O

JURONGVILLE SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2024
Secondary 4 Express

STUDENT NAME

CLASS

INDEX NUMBER

BIOLOGY

6093/01

Paper 1

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
White your name, index number and class on the Answer Sheet in the spaces provided.

There are **forty** questions on 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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

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.

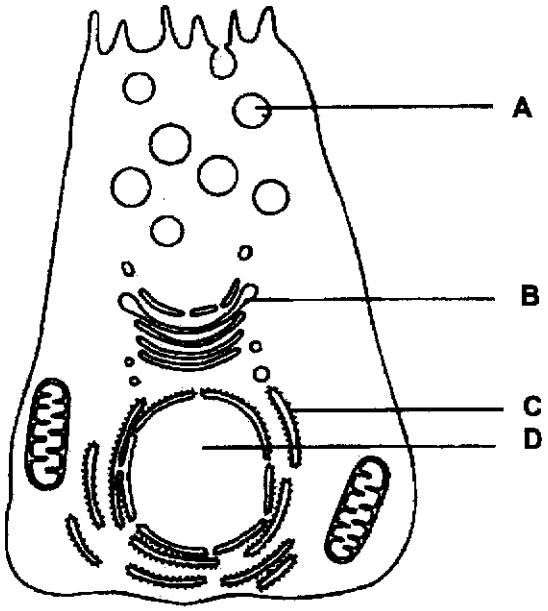
DO NOT OPEN THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

For Examiner's Use
40

Downloaded from SingaKids.com

1 The diagram below shows an animal cell. Radioactively labelled amino acids are introduced to the cell.

In which structure will radioactivity be first detected?



2 Which mature cell contains a nucleus?

A red blood cell

B root hair cell

C sieve tube element

D xylem vessel

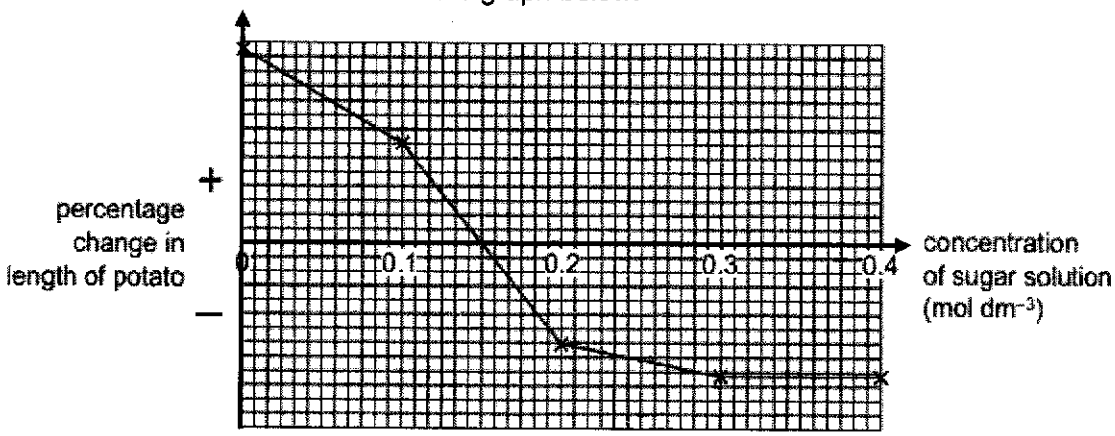
3 Which process can only occur through a partially permeable membrane?

	active transport	diffusion	osmosis
A	√	√	√
B	√	X	X
C	√	X	√
D	X	√	√

key
√ = yes
X = no

Downloaded from SingaKids.com

4 Five strips are cut from a potato, all of equal size and shape. The strips are then placed in sugar solutions of different concentrations. After four hours, the change in length of each potato strip is measured. The results are shown in the graph below.



Which concentration of sugar solution has approximately the same water potential as the potato?

A 0.00 mol dm^{-3}

B 0.15 mol dm^{-3}

C 0.30 mol dm^{-3}

D 0.40 mol dm^{-3}

5 A student conducted a series of food tests on an unknown sample of food. The results are shown in the table below.

reagent added	observation
iodine	remains yellow
Benedict's solution	orange precipitate
Biuret reagent	remains blue
ethanol	remains clear

What is the unknown sample most likely to be?

