Name: _____ Register Number: _____ Class: _____

南仁中学

NAN CHIAU HIGH SCHOOL
PRELIMINARY EXAMINATION 2024
SECONDARY FOUR EXPRESS

For Marker's Use

Parent's Signature: _____

BIOLOGY **6093/1**

Paper 1 Multiple Choice **28 August 2024, Wednesday**

1 hour

Additional Materials: Multiple Choice Answer Sheet (OTAS)

READ THESE INSTRUCTIONS FIRST

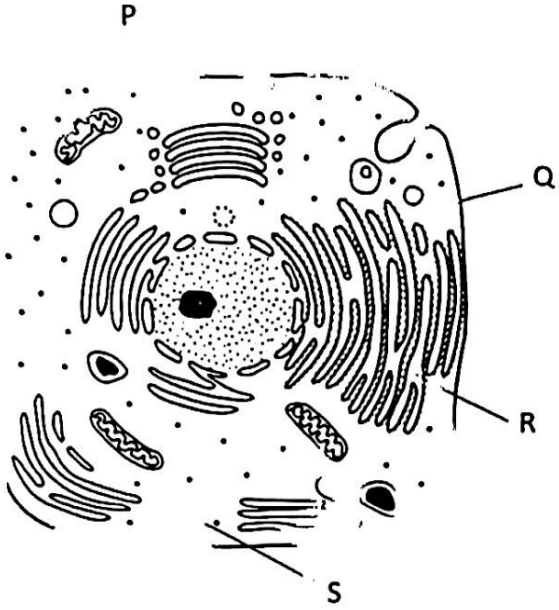
Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, register number and class on the OTAS in the spaces provided unless this has been done for you.

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

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.
The total marks for this paper is 40.

This paper consists of **22** printed pages including the cover page.

1 The diagram shows a drawing of a eukaryotic cell.



Which row correctly matches the labelled parts to their functions?

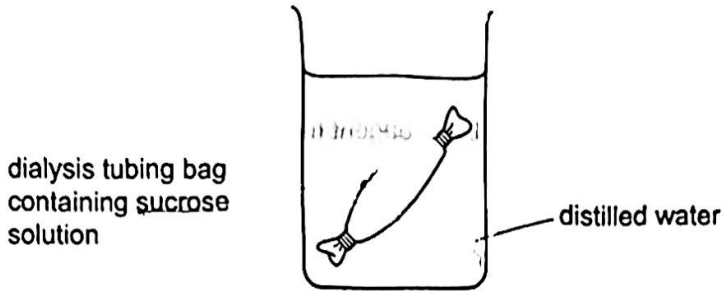
	P	Q	R	S
A	release of energy	transport of protein	synthesis of protein	transport of protein
B	release of energy	synthesis of protein	transport of protein	regulate entry of substances
C	synthesis of protein	transport of protein	synthesis of lipid	regulate entry of substances
D	synthesis of glucose	synthesis of protein	transport of protein	transport of protein

2 The table shows some features of specialised cells.

Which row is correct?

	feature	bacterial cell	sperm cell	xylem vessel
A	able to move to another site	yes	yes	no
B	DNA present in nucleus	yes	yes	no
C	has cytoplasm	yes	yes	yes
D	has many mitochondria	no	no	no

3 The diagram shows some of the apparatus used in an osmosis investigation.



In this investigation a dialysis tubing bag was filled with sucrose solution, sealed and weighed. The dialysis tubing bag was then immersed in distilled water for one hour. After one hour the dialysis tubing bag was removed from the beaker, the surface was dried and the bag was reweighed.

Which row explains what will happen during the investigation?

	mass of the dialysis tubing bag after one hour	net movement of sucrose molecules	net movement of water molecules
A	decreased	none	out of the bag
B	deceased	into the bag	out of the bag
C	increased	none	into the bag
D	increased	out of the bag	into the bag

4 The results in the table below were obtained by analysis of the vacuole sap of a fresh water algae, *Nitella clavata*, and of the pond water in which it was growing.

Ion	sap concentration / mg ions per dm^3	pond water concentration / mg ions per dm^3
Ca^{2+}	26.0	2.6
Mg^{2+}	21.6	6.0
Na^{+}	49.9	1.2
K^{+}	49.3	0.51

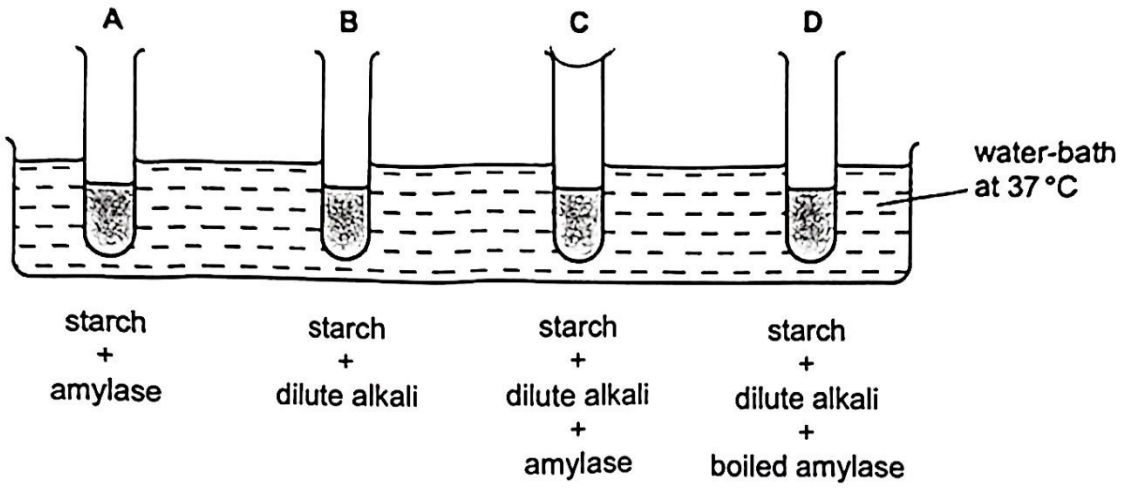
Which process accounts for the results?

