NAME:		( )	CLASS:	

YISHUN TOWN SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2024

SEC 4 EXPRESS

BIOLOGY

(6093/1)

DATE : 28 August 2024 **DAY : Wednesday**

DURATION : 1 hr **MARKS : 40 marks**

ADDITIONAL MATERIALS

Multiple Choice Answer Sheet (OMS)

READ THESE INSTRUCTIONS FIRST

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

There are **forty** questions. 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 OMS answer sheet.

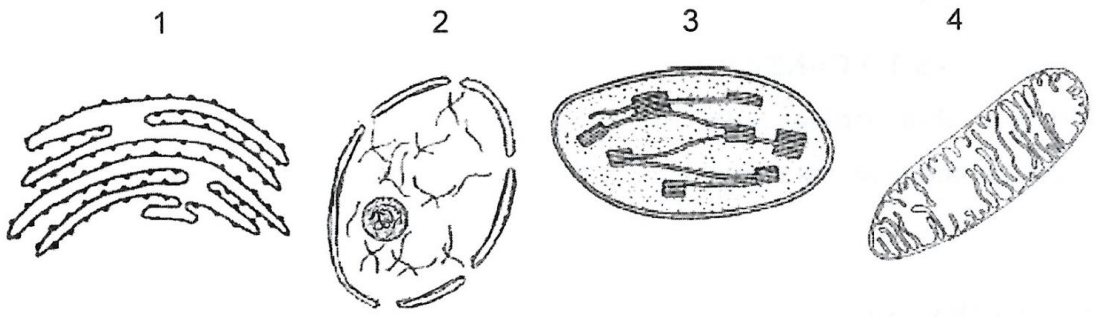
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

You may use an approved calculator.

This question paper consists of **17** printed pages

1 The diagrams below are organelles found inside cells.



Which row identifies the typical distribution of these organelles?

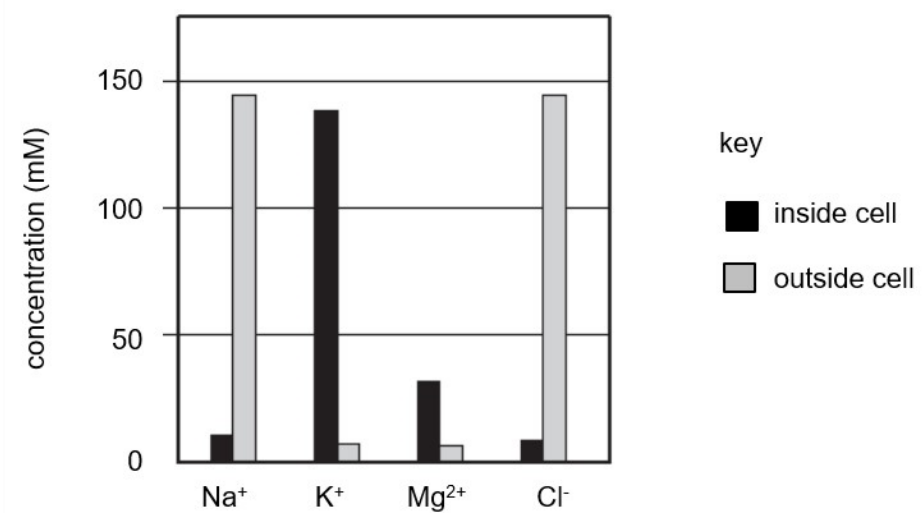
	plants only	animals and plants
A	3	1, 2, 4
B	4	1, 2, 3
C	1, 4	2, 3
D	3, 4	1, 2

2 Which substances are not produced at the ribosomes?

1 amino acids
2 amylase
3 glycerol

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

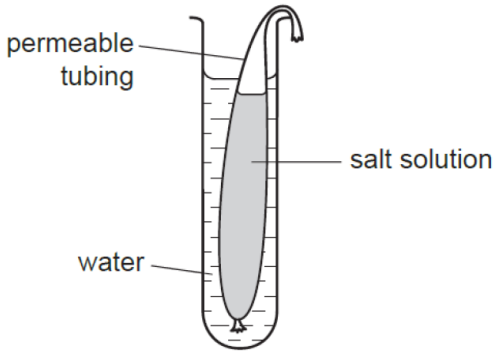
3 The graph shows the concentrations of different ions inside and outside of an animal cell.



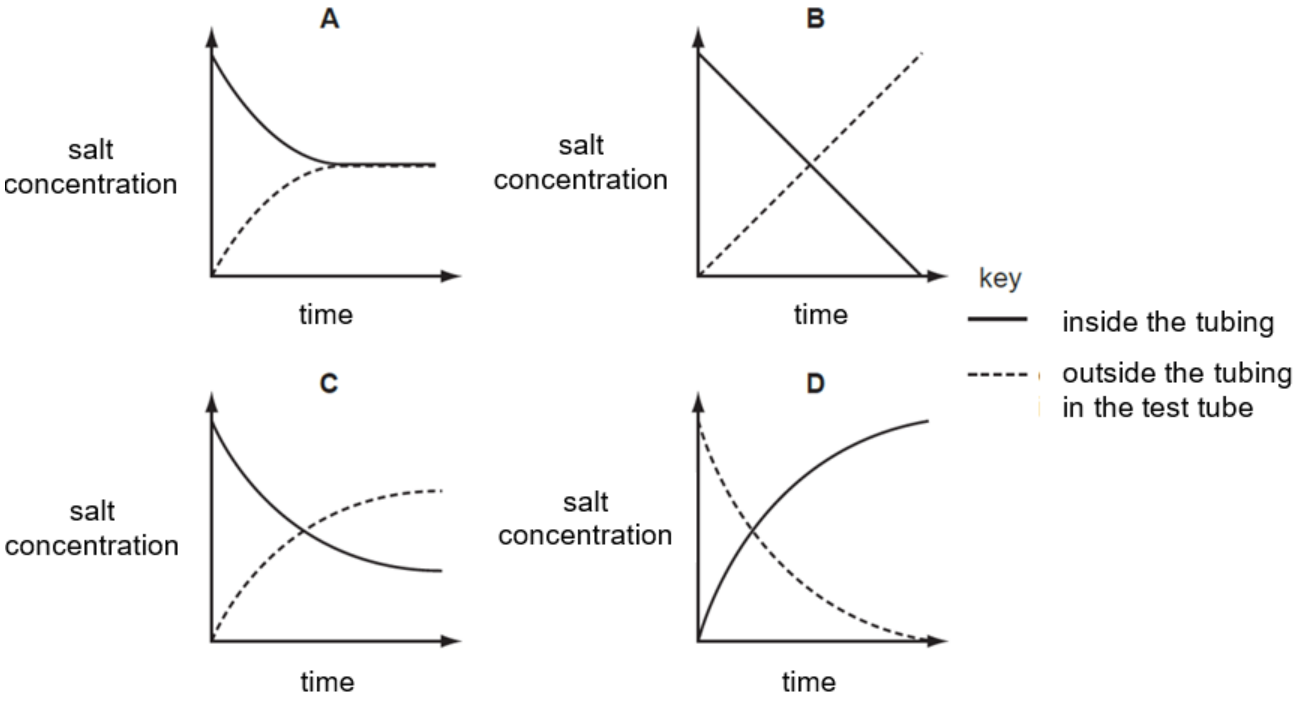
Which process is directly responsible for the net movement of K^+ and Mg^{2+} ions into the animal cell?