A apple slices

B butter

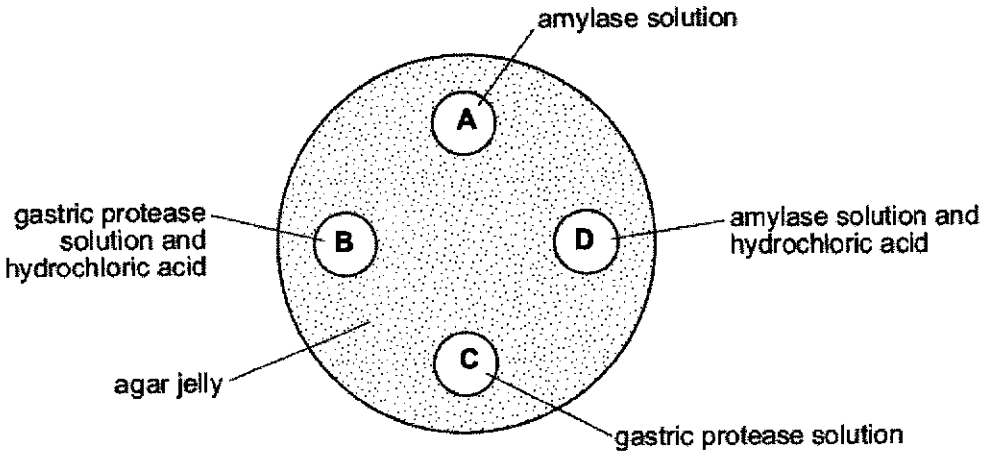
C fried fish

D toasted bread

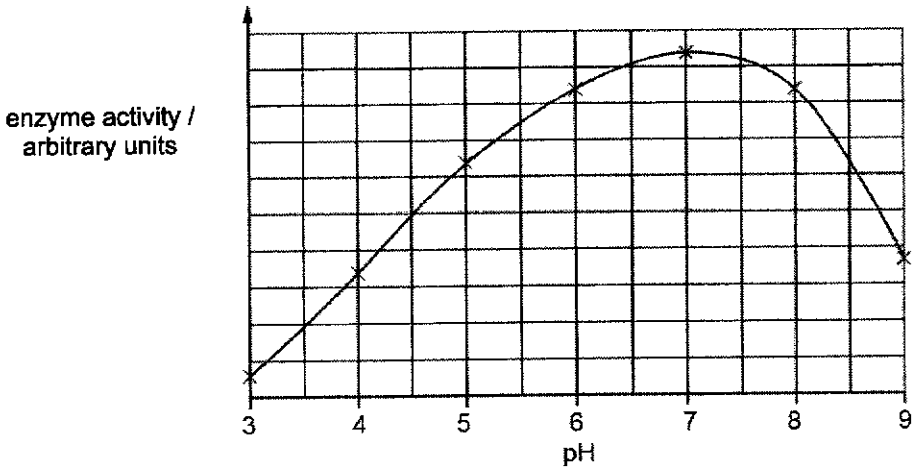
Downloaded from SingaKids.com

6 A dish is filled with agar jelly containing starch. Four holes were cut in the jelly and each hole was filled as shown in the diagram below.

After 30 minutes, which hole will be surrounded by the largest area without starch?



7 The graph below shows the effect of pH on enzyme activity.



What can be concluded from the graph?

A At pH 9, all enzymes are denatured.

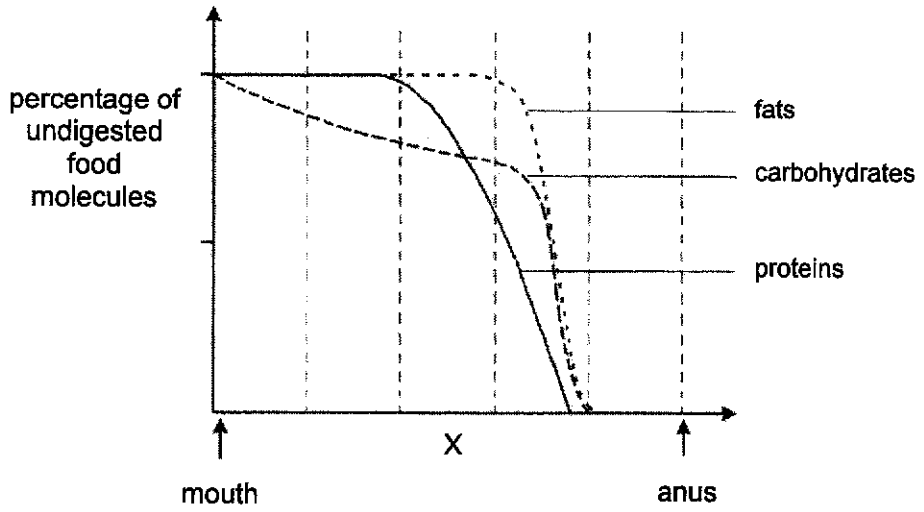
B Enzyme activity stops when at pH 3.

