Class	Register Number	Name

南洋女子中学校

NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2011
Secondary Three

BIOLOGY **45 minutes**

Paper 1 Multiple Choice **0800 - 0845**

Friday **14 October 2011**

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 instrument led to the discovery and early study of cells?

A Potometer
B Centrifuge
C Light microscope
D Electron microscope

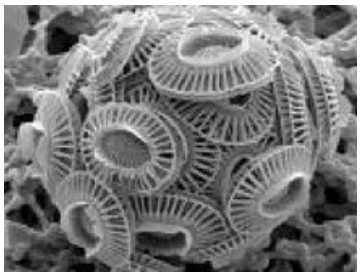
2 The photo shows a laboratory apparatus.

(Photo taken by STan 9 Jul 2010)

What is the laboratory technique that uses this apparatus?

A Staining
B Centrifugation
C Bacteria culture
D Gel electrophoresis

3 The photo shows a particular view of a living plankton.



(Photo taken by pennstatelive 2 Sep 2010 Flickr Creative Commons-licensed content)

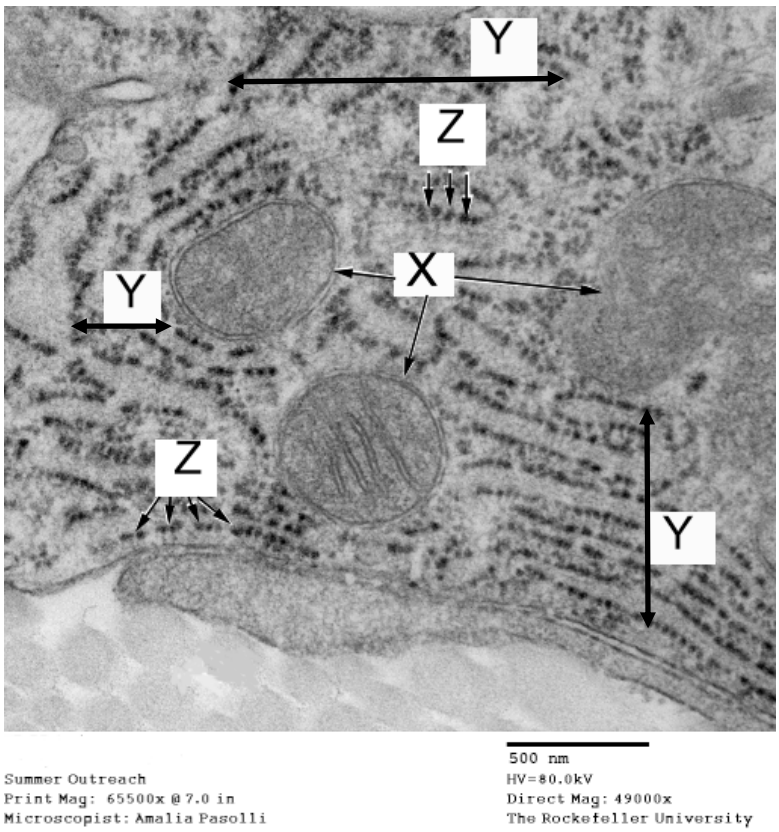
What is the laboratory tool that is used by biologist to view this living plankton?

A Stethoscope
B Light microscope
C Scanning electron microscope
D Transmission electron microscope

4 What makes the phospholipid molecules in cell membranes form fluid bilayers?

A The hydrocarbon tails repel water.
B The polar heads repel each other.
C The hydrocarbon tails are attracted to water.
D The polar heads are attracted to the hydrocarbon tails.

Questions 5 and 6 refer to the photomicrograph which shows part of a cell with a magnification of 49 000 times. Organelles **Z** are related to organelles **Y**.