A active transport
B diffusion
C osmosis
D plasmolysis

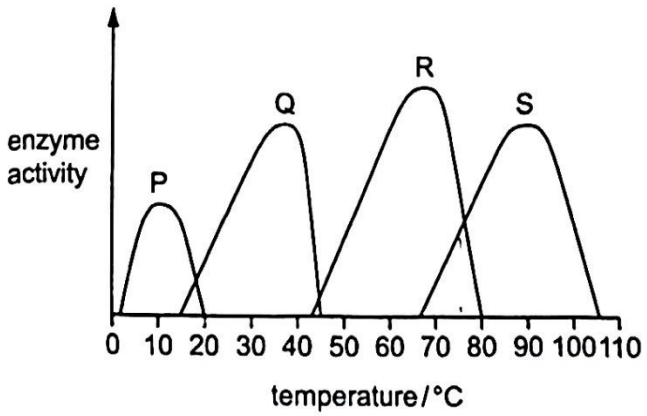
5 The diagram shows an experiment on the digestion of the starch by amylase. The amylase was extracted from a human small intestine.

After 30 minutes, the contents of the test tube were tested using Benedict's reagent.

In which test-tube will the Benedict's reagent turn red the fastest?



6 The graph shows the effect of temperature on the activity of four different enzymes.

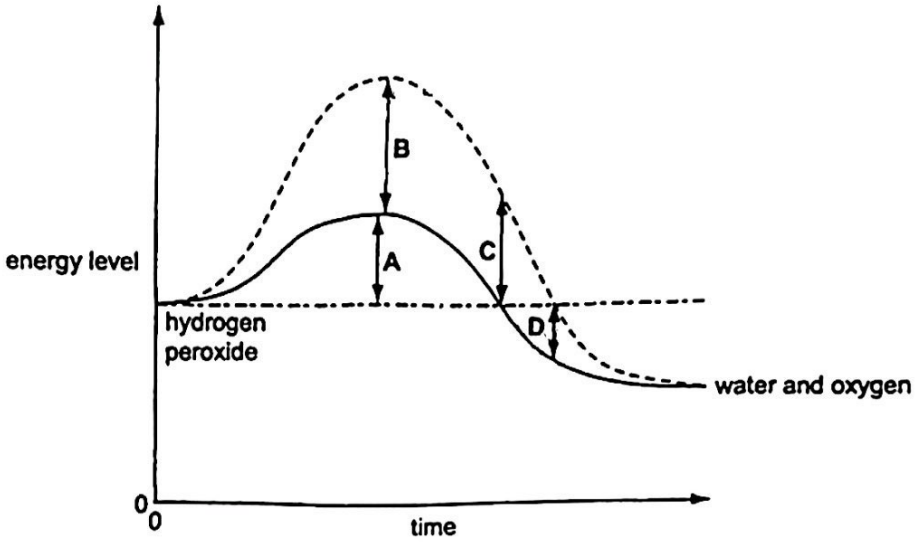


Which conclusion about the data in the graph is correct?

A enzyme P and enzyme Q are both active at 25 °C
B enzyme P has an optimum temperature of 0 °C
C enzyme R and enzyme S are both active at 75 °C
D enzyme S has an optimum temperature above 100 °C

7 The graph below shows the energy level during the breakdown of hydrogen peroxide into water and oxygen, in the presence and absence of catalase enzyme.

What is the\difference in energy levels between an enzyme-catalysed reaction and a reaction without enzyme?

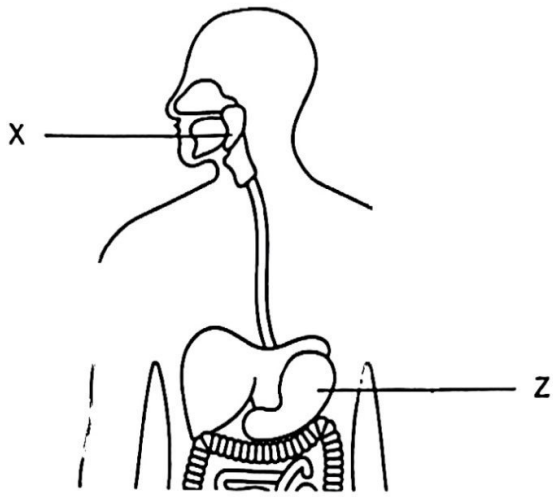


8 The table shows information about urea.

Which row is correct?