C The enzymes work best when they are placed in acidic mediums.

D The greatest number of enzyme-substrate complexes form at pH 7.

Downloaded from SingaKids.com

8 The graph shows the percentage of undigested food molecules in the alimentary canal.



What is part X likely to be?

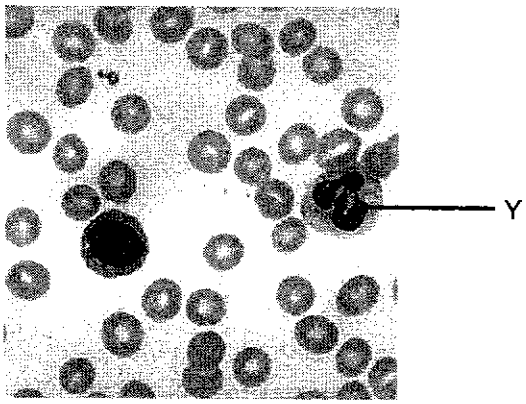
A duodenum

B ileum

C oesophagus

D stomach

9 The diagram below shows some cells from a newborn's blood under a microscope. Newborn babies are known to have elevated levels of cell Y.



Which of the following best explains why newborns have elevated levels of cell Y?

A The nitrogenous waste materials need to be removed at a faster rate in newborns.

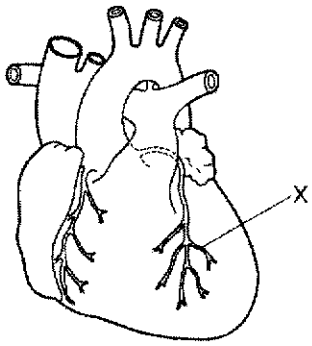
B Their blood needs to clot when the umbilical cord is cut upon birth.

C There is a greater susceptibility to infections in newborns.

D They require a greater need to transport oxygen as they can breathe on their own.

Downloaded from SingaKids.com

10 The diagram below shows the external view of the heart.



What would occur if structure X was blocked?