(Permission obtained from The Rockefeller University for 2010 Summer Outreach Programme)

5 What is organelle **X**?

A Nucleus
B Chloroplast
C Mitochondrion
D Endoplasmic reticulum

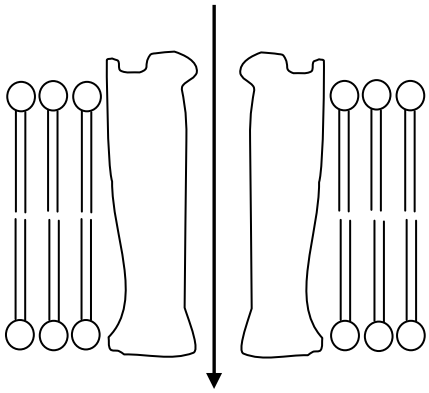
6 How is organelle **Y** related to organelle **Z**?

A **Y** transport proteins made by **Z**.
B **Z** transport proteins made by **Y**.
C **Y** modifies proteins made by **Z** by adding carbohydrate.
D **Z** modifies proteins made by **Y** by adding carbohydrate.

7 Four identical samples of plant tissue, each with a water potential of -700 kPa, are placed in four different solutions.
Which solution caused full plasmolysis to occur?

A Solution with water potential -200 kPa.
B Solution with water potential -400 kPa.
C Solution with water potential -700 kPa.
D Solution with water potential -1000 kPa.

8 The diagram shows the pathway of **facilitated diffusion** of a particle through a cell membrane.



What are the most likely properties of the particle?

	Lipid solubility	**Electrically charged**
A	High	Yes
B	High	No
C	Low	Yes
D	Low	No

9 A fungal amylase was incubated with starch at 22°C at pH 8.
A sample of the starch was removed after five minutes and mixed with iodine solution.
The mixture remained brown.

What is the most likely conclusion for this observation?

A An inhibitor of the fungal amylase was present.
B The starch had been completely hydrolysed to maltose.
C The pH was too high to allow the reaction to proceed quickly.
D The optimum temperature for fungal amylase was less than 22°C.

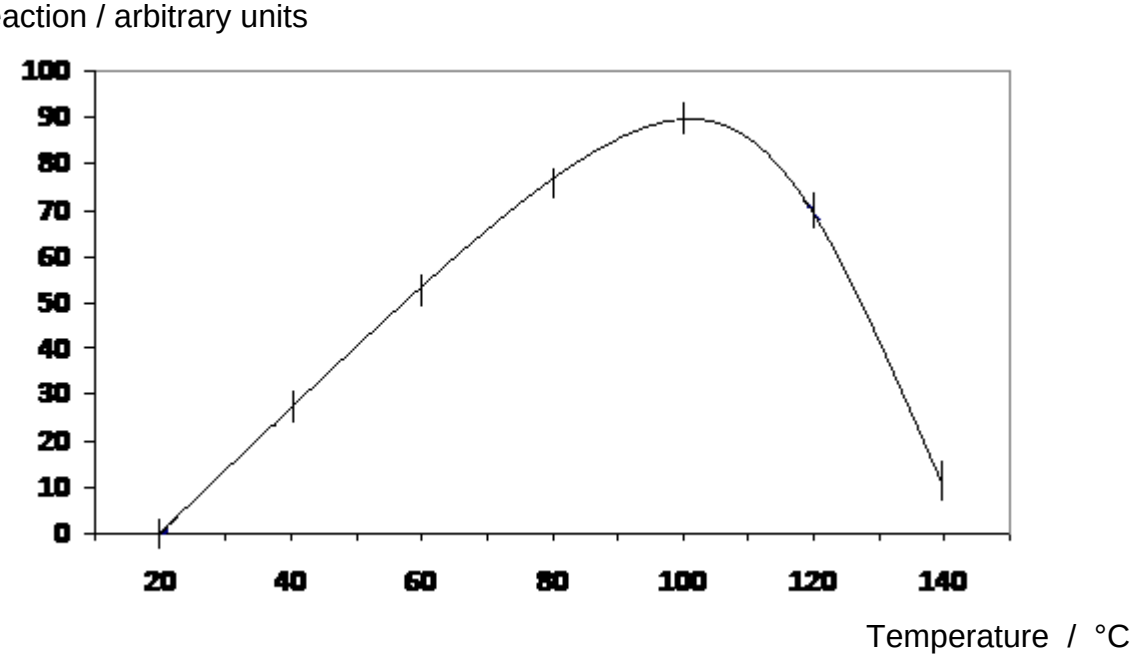
10 A student was asked to identify the two compounds in each of three test tubes. The table shows the results of the student's tests.