A absorption **B** active transport **C** diffusion **D** osmosis

4 The diagram shows a permeable tubing filled with salt solution in a test-tube of water.



Which graph shows the changes in salt concentration inside and outside the tubing after 24 hours?



5 Two samples of food are tested. The results are shown in the table.

sample	results		
	iodine test	Benedict's test	biuret test
X	brown	orange	blue
Y	blue-black	blue	violet

What do these results show?

A Sample **X** contains reducing sugars and starch.
B Sample **X** contains starch only.
C Sample **Y** contains protein and starch.
D Sample **Y** contains protein only.

6 The table shows the percentage of carbon, hydrogen, nitrogen and oxygen atoms in three molecules, **X**, **Y** and **Z**.

molecule	percentage of atoms / %			
	carbon	hydrogen	nitrogen	oxygen
X	25.0	50.0	0.0	25.0
Y	28.5	42.7	8.0	20.8
Z	35.0	61.6	0.0	3.4

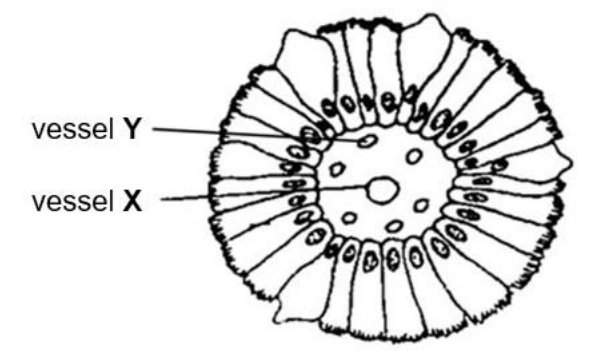
Which correctly identifies molecules **X**, **Y** and **Z**?

	X	**Y**	**Z**
A	fat	protein	glucose
B	glucose	protein	fat
C	protein	glucose	fat
D	protein	fat	glucose

7 In an enzymatic reaction, where is the active site located and what represents the lock and the key?

	active site	lock	key
A	on the enzyme	substrate	enzyme
B	on the enzyme	enzyme	substrate
C	on the substrate	enzyme	substrate
D	on the substrate	substrate	enzyme

8 The diagram shows a transverse section of an intestinal villus.

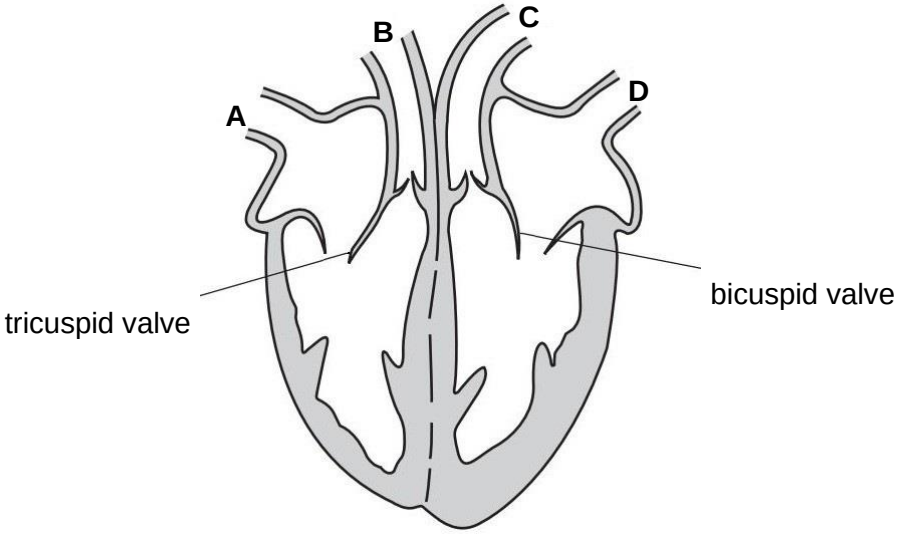


Which correctly shows the substances transported by vessels **X** and **Y**?

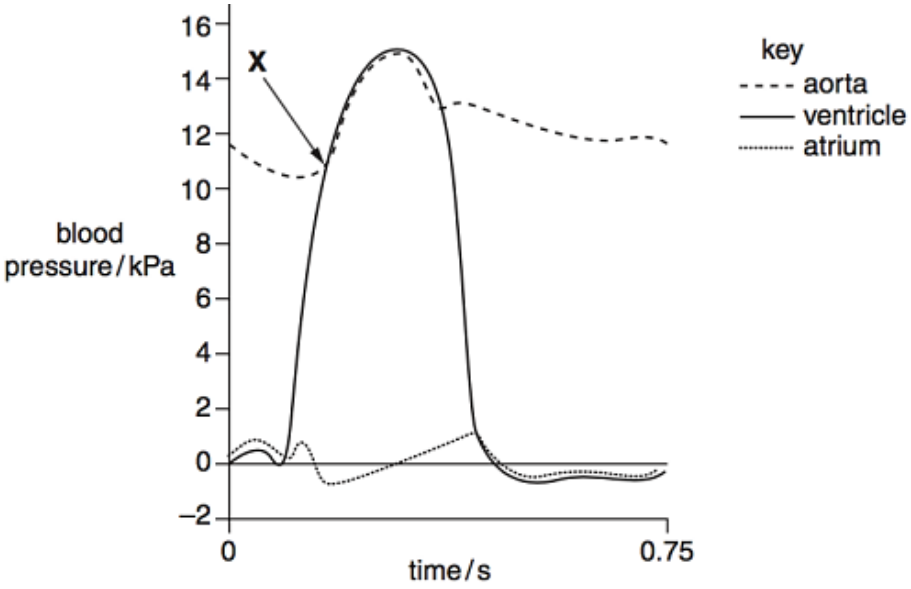
	vessel **X**	vessel **Y**
A	amino acids	glucose
B	fats	amino acids
C	glucose	water
D	amino acids	fats

9 The diagram shows a section through a mammalian heart.

Which vessel would be the first to receive nicotine that is absorbed into the bloodstream through the lungs of a cigarette smoker?