	substance that urea is made from	organ that makes urea	organ that excretes urea
A	amino acids	kidney	kidney
B	amino acids	liver	kidney
C	proteins	kidney	large intestine
D	proteins	liver	large intestine

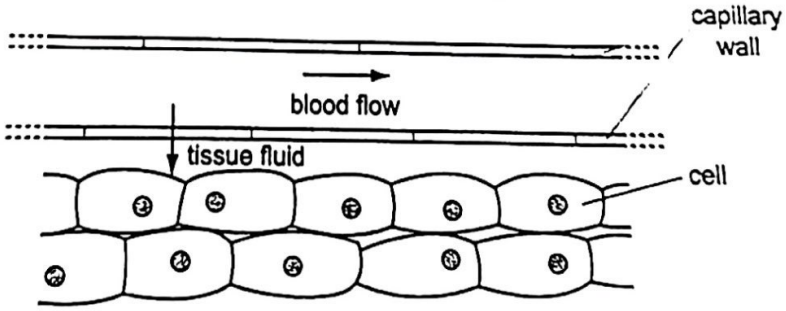
9 The diagram shows part of the alimentary canal.



Which row correctly matches the parts shown in the diagram to the description of the food there?

	X	Z
A	more polypeptides	more glucose
B	more proteins	more glucose
C	more starch	more maltose
D	more starch	more protein

10 The diagram shows some cells next to a capillary ih the body of a human female.

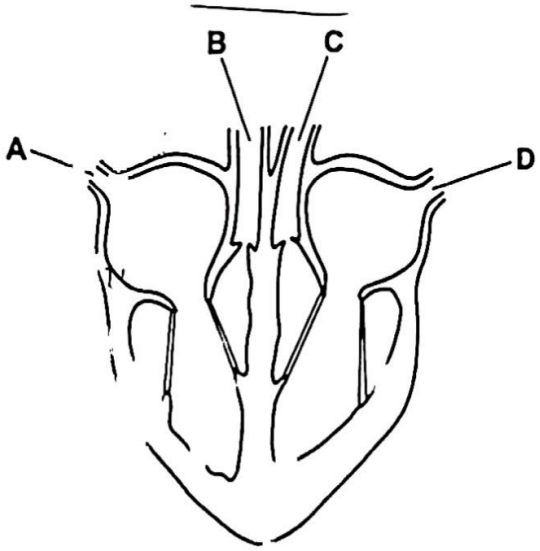


What is present in the tissue fluid formed from the plasma?

A ADH and testosterone
B amino acids and thrombokinase
C glucose and oxygen
D red blood cells and antibodies

11 The diagram shows a section through a mammalian heart.

Which part contains blood with the lowest pressure?

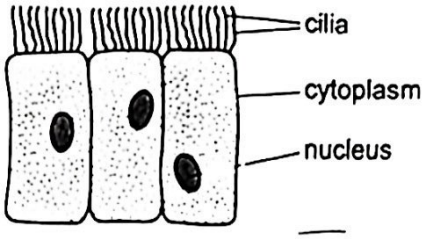


12 The diagram shows a section through a blood vessel.

Which type of blood vessel is shown, and in which direction does the blood flow?

	type of blood vessel	direction of flow
A	artery	P to Q
B	capillary	Q to P
C	vein	P to Q
D	vein	Q to P

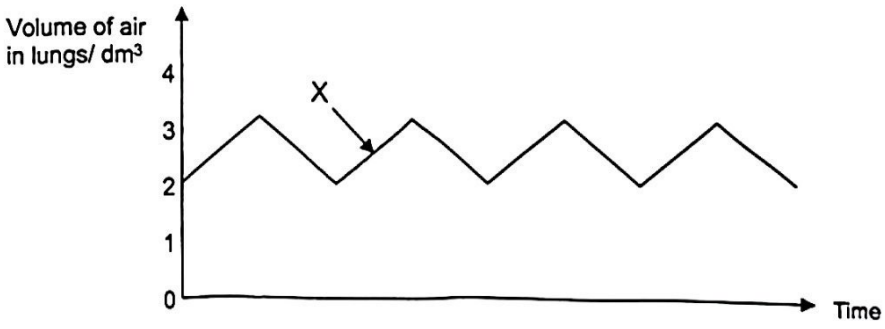
13 The diagram shows some cells.



Which statement correctly describes the function of these cells.

A facilitate air flow to lungs
B increase surface area to volume ratio for gaseous exchange
C sweep mucus towards pharynx
D trap foreign bodies in airway

14 The graph shows the changes in the volume of the lungs of a person at rest over a period of time.



Which row correctly describes state of muscles at stage X?

	internal intercostal muscles	diaphragm muscles
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