Test tube	Reagent added to test tube		
	Sodium hydroxide solution + copper sulphate solution	Benedict's solution	Iodine solution
X	Purple	Brick red	Brown
Y	Purple	Blue	Blue black
Z	Purple	Blue	Blue black

Which conclusion is consistent with the results?

A Egg white and sucrose had been placed in tube **X**.
B Maltose and starch had been placed in tube **Z**.
C Maltose and sucrose had been placed in tube **X**.
D Starch and egg white had been placed in tube **Y**.

Questions 11 and 12 refer to the graph which shows the effect of increasing temperature on activity of an amylase from the bacterium *Pyrococcus furiosus*. This bacterium is found in hot water associated with volcanic activity.



11 Which statement explains the shape of the graph above 100°C?

A The activation energy is too low.
B The activation energy is exceeded.
C The enzyme-substrate complex does not separate.
D The shape of the active site of the enzyme is altered.

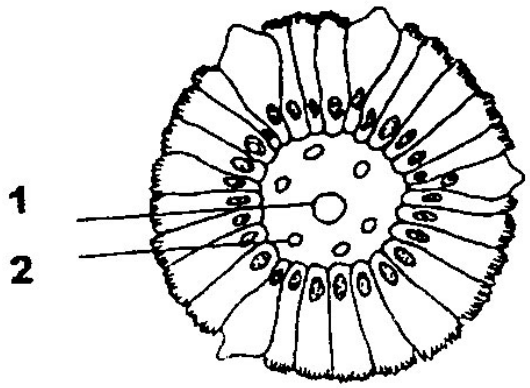
12 Which statement explains how amylase in the bacterium *Pyrococcus furiosus* can work at temperatures as high as 100°C?

A Amylase in the bacterium has more bonds.
B Amylase in the bacterium has more than one active site.
C Amylase in the bacterium has optimum temperature at 80°C.
D Amylase in the bacterium has optimum pH at around pH5 to pH6.

13 What are the substrates and end products for the action of the enzyme trypsin?

	Substrates	**End products**
A	Fats	Fatty acids and glycerol
B	Fats	Fatty acids and glucagon
C	Proteins	Amino acids
D	Proteins	Polypeptides

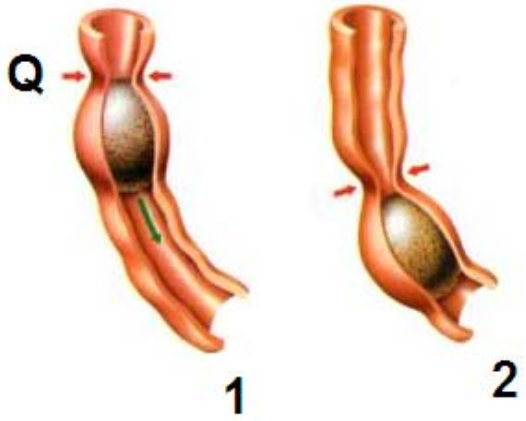
14 The figure shows a transverse section of an intestinal villus.



What is the main food substance that is absorbed into structure **1**?