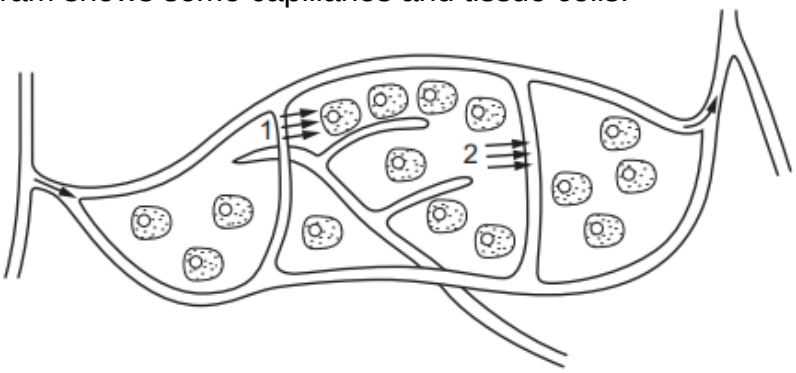
10 The graph shows the changes in the blood pressure during one cardiac cycle.



Which row describes the ventricle and the semi-lunar valve at **X**?

	ventricle	semi-lunar valve
A	contracting	closing
B	contracting	opening
C	relaxing	closing
D	relaxing	opening

11 The diagram shows some capillaries and tissue cells.



Which row describes what is happening at points **1** and **2**?

	1	2
A	fluid passes out of the capillary	carbon dioxide enters the blood
B	oxygen leaves the blood	glucose enters the blood
C	proteins leave the blood	water enters the blood
D	urea leaves the blood	fluid passes into the capillary

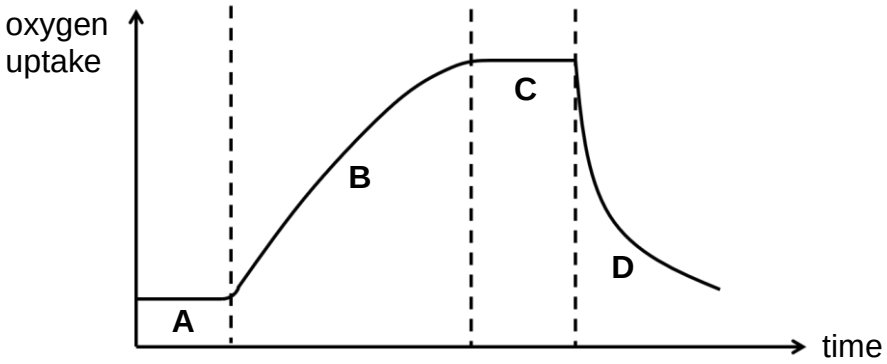
12 Annie, Belinda and Caleb are siblings.

Caleb can donate blood to his two sisters. Annie can receive blood from both Belinda and Caleb. When the serum of blood type B is added to a sample of Belinda's blood, agglutination occurs.

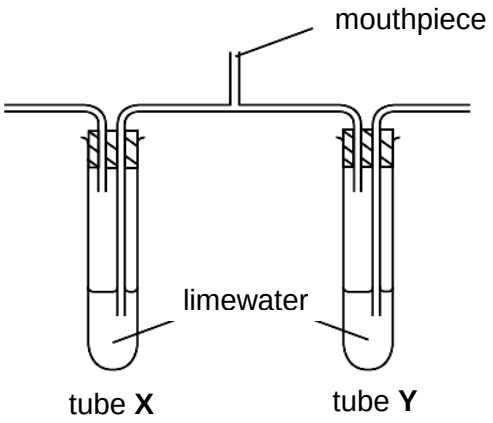
What are the blood types of the siblings?

	Annie	Belinda	Caleb
A	AB	A	O
B	O	B	AB
C	O	A	AB
D	AB	B	O

13 The graph shows the oxygen uptake of a man before, during and after strenuous exercise. Which region of the graph represents the repayment of oxygen debt?