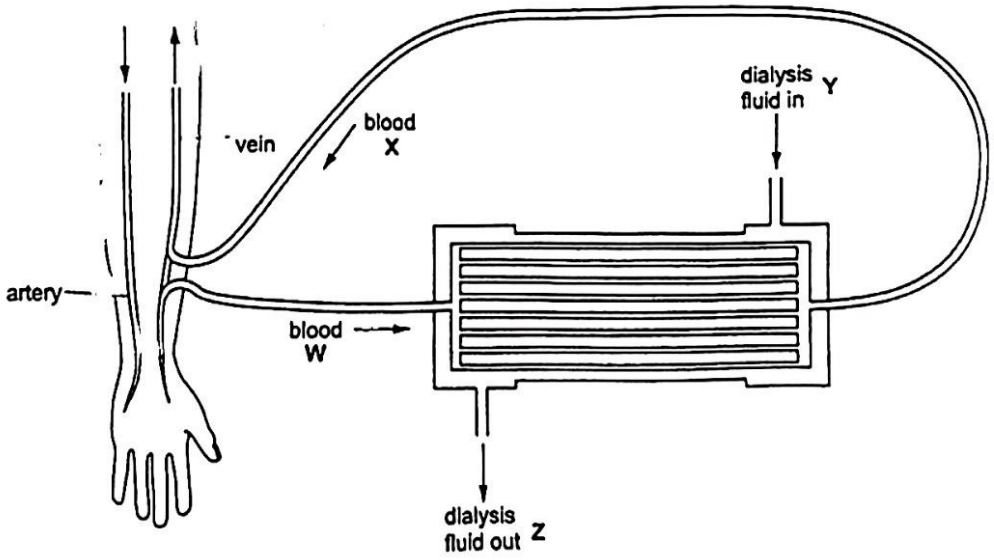
15 Fanconi Syndrome is a disorder that affects the kidney. Patients with this syndrome has lowered functional capabilities in their proximal convoluted tubules.

Arterial blood, glomerular filtrate and urine samples were collected from a patient with Fanconi Syndrome and analysed for concentrations of glucose.

Which row shows the most probable analysis result from the urine sample of a patient with Fanconi Syndrome with no other medical condition?

	glucose concentration ($g/100cm^3$)		
	arterial blood	glomerular filtrate	urine
A	0.10	0.09	0.06
B	0.10	0.09	0.00
C	0.25	0.00	0.00
D	0.25	0.15	0.09

16 The diagram shows the flow of blood and dialysis fluid through a kidney machine.



Where would the concentration of urea be highest?

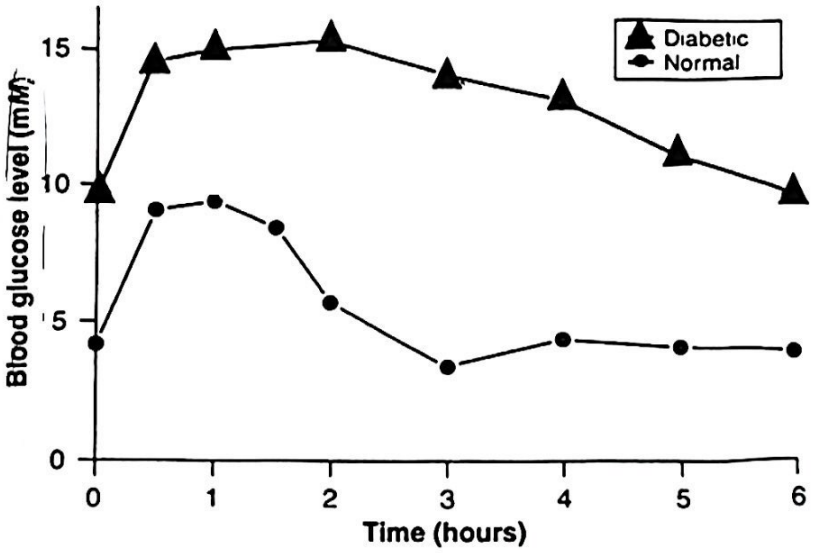
A W and X
B X and Y
C Y and Z
D Z and W

17 Caffeine is present in coffee and tea. Caffeine inhibits the production of anti-diuretic hormone (ADH) by the pituitary gland in the brain.

Which row shows how the urine volume and urea concentration change after ingesting caffeine?

	urine volume	urea concentration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

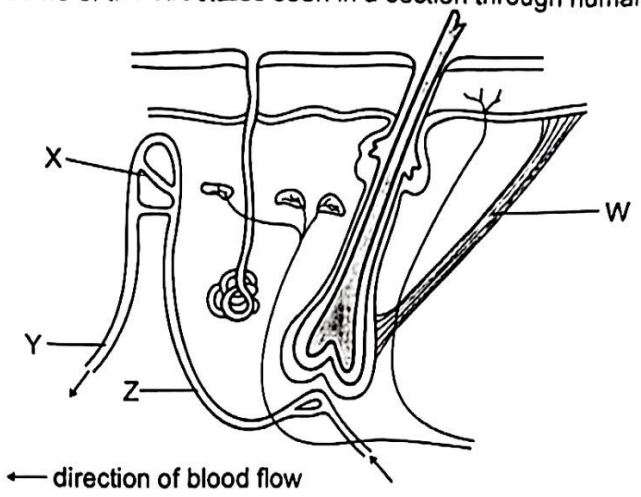
18 The graph shows the blood glucose concentration of a normal and diabetic individual after consuming a heavy meal at Time = 0 hours.



