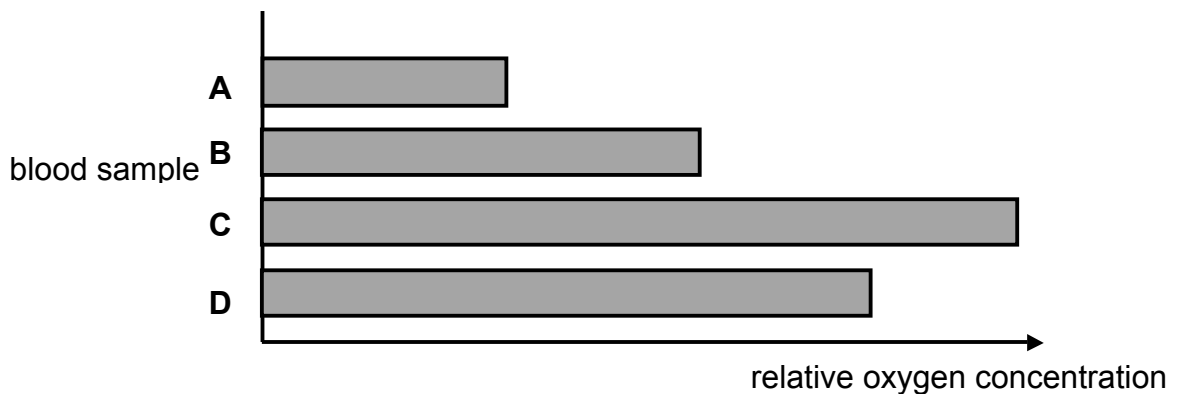
25 The diagram describes the formation of long insoluble threads during the clotting of blood.



Which of the following correctly identifies S, T and U?

	S	T	U
A	fibrin	fibrinogen	thrombokinase
B	fibrinogen	fibrin	thrombin
C	fibrin	fibrinogen	thrombin
D	fibrinogen	fibrin	thrombokinase

- 26** The bar chart shows the relative concentration of oxygen in blood samples of four different blood vessels of the human circulatory system. Which blood sample is taken from the pulmonary artery?



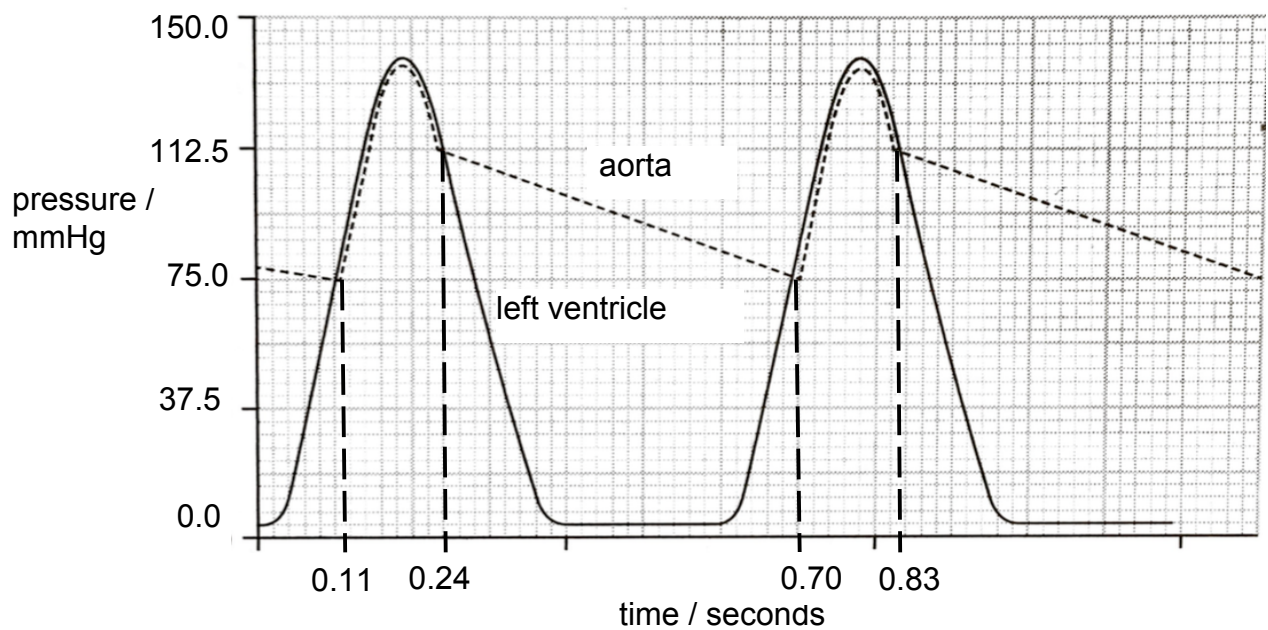
- 27** The table shows the heart rate and volume of blood pumped per beat in a man at rest and during vigorous exercise.

activity	heart rate / beats per min	volume of blood pumped per beat / cm ³
rest	60	50
vigorous exercise	200	75

Compare the activity of the man at rest and during vigorous exercise, how many times did the volume of blood pumped per minute increase from at rest to during vigorous exercise?