A Amino acids
B Fatty acids
C Glucose
D Ions

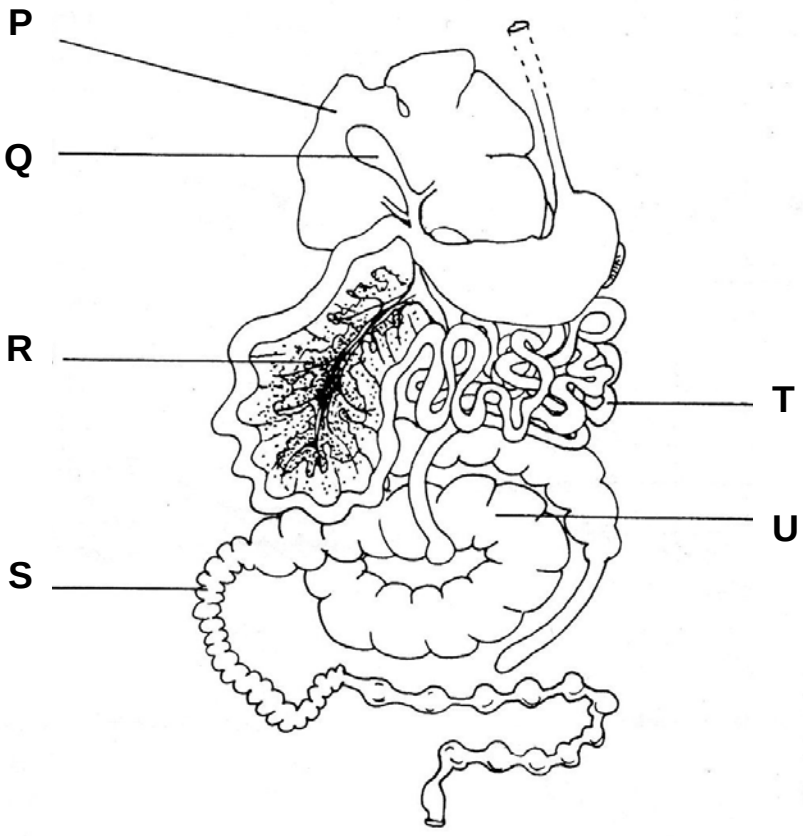
15 The diagram illustrates how a food bolus is moved during peristalsis.



Which of the following correctly identifies and describes the action of the muscles at **Q** to bring about the movement of the bolus as shown from 1 to 2?

	Muscles at Q	**Action of Q**
A	Circular muscles	Relaxed
B	Circular muscles	Contracted
C	Longitudinal muscles	Relaxed
D	Longitudinal muscles	Contracted

Questions 16, 17 and 18, refer to the diagram which shows part of the alimentary canal of a mammal.



16 Which structure(s) is/are involved in the emulsification of fats?

A **P** only
B **Q** only
C **P** and **Q** only
D **P**, **Q** and **R**

17 Which structure produces substances to regulate the level of glucose in the blood?

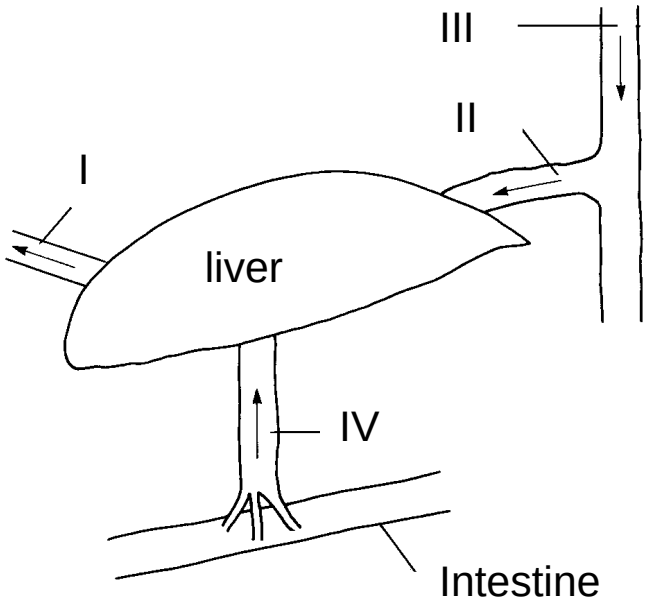
A **P**
B **Q**
C **R**
D **T**

18 **U** is an enlarged, functional structure found in plant eating mammals. It contains bacteria that release the enzyme cellulase for the hydrolysis of cellulose. The role of **S** is in the absorption of water and dissolved mineral salts.