Which row describes what is happening in the normal and diabetic individuals between 1 to 3 hours after consuming the heavy meal?

	normal individual	diabetic individual
A	breakdown of glucose via respiration	conversion of glycogen into glucose
B	conversion of glucose into glycogen	conversion of glucose into glycerol
C	more glucagon produced	less glucagon produced
D	more insulin produced	less insulin produced

19 The diagram shows some of the structures seen in a section through human skin.



Which structure(s) contain(s) muscle that relax when the body temperature is too high?

A X only
B W and X
C W and Z
D Y and Z

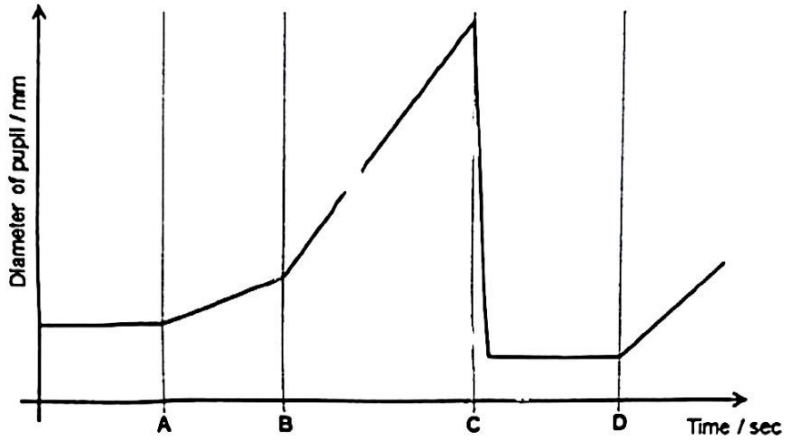
20 The diagram below shows part of the human nervous system.

Which of the following shows the correct neuronal pathway when a person decides to lift up his leg?

A S → T → P
B S → T → Q → R
C P → Q → R
D P → T → S → T → Q → R

21 A man was wearing sunglasses on a sunny day and removed them as he prepared to enter the swimming pool. The following graph shows the changes in the diameter of his pupil against time.

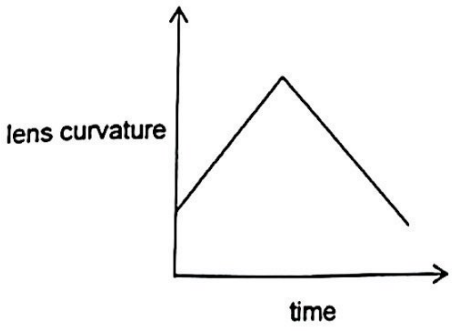
At which point on the graph did he remove his sunglasses?



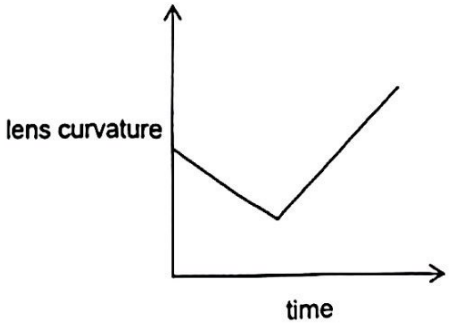
22 A student observed an insect flying away after landing on his nose.

Which graph shows the changes in the curvature of lens in his eyes during this time?

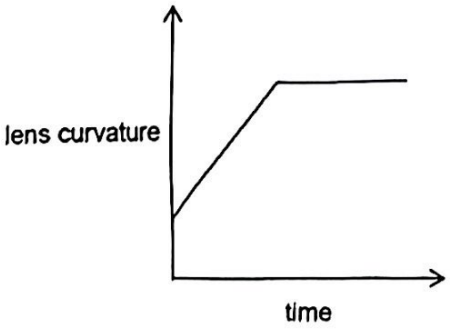
A



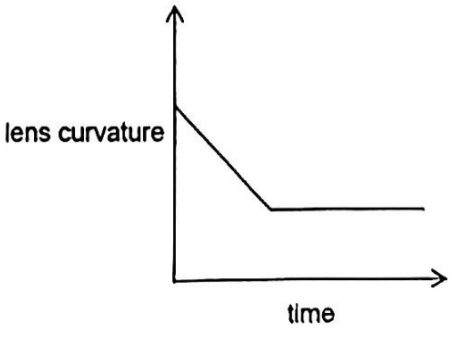
B



C



D



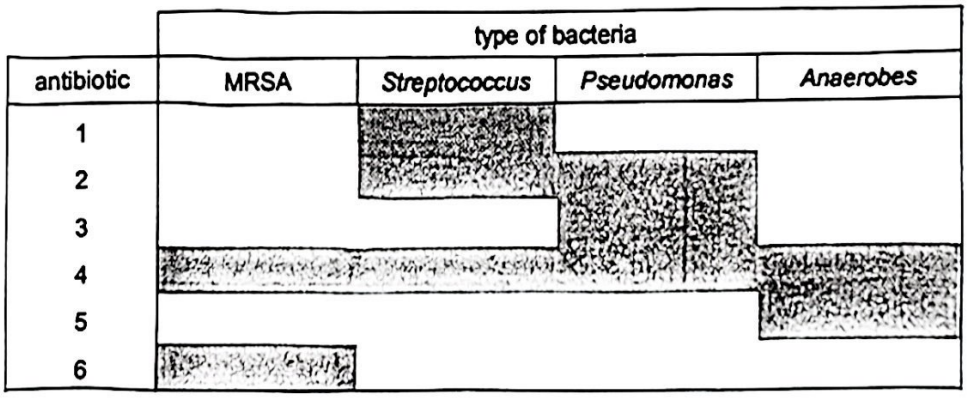
23 A student made some statements comparing red blood cell and influenza virus:

1 Both have molecules embedded on its surface.
2 Both contain DNA
3 Only the influenza virus has a cell wall
4 Only red blood cell has no nucleus

Which statement(s) is/are correct?