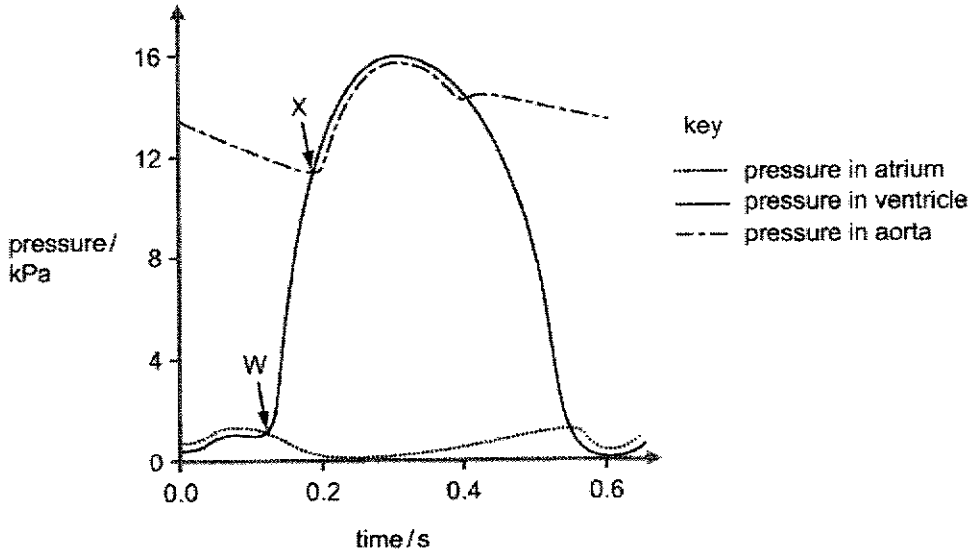
A blood cannot enter the heart

B decrease in oxygen transported to the heart muscles

C rate of contraction of heart muscles increases

D valves in the heart fail and allows backflow of blood

11 The graph below shows pressure changes that occur during a cardiac cycle.



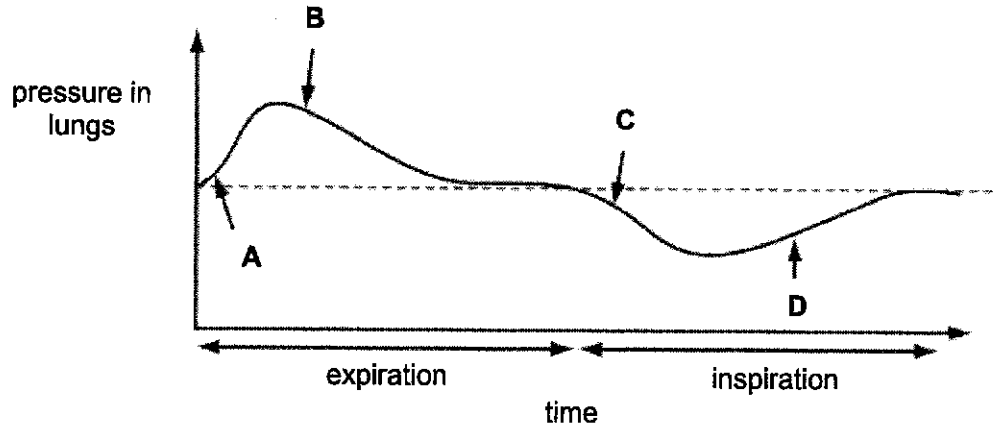
What happens to the atrioventricular valves and semilunar valves between W and X?

	atrioventricular valve	semilunar valve
A	closed	closed
B	closed	open
C	open	closed
D	open	open

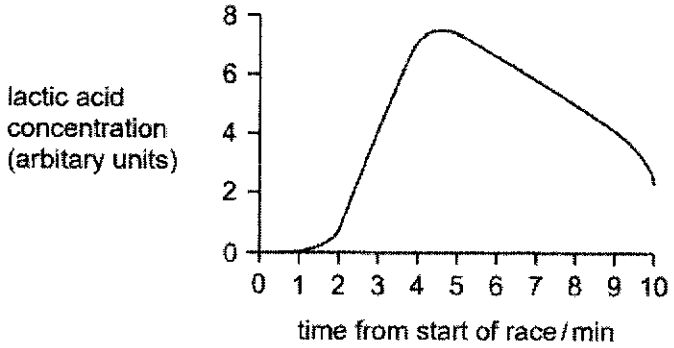
Downloaded from SingaKids.com

12 The diagram illustrates changes in air pressure taking place inside the lungs during a complete cycle of breathing.

Which position on the graph corresponds to the point at which the ribs are beginning to be raised



13 An athlete runs a race. The graph shows how the concentration of lactic acid in his leg muscles changes.



How long did the athlete run for?

A 2 minutes

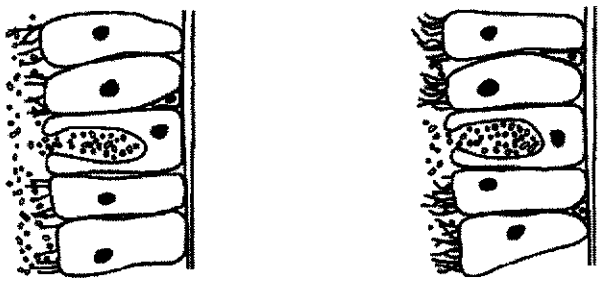
B 4 minutes

C 6 minutes

D 10 minutes

Downloaded from SingaKids.com

14 The diagram below shows the bronchus lining of a smoker and non-smoker.



smoker　　non-smoker

Why is it harder for the smoker to remove mucus from his respiratory tract?