What is structure **U**?

A Appendix
B Caecum
C Colon
D Ileum

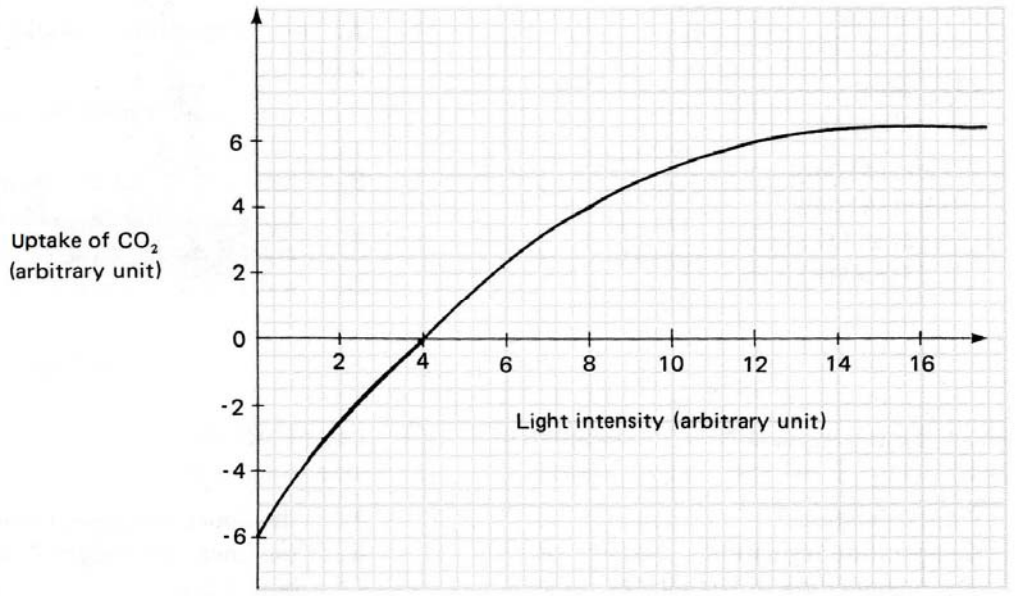
19 The diagram shows the blood supply to the liver.



Which blood vessels transport blood that is deoxygenated and is rich in nutrients?

A I and II
B III and IV
C I and IV
D II and IV

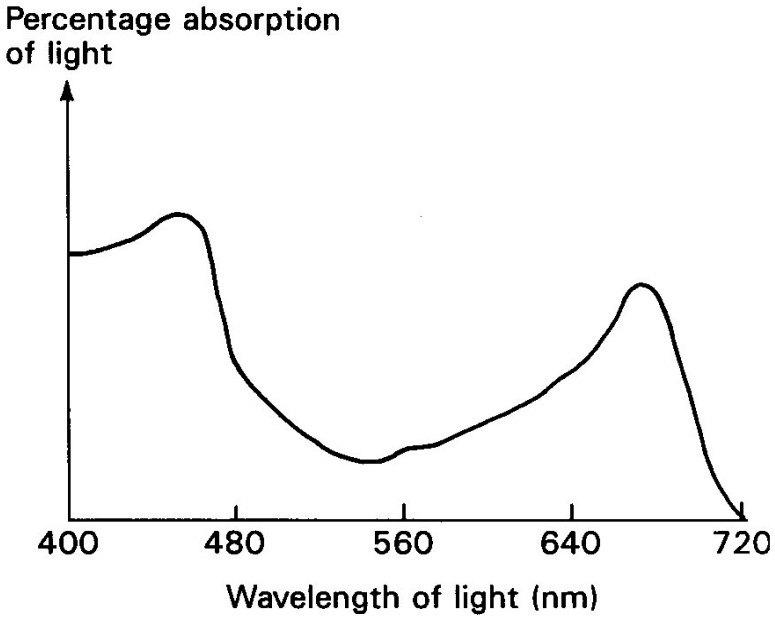
20 The graph shows the relationship between carbon dioxide uptake during photosynthesis and light intensity for a particular species of green plant.