14 A person blows into the mouthpiece for a short period of time, as shown in the diagram.

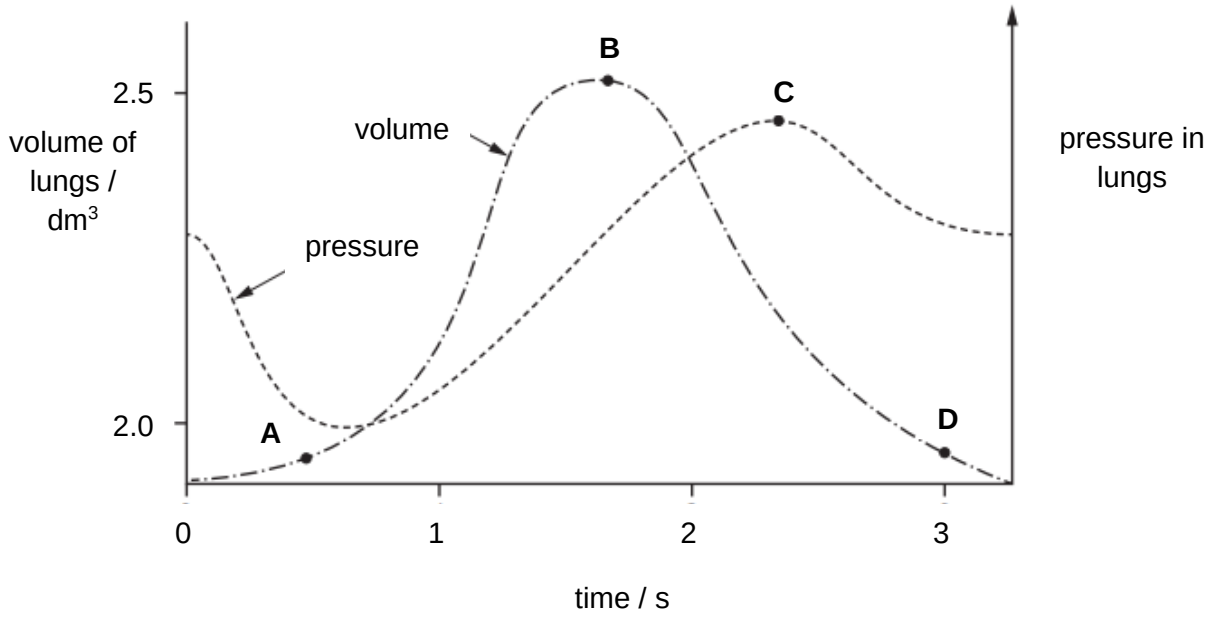


Which row is correct?

	limewater in tube **X**	limewater in tube **Y**
A	remains clear	remains clear
B	remains clear	turns cloudy
C	turns cloudy	remains clear
D	turns cloudy	turns cloudy

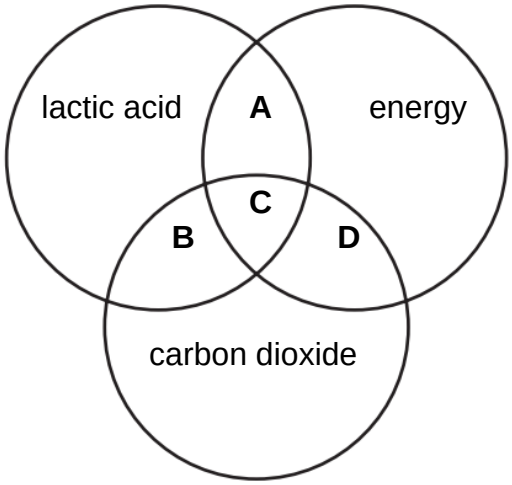
15 The graph shows the changes in the pressure and the volume inside the lungs during one complete breath.

At which point are the internal intercostal muscles starting to contract?