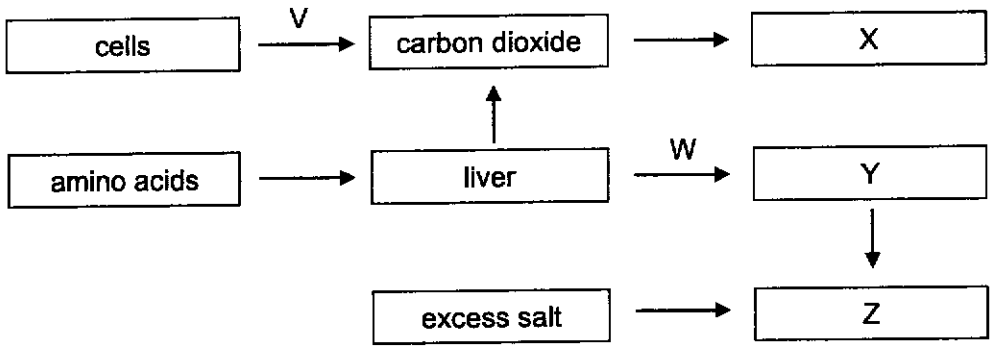
A The smoker produces less mucus than the non-smoker.

B The smoker has less epithelial cells than the non-smoker.

C A significant number of cilia are damaged in the smoker's epithelial cells.

D The smoker's epithelial cells have burst.

15 The diagram below shows the production and excretion of materials in the body.

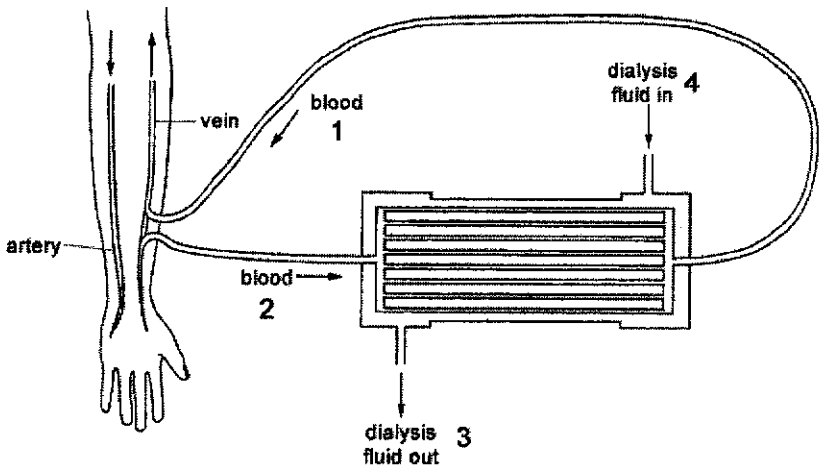


What are V, W, X, Y and Z in the diagram?

	V	W	X	Y	Z
A	aerobic respiration	deamination	lungs	urea	kidney
B	aerobic respiration	filtration	urea	lungs	kidney
C	anaerobic respiration	deamination	kidneys	urea	lungs
D	anaerobic respiration	filtration	lungs	lungs	urea

Downloaded from SingaKids.com

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



Where would the urea concentration be the highest?

A 1 and 2

B 1 and 4

C 2 and 3

D 2 and 4

17 Two fluid samples were drawn from different parts of the kidney nephron and the components of the fluids were analysed. The results are shown in the table below.

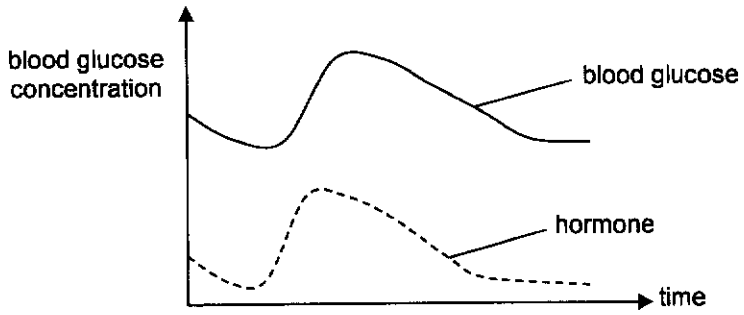
component	fluid P (g / L)	fluid Q (g / L)
glucose	0.0	0.9
sodium ions	5.0	3.5
urea	20.0	0.3

Which parts of the kidney nephron were fluids P and Q extracted from?

	fluid P	fluid Q
A	collecting duct	glomerulus
B	glomerulus	collecting duct
C	glomerulus	proximal convoluted tubule
D	proximal convoluted tubule	collecting duct

Downloaded from SingaKids.com

18 The graph below shows the concentration changes of blood glucose and a hormone.



What is the hormone and what is its effect?

	hormone	effect
A	glucagon	glucose is converted to glycogen
B	glucagon	glycogen is converted to glucose
C	insulin	glucose is converted into glycogen
D	insulin	glycogen is converted into glucose

19 David injured his hand during an accident. Shortly after that, he could feel objects he touched but was unable to move his hand away from them.