At which light intensity was the rate of photosynthesis the same as that of respiration?

A 0
B 4
C 8
D 16

21 The graph shows the absorption spectrum of a green leaf.



Which wavelength/s is/are most effective for the production of carbohydrates in the green plant?

A 460nm and 680nm
B 480nm and 640nm
C 560nm
D 720nm

22 If light intensity is uniformly high, under which of the following conditions is carbon dioxide most likely to be the **main** limiting factor on the rate of photosynthesis?

	Temperature/^{o}C	% carbon dioxide
A	30	4.00
B	30	0.04
C	10	4.00
D	10	0.04

23 Equal masses of freshly picked hibiscus leaves were dried at the times indicated in the following table and their dry masses were recorded.

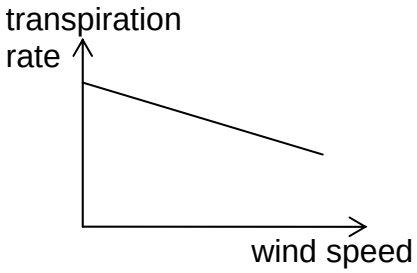
Time	Dry mass (g)
6 am	0.12
9 am	0.15
12 noon	0.21
3 pm	0.38

Which of the following processes accounts for the change in dry weights?

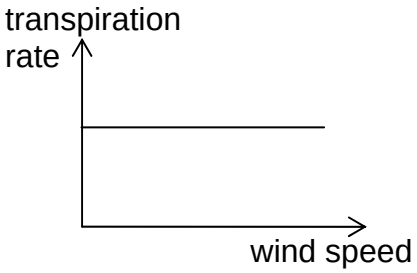
A Photosynthesis
B Respiration
C Transpiration
D Translocation

24 Which graph shows the effect of increased wind speed on the transpiration rate of a plant?

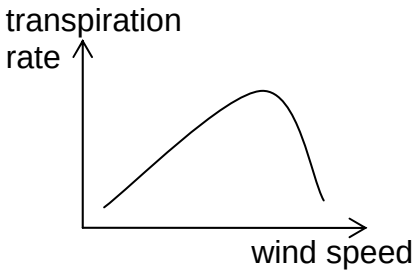
A



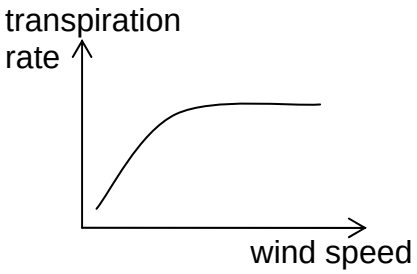
B



C



D



25 A plant is exposed to different temperatures and humidities.
Which set of conditions will cause the plant to lose most water?

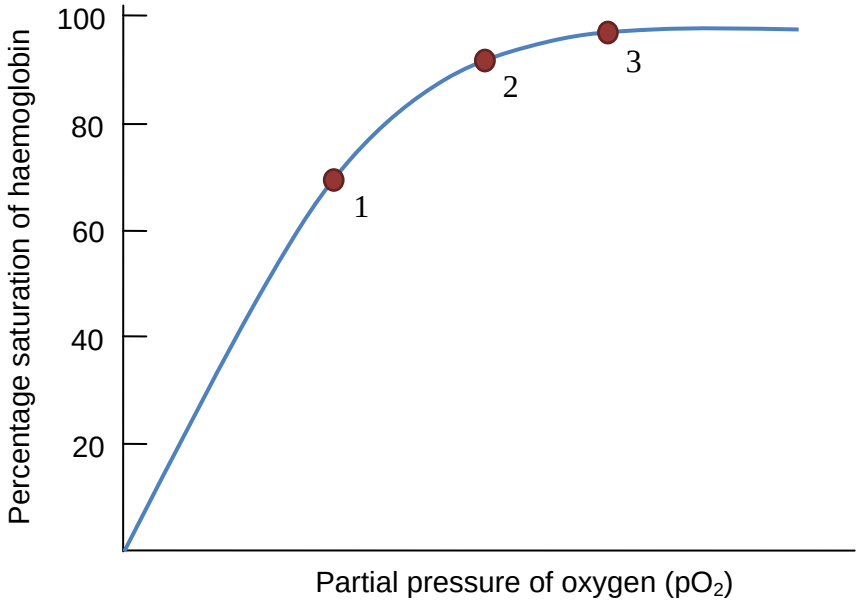
	Temperature / °C	Humidity / %
A	15	30
B	15	60
C	25	30
D	25	60