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

24 The table shows which antibiotics are effective against different types of bacteria
The shaded areas show the antibiotic is effective against that type of bacteria.



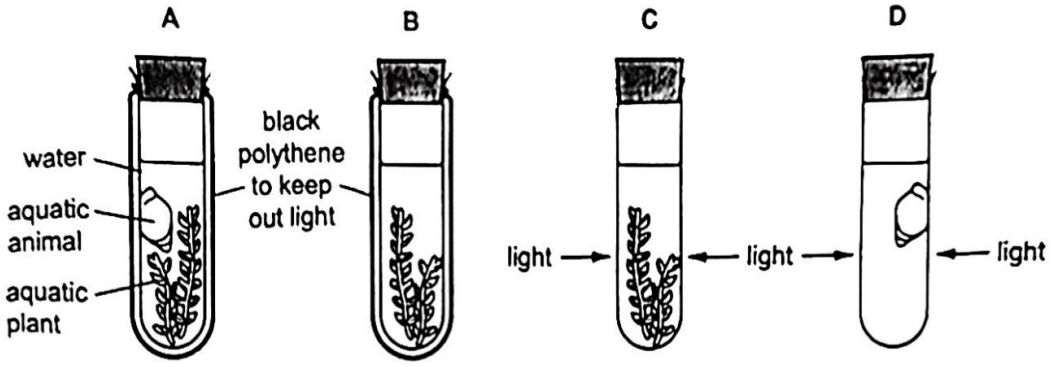
A person has a disease caused by a type of *Streptococcus* bacteria and a second infection caused by a type of *Pseudomonas* bacteria.

Which antibiotic should be taken?

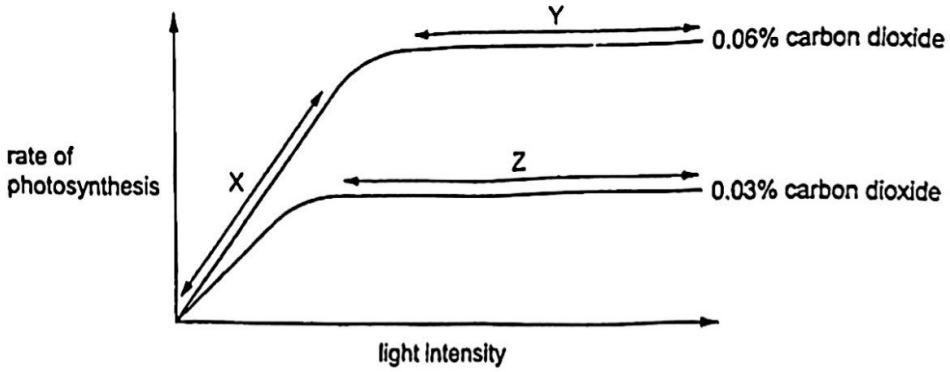
A 1 or 6
B 2 or 4
C 3 or 4
D 4 or 5

25 Four test-tubes are set up as shown.

Which test-tube contains the least carbon dioxide after one hour?



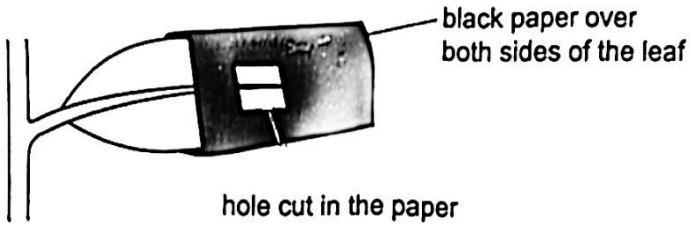
26 The graph shows the rate of photosynthesis of a plant, in increasing light intensity, at two different carbon dioxide concentrations The temperature was kept constant.



What may be limiting the rate of photosynthesis at X, Y and Z?

	X	Y	Z
A	carbon dioxide	light intensity	carbon dioxide
B	carbon dioxide	light intensity	light intensity
C	light intensity	carbon dioxide	carbon dioxide
D	light intensity	carbon dioxide	light intensity

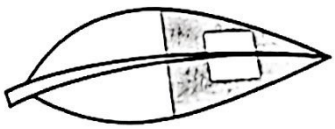
27 A plant is placed in the dark until all its stored starch is used up. The plant is placed in light with black paper over part of one green leaf.



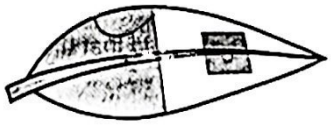
After eight hours, the leaf is tested for starch.

Which diagram shows the appearance of the leaf after this test?