What could have caused this?

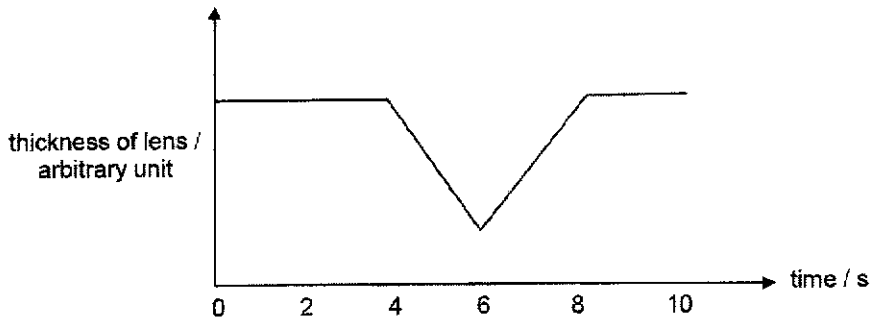
A The receptors in his hand were damaged.

B Relay neurones in his hand could no longer carry out their function.

C Only the nerve connection between receptors and the central nervous system was cut.

D Only the nerve connection between the central nervous system and the effectors was cut.

20 The graph below shows the changes in the thickness of the lens of a person during a period of 10 seconds.



What is happening to the eye between the 4th and 6th seconds?

A ciliary muscles contract

B circular muscles contract

C suspensory ligaments slacken

D suspensory ligaments are pulled taut

Downloaded from SingaKids.com

21 Mr Tan suffered an eye infection caused by the bacteria *Bacillus cereus*. He was prescribed antibiotics but occasionally forgot to take his medicine. After a week he noticed the infection remained.

What could be a possible reason for this?

A *Bacillus cereus* is better treated with a vaccine.

B *Bacillus cereus* grew resistant to antibiotics.

C Mr Tan was given the wrong dosage of antibiotics.

D Mr Tan was prescribed the wrong type of antibiotics.

22 David recently received his vaccination for Covid-19.

Which statement correctly describes how vaccines work?

A cell wall synthesis by pathogen is inhibited

B enzymes activity of pathogen is disrupted

C ribosomes of pathogen cannot produce proteins

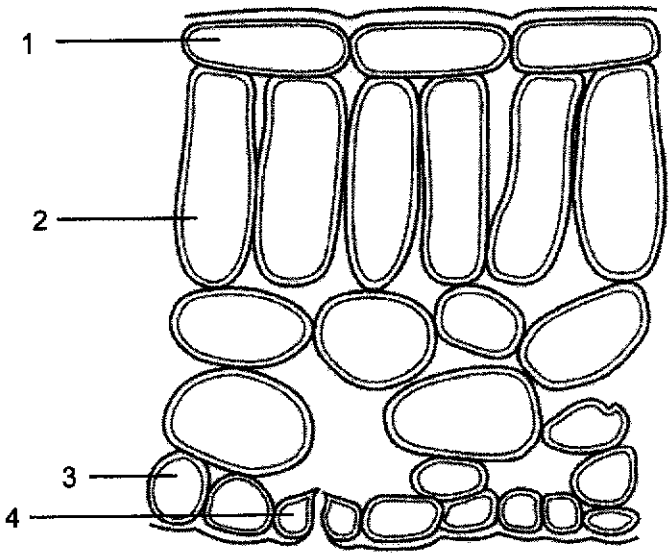
D stimulation of antibodies by white blood cells

23 Which correctly describe the difference between a bacterium and a virus?

	feature	bacterium	virus
A	cell membrane	present	present
B	cytoplasm	absent	absent
C	ribosome	present	present
D	protein coat	absent	present

Downloaded from SingaKids.com

24 The diagram below shows the cross-section of a leaf of a typical green plant. The contents of the cells are absent.



Which cells contain chloroplasts?