26 Which of these statements correctly explain part of transpiration pull?

1 Water evaporates into the air space of the leaf.
2 Water molecules cohere so are pulled upwards in the xylem.
3 Water passes by osmosis through the stomata.
4 Water vapour diffuses through the mesophyll cells.

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

27 The graph shows an oxygen dissociation curve for haemoglobin.



Where in the body will haemoglobin be saturated at the percentages shown at points 1, 2 and 3 on the graph?

	left ventricle	pulmonary vein	venae cavae
A	1	2	3
B	2	1	3
C	2	3	1
D	3	2	1

28 Some events that take place during the cardiac cycle are listed below.

1 bicuspid valve closes
2 left atrium contracts
3 left ventricle contracts
4 left ventricle relaxes

Which sequence of events is correct?

	first → last			
A	2	1	3	4
B	2	3	1	4
C	3	1	2	4
D	3	2	4	1

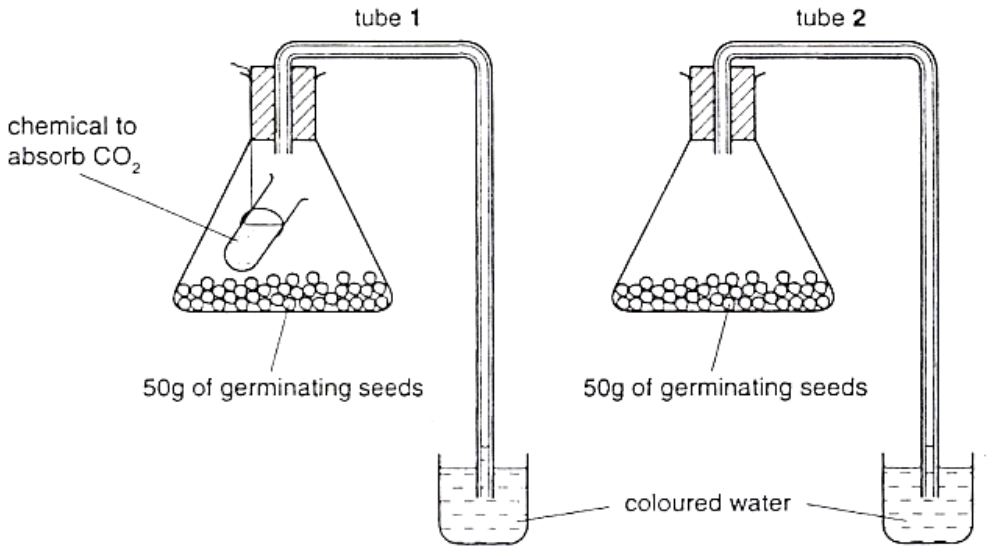
29 The photomicrograph shows part of the lining of the human trachea.

Source: http://biology.uco.edu/AnimalBiology/Tissues/Epithelium.html

What is the function of cell **X**?

A phagocytosis
B gaseous exchange
C secretion of mucus
D absorption of glucose

30 The diagram shows apparatus used to investigate respiration.



After four hours, what would the levels of coloured water in the two tubes be?

	Tube 1	Tube 2
A	Higher	Higher
B	Higher	No change
C	No change	Higher
D	No change	No change

End of paper