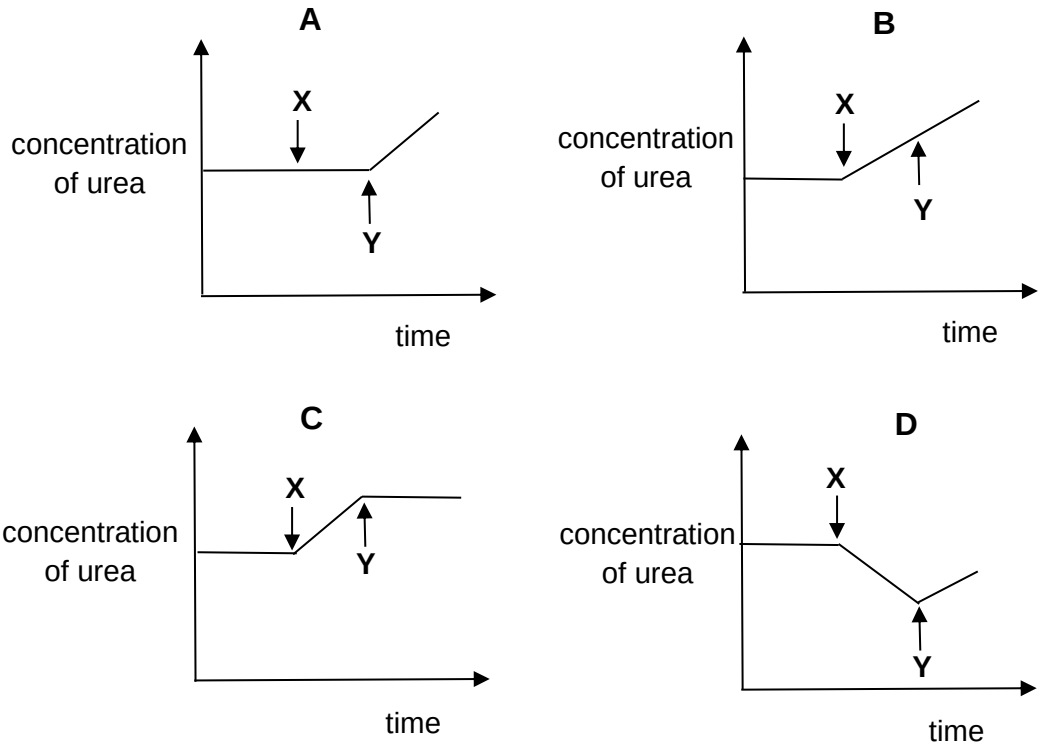


16 The diagram shows some substances found in the human body.

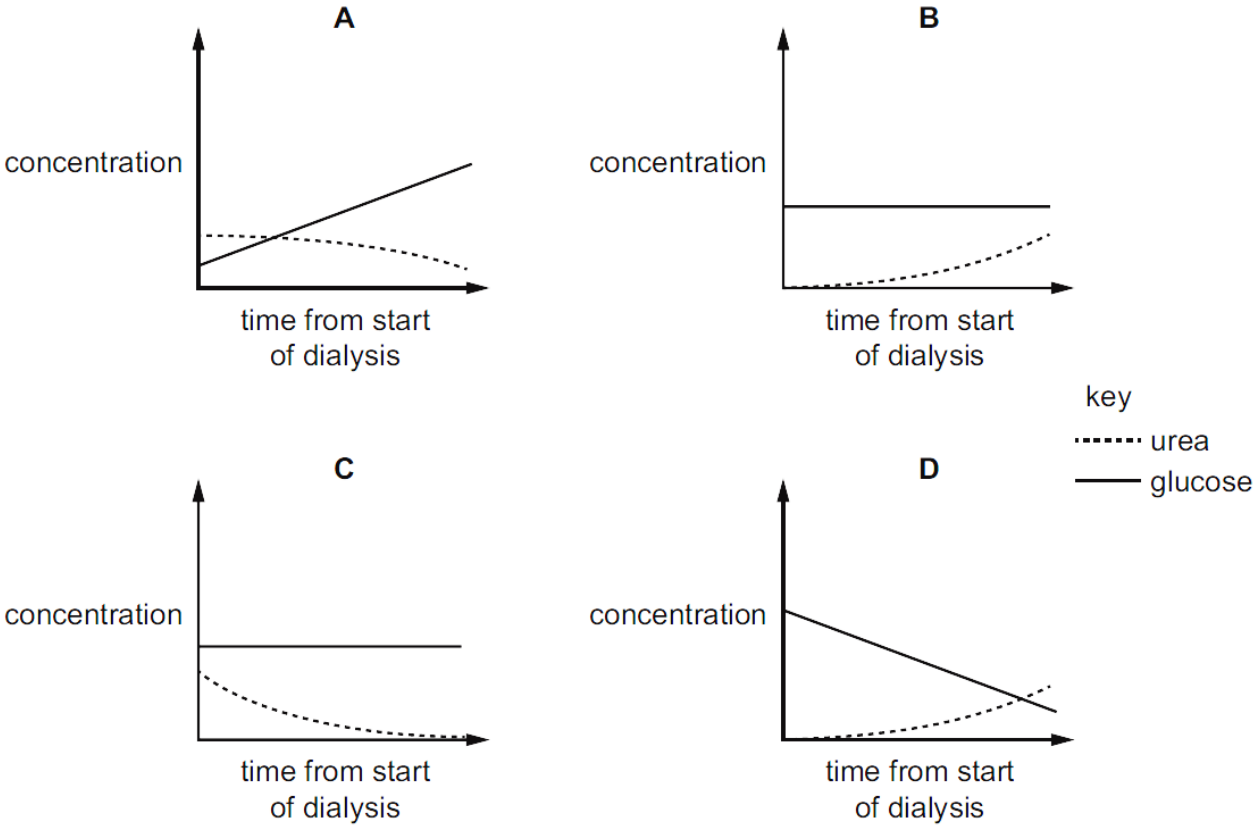
Which area of the diagram represents the products of anaerobic respiration?



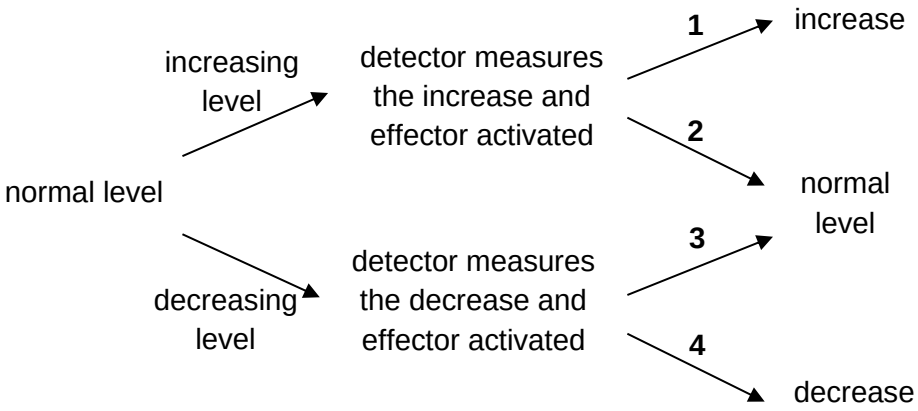
17 Which graph, **A, B, C** or **D**, shows the effect on urea concentration in the blood after removing a mammal's kidneys at time **X** and its liver at time **Y**?



18 Which graph shows the change in concentration of molecules in the dialysis fluid during kidney dialysis?



19 The diagram summarises the process of homeostasis.



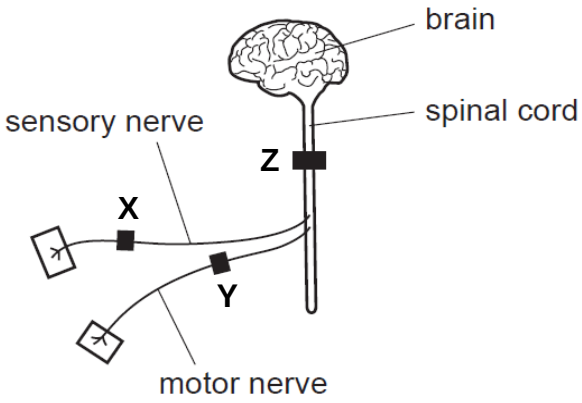
Which numbered arrows represent the effect of negative feedback?

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

20 Which of the following may cause diabetes mellitus?

A blocked pancreatic duct
B damaged cells in pancreas
C sugar in urine
D sugar in blood

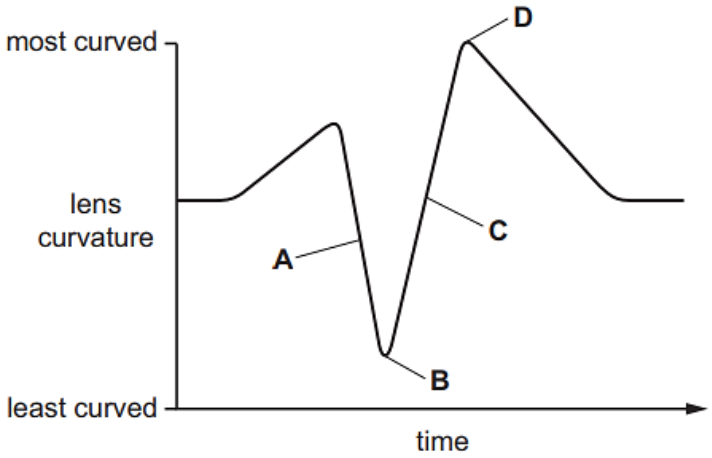
21 A local anaesthetic is a drug used to block nerve impulses. The diagram represents part of the nervous system. **X**, **Y** and **Z** show sites where the anaesthetic can be injected.