A

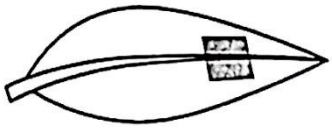


B



C

D



key

= starch present

= starch **not** present

28 Parts of a plant are listed.

1 mesophyll cells
2 root cortex cells
3 root hair cells
4 xylem vessels

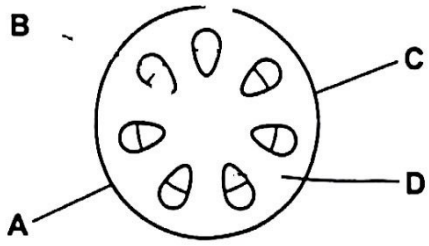
What is the pathway taken by water in the plant?

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

29 Many insects use their sharp mouthpart to pierce through plant stems and consume the sugary liquid from the inside of the plant stems for energy.

A section of the plant stem is examined using a microscope.

Which part contains the sugary liquid that the insects consume?



30 The table shows the results of mapping 100 nucleotides on a single-stranded DNA molecule.

nucleotide	quantity (arbitary units)
adenine	20
cytosine	22
gunanine	12
thymine	46

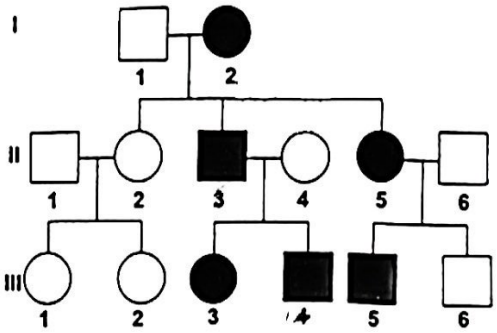
The DNA molecule underwent transcription. How many uracil nucleotides can be found on the mRNA strand produced?

A 10
B 20
C 23
D 46

31 What is an example of genetic engineering?

A inserting genes into bacteria
B inserting insulin into bacteria
C spraying plants with herbicides
D using biological washing powders

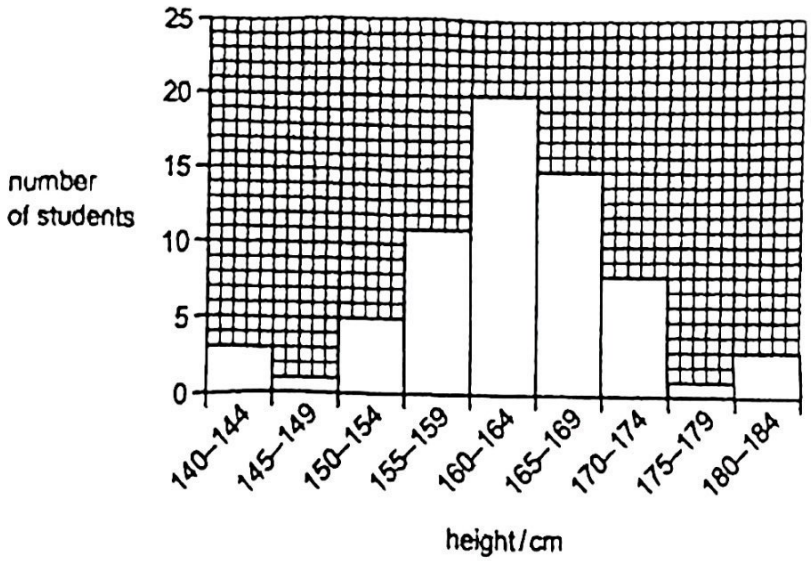
32 The inheritance pattern of freckles in a family over three generations is shown. Freckles are extra patches of pigment under the skin caused by a dominant allele. Affected individuals are shaded.



What are the genotypes of individual II-3 and individual II-4?

	individual II-3	individual II-4
A	Ff	Ff
B	Ff	ff
C	FF	ff
D	FF	Ff

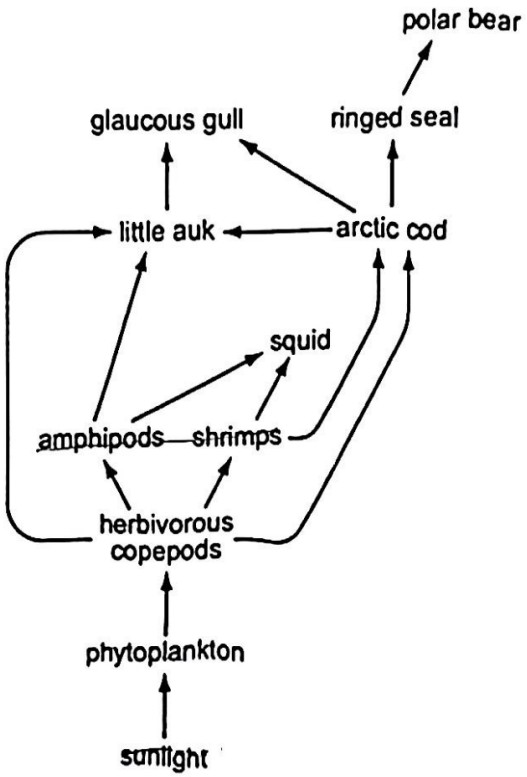
33 The graph shows the heights of students in a class



Which statement about the inheritance of height of the students in this class is correct?