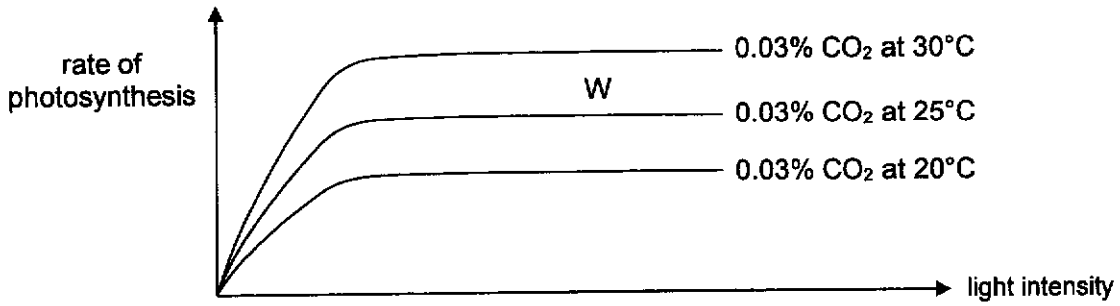
A 1 and 2

B 1 and 4

C 2 and 3

D 2 and 4

25 The graph below shows the effect of light intensity on the rate of photosynthesis in a plant at different temperatures.



What factor(s) limit the rate of photosynthesis at W?

A carbon dioxide concentration only

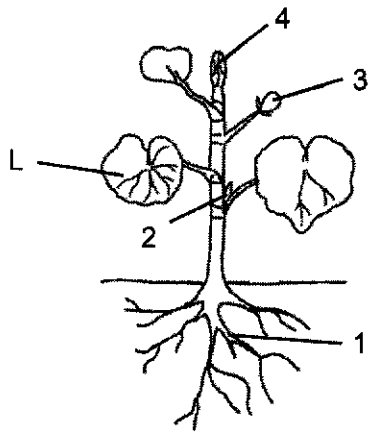
B light intensity only

C light intensity and temperature only

D temperature only

Downloaded from SingaKids.com

26 The diagram below shows a green plant.



Where will food made by leaf L be found after translocation?

A 1 only

B 1 and 2 only

C 1, 2 and 3 only

D 1, 2, 3 and 4

27 Which of the following conditions would cause a plant to wilt most quickly?

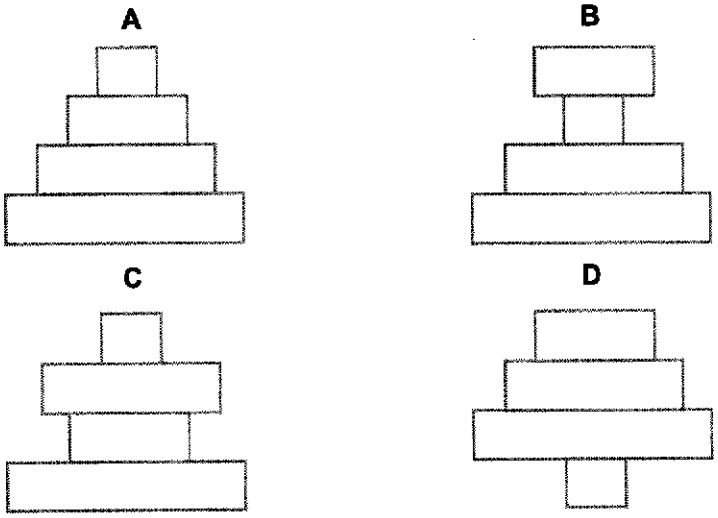
	air movement	humidity	temperature
A	high	low	high
B	high	high	low
C	low	low	high
D	low	high	low

28 Sewage accidentally enters a river for several days.
What are the changes to the concentration of oxygen, the number of bacteria and the number of fish?

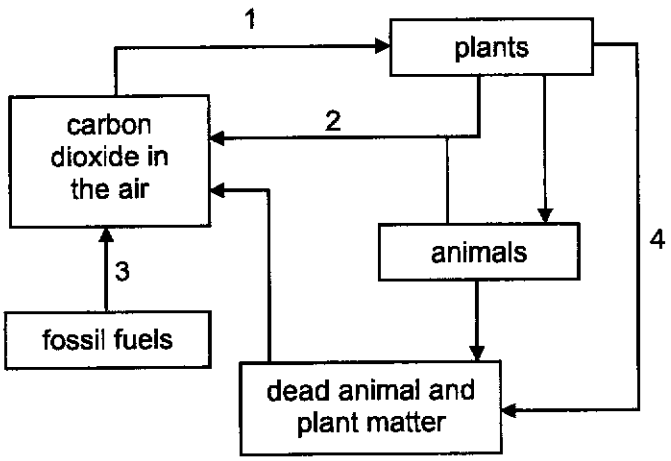
	concentration of oxygen	number of bacteria	number of fish
A	decreases	increases	decreases
B	decreases	decreases	increases
C	increases	increases	decreases
D	increases	decreases	increases