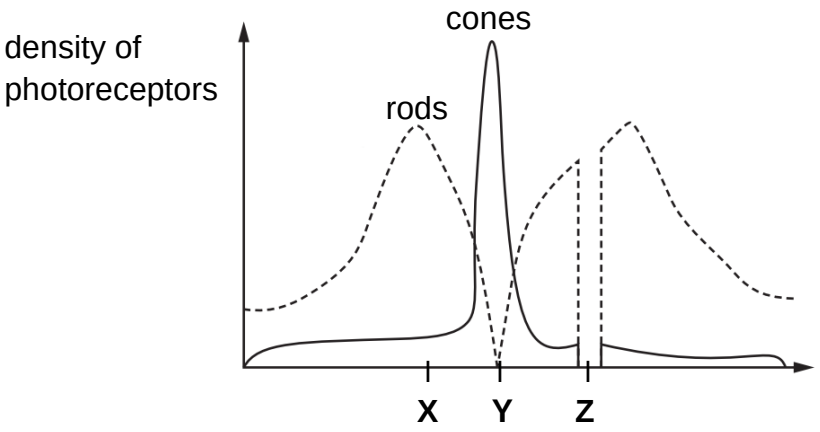
In an experiment, one person can feel a pin prick his leg but cannot move his leg. Where was the anaesthetic injected in this person?

A at **X**
B at **Y**
C at **Z**
D at both **X** and **Y**

22 The graph shows changes in the shape of the lenses of a person's eyes while watching a bird flying. At which point is the bird flying most rapidly towards the person?



23 The diagram shows the density of photoreceptors across a horizontal section of the retina.



What are the positions of the fovea and the optic nerve?

	fovea	optic nerve
A	**X**	**Z**
B	**Y**	**Z**
C	**Y**	**X**
D	**Z**	**Y**

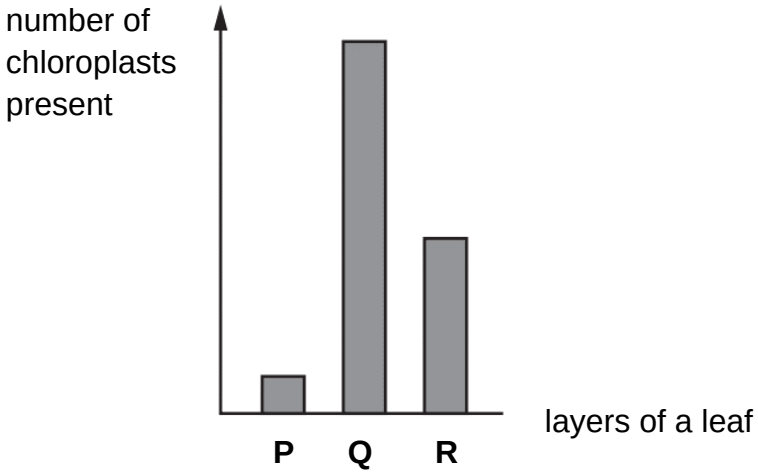
24 Which row correctly matches the features of the pathogen which causes pneumococcal disease?

	genetic material	ribosomes	cell wall	undergoes respiration
A	DNA	absent	absent	yes
B	DNA	present	present	yes
C	RNA	absent	absent	no
D	RNA	present	present	yes

25 Which is **not** an example of antibiotic action?

A damage to cell surface membranes
B prevention of protein synthesis
C prevention of synthesis of new cell walls
D stimulation of antibody production

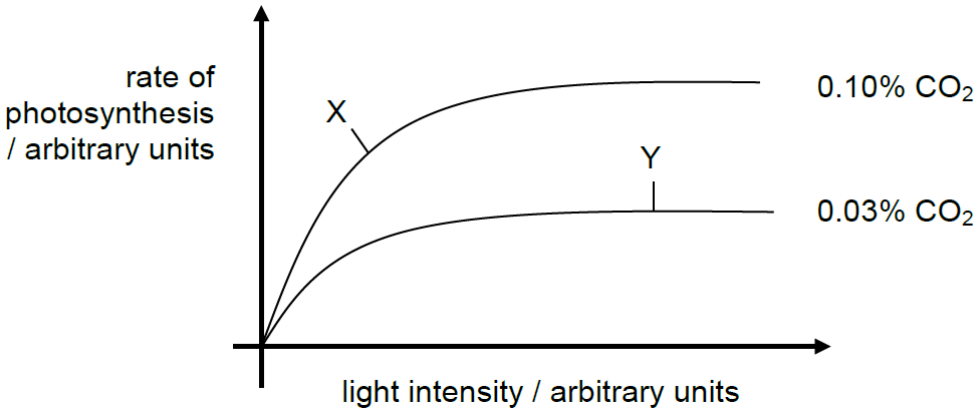
26 The bar graph shows the number of chloroplasts present in three different layers of a leaf.



Which correctly identifies **P**, **Q** and **R**?

	P	Q	R
A	lower epidermis	palisade mesophyll	spongy mesophyll
B	lower epidermis	spongy mesophyll	palisade mesophyll
C	upper epidermis	palisade mesophyll	spongy mesophyll
D	upper epidermis	spongy mesophyll	palisade mesophyll

27 The graph shows the effect of different factors on the rate of photosynthesis.



What are the limiting factors at **X** and **Y**?

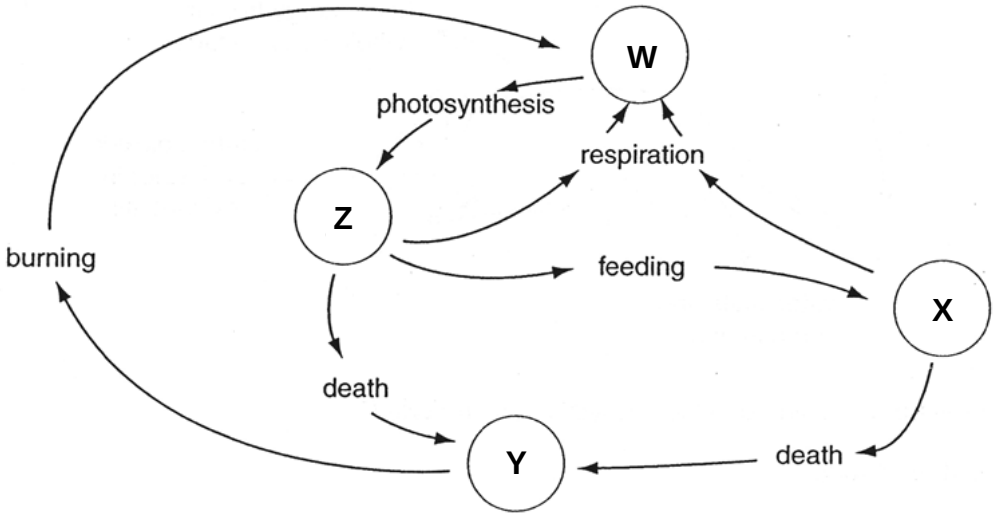
	X	Y
A	carbon dioxide concentration	light intensity
B	light intensity	carbon dioxide concentration
C	carbon dioxide concentration and light intensity	light intensity
D	light intensity	carbon dioxide concentration and light intensity