A There are three distinct categories of height in the class
B The height of the students is not affected by environmental factors.
C The height of the students is determined by many genes.
D The height of 160-164 cm is caused by a dominant allele.

34 The diagram shows a food web in an artic ecosystem.

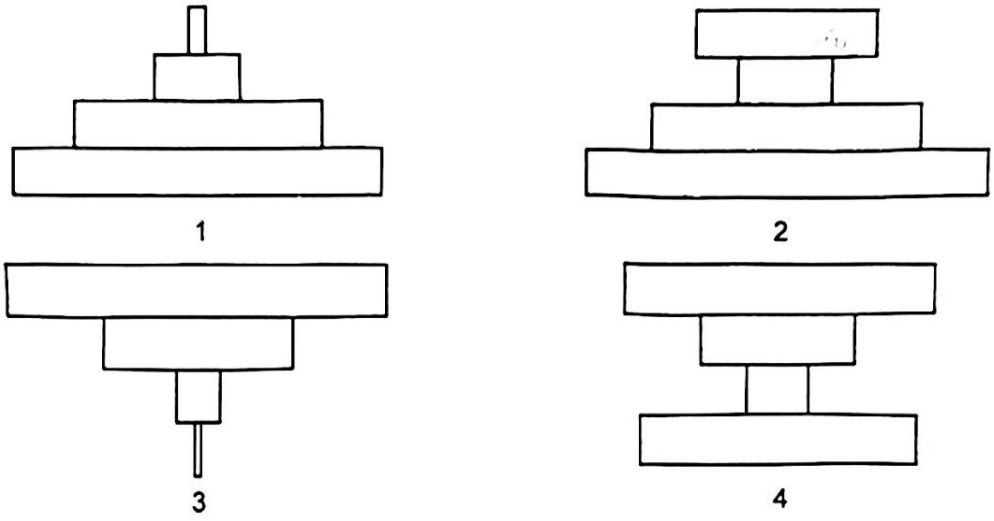


How many trophic levels are represented in the food web?

A 5
B 6
C 7
D 10

35 In a pond habitat, there are numerous mosquito larvae which are predated on by fish.

Fish lice are tiny arthopods that attach themselves on the fish body to feed on fish skin cells.



Which is a pyramid of numbers and which is a pyramid of biomass for this food chain?

	pyramid of numbers	pyramid of biomass
A	1	1
B	2	1
C	3	2
D	4	2

36 Large-scale floating fish farms can be set up in natural lakes. Fish farms that are not regulated may not properly discharge the excess fish feed and waste produced by the farmed fishes. This introduces additional nitrogen and phosphorous into the lakes, which can eventually result in eutrophication.

Some of the events leading up to eutrophication are listed.

I submerged plants are unable to photosynthesise
II organisms in the lake die from lack of oxygen
III bacteria reproduces rapidly
IV rapid algal growth in the lake

Which of the following states the correct sequence of events?

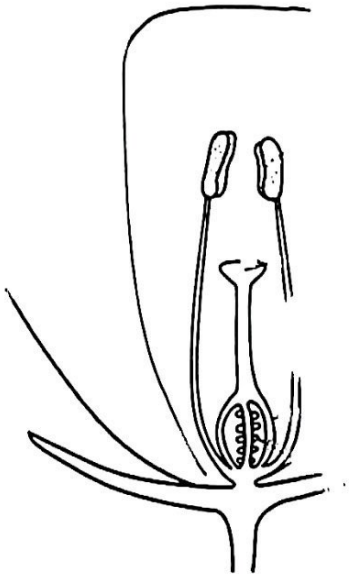
A III → II → IV → I
B III → IV → I → II
C IV → I → III → II
D IV → II → I → III

37 Which statement about reproduction is correct?

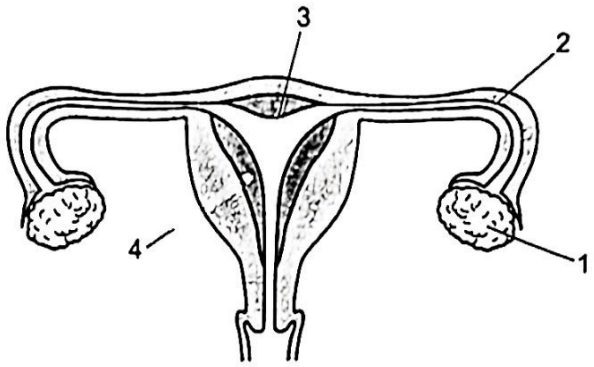
A All the adult offpsring formed by asexual reproduction have identical phenotypes.
B Asexual reproduction involves cells produced by meiosis.
C Offspring formed after self-pollination contain identical genetic materials as the parents.
D Sexual reproduction involves the fusion of nuclei from male and female gametes.

38 The diagram shows parts of a flower.

Which structure represents the site of fertilisation?



39 The diagram shows the female reproductive system.



Where does implantation normally occur?

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

40 Which precautions could help to prevent the spread of HIV?

1 avoiding the mixing of blood
2 abstaining from sexual intercourse
3 using the contraceptive pill
4 using a condom

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

End of Paper