- A** 1.5 times
- B** 3.3 times
- C** 4.0 times
- D** 5.0 times

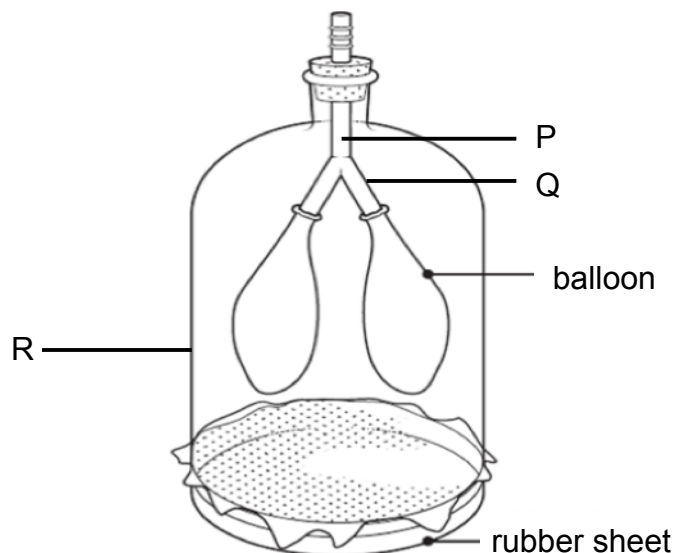
28 The graph shows the changes in pressure in the left ventricle and the aorta.



How long did the semi-lunar valve between the aorta and left ventricle remain closed?

- A** 0.13 seconds
- B** 0.46 seconds
- C** 0.59 seconds
- D** 0.72 seconds

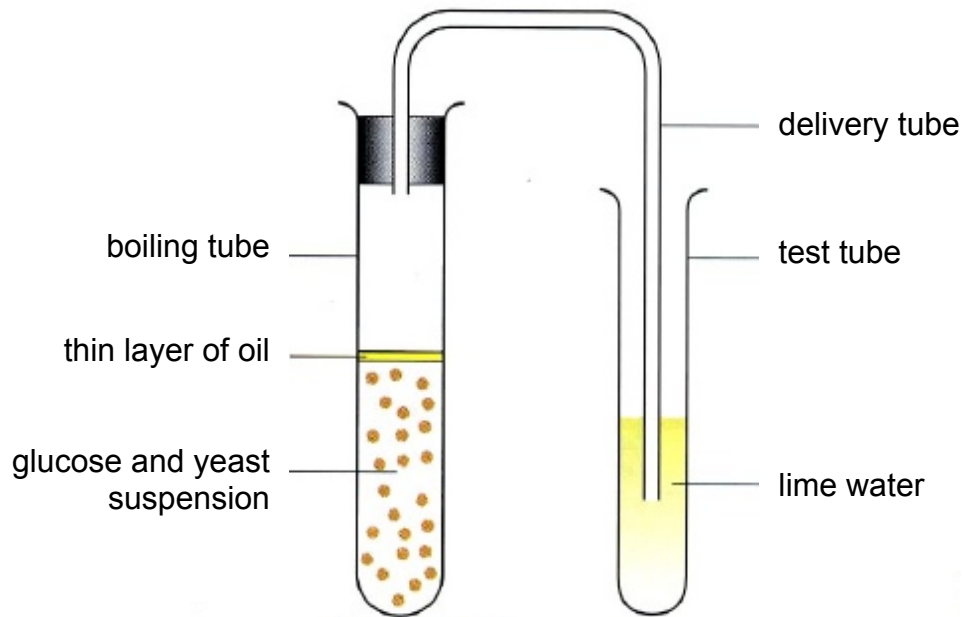
29 The diagram shows a model representing the human respiratory system.



What structures in the human respiratory system do P, Q and R represent?

	P	Q	R
A	bronchiole	trachea	diaphragm
B	bronchus	bronchiole	diaphragm
C	trachea	bronchus	rib cage
D	trachea	bronchiole	rib cage

30 The diagram shows a set-up used to investigate anaerobic respiration in yeast cells.



Which of the following would lead to an increase in the rate of ethanol production?

- A** adding oxygen into the yeast and glucose mixture
- B** increasing the concentration of glucose in the mixture
- C** increasing the volume of limewater
- D** maintaining the temperature of the yeast and glucose mixture at 85°C

End of paper