28 During photosynthesis, what is the diffusion pathway of carbon dioxide in a leaf after entering a stoma?

1 cell membrane
2 cell wall
3 chloroplast membrane
4 cytoplasm
5 intercellular air spaces

A 2 → 1 → 5 → 4 → 3
B 2 → 5 → 1 → 3 → 4
C 5 → 1 → 2 → 3 → 4
D 5 → 2 → 1 → 4 → 3

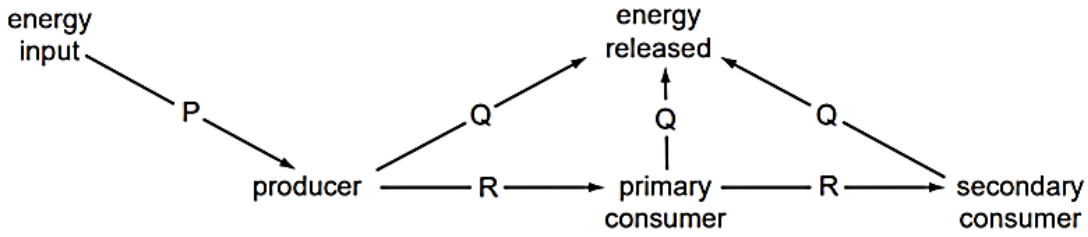
29 The diagram shows some stages in the carbon cycle. **W**, **X**, **Y** and **Z** are carbon compounds.



What is **Z**?

A carbon dioxide in the air
B carbon compounds in plants
C carbon compounds in animals
D fossil fuels

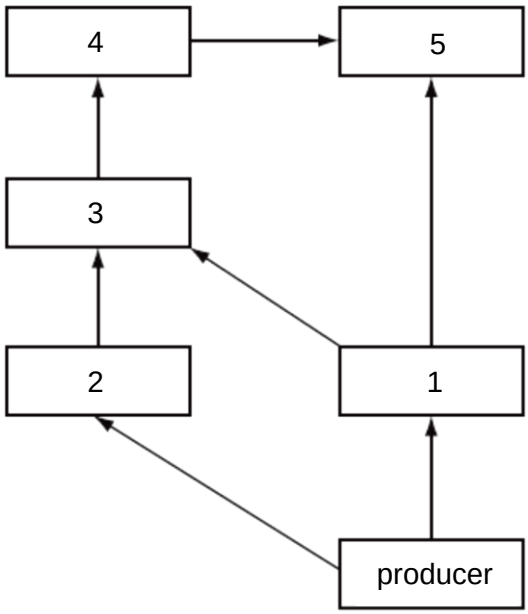
30 The diagram shows the flow of energy in a food chain.



What are the forms of energy **P**, **Q** and **R**?

	P	**Q**	**R**
A	chemical	light	heat
B	heat	chemical	light
C	light	chemical	heat
D	light	heat	chemical

31 The diagram shows a food web.



Which organisms occupy the same trophic level?

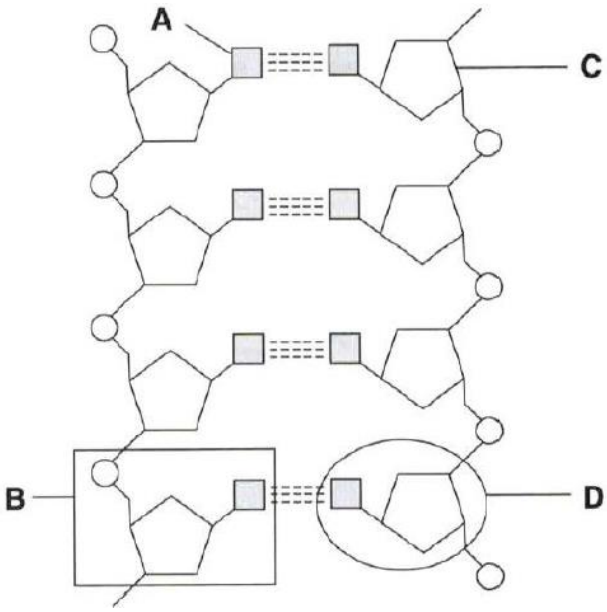
A 1 and 5
B 2 and 3
C 3 and 5
D 4 and 5

32 A double-stranded DNA fragment consists of 600 cytosine bases, which make up 20% of the sequence.

How many adenine bases does the gene contain?

A 300
B 600
C 900
D 1800

33 The diagram shows the structure of part of a DNA molecule. Which is a nucleotide?



34 The following list gives some features related to artificial selection and genetic engineering.

1 The organism's genotype is different from its parent.
2 The new variety can synthesise a substance previously only made by a different species.
3 The process involves working with many generations of the organism over a long period of time.
4 A gene is intentionally transferred from one species to another.

Which row shows the correct features of genetic engineering and artificial selection?

	genetic engineering	artificial selection
A	1, 2 and 4	1 and 3
B	1 and 3	1, 2 and 4
C	2 and 4	1 and 3
D	1, 2, 3 and 4	1, 2 and 3

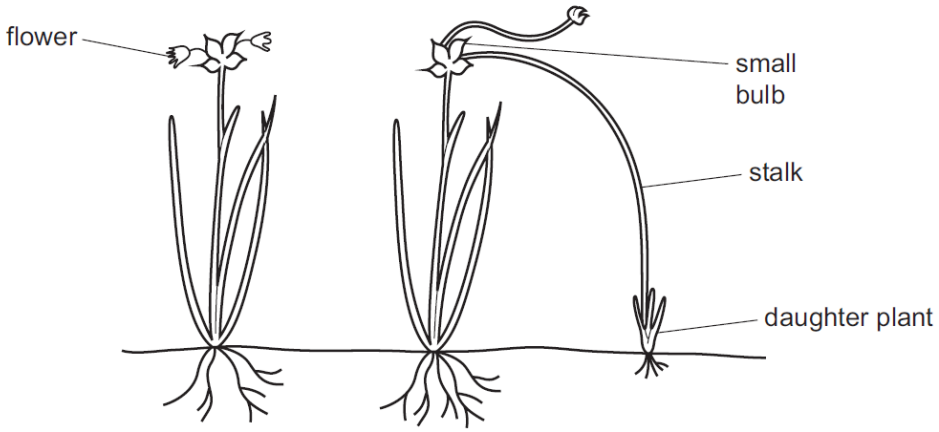
35 What is the use of restriction enzymes in genetic engineering?

A To cut the DNA at specific locations
B To transcribe the DNA sequence into mRNA
C To amplify specific DNA sequences
D To join DNA fragments together

36 Which statement is correct about the offsprings produced by asexual reproduction?

A They are genetically identical to both their parents.
B They are only produced by female parent plants.
C They are produced by the formation of a zygote.
D They have identical chromosomes to their parent.

37 The diagram shows two onion plants.



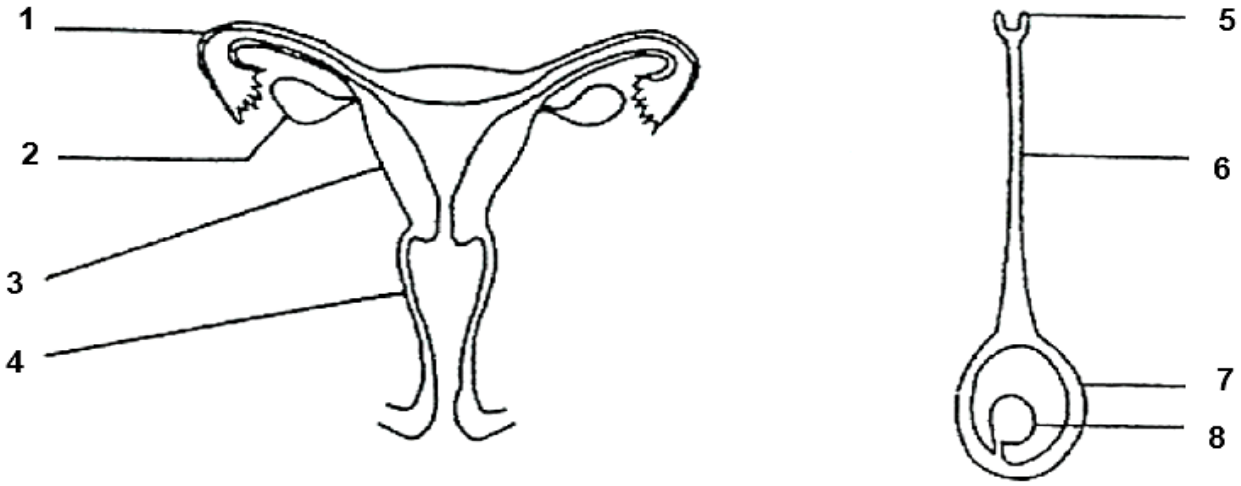
Using the information in the diagram, which statement about these onion plants is correct?

A Daughter plants are produced from the small bulb by meiosis.
B Daughter plants produced from the flower have the same genes as the parent plant.
C The plants can reproduce sexually and asexually.
D Two parent plants are required for reproduction.

38 Which row shows the correct sequence of structures in which the pollen tube must pass to result in fertilisation?

A micropyle → ovule → ovary → style
B stigma → ovary → style → ovule
C stigma → style → ovary → ovule
D style → ovary → ovule → micropyle

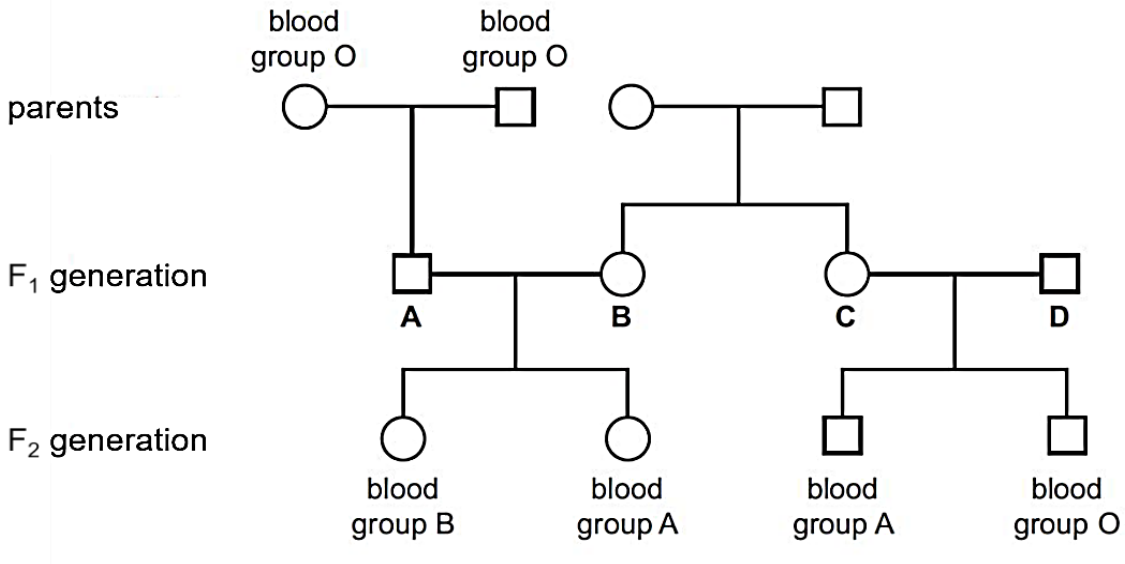
39 The diagrams show the human female reproductive system and the carpel of a flower.



Which pairs of structures and their roles in reproduction are correctly matched?

	structures	role in reproduction
A	**1** and **8**	the site of fertilisation
B	**2** and **7**	the site where zygote is formed
C	**3** and **7**	for supplying nutrients and oxygen to the embryo
D	**4** and **5**	for protecting the male gamete

40 The diagram shows the blood groups of some members in a family.



Which family member, **A**, **B**, **C** or **D**, must have codominant alleles?