Downloaded from SingaKids.com

29 Which pyramid of numbers has more herbivores than producers?



30 The diagram below represents the carbon cycle.

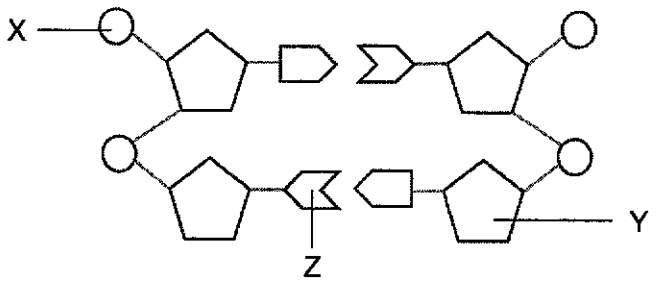


What processes are occurring at 1, 2, 3 and 4?

	1	2	3	4
A	combustion	photosynthesis	respiration	decomposition
B	photosynthesis	respiration	combustion	decomposition
C	photosynthesis	combustion	decomposition	respiration
D	respiration	photosynthesis	combustion	photosynthesis

Downloaded from SingaKids.com

31 The diagram below shows part of a DNA strand.



What are structures X, Y and Z?

	X	Y	Z
A	deoxyribose sugar	nitrogenous base	phosphate group
B	deoxyribose sugar	phosphate group	nitrogenous base
C	nitrogenous base	phosphate group	deoxyribose sugar
D	phosphate group	deoxyribose sugar	nitrogenous base

32 The following statements are about the production of insulin through the use of genetic engineering.

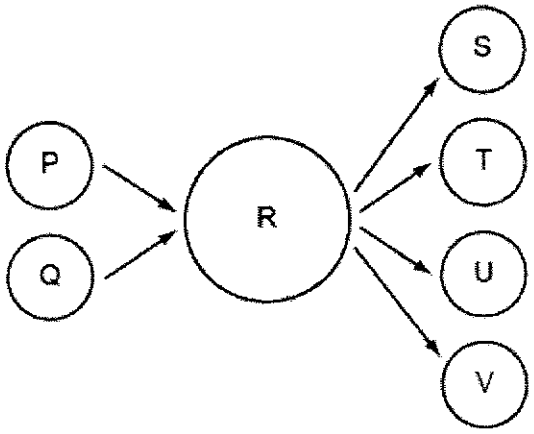
1 Recombinant plasmid is formed.
2 The insulin gene is isolated using a restriction enzyme.
3 The bacterium is made to take up the plasmid.
4 Bacterium plasmid is cut open.

What is the correct sequence of these statements?

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

Downloaded from SingaKids.com

33 The diagram represents gametes P and Q fusing to give cell R. Cell R then produces gametes S, T, U and V.



Which statement about the numbers of chromosomes in the cells and gametes is correct?

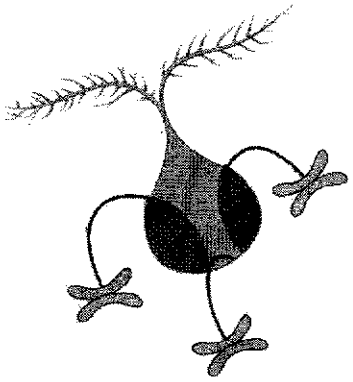
A The numbers of chromosomes in **P** and **Q** are different.

B The numbers of chromosomes in **P** and **S** are the same.

C The number of chromosomes in **S** is one quarter of the number of chromosomes in **R**.

D The number of chromosomes in **T** is half the number of chromosomes in **Q**.

34 The diagram below shows a wind-pollinated flower.



Which features of the flower indicate that is wind-pollinated?

	petals	position of anther	stigma
A	large	inside flower	smooth
B	large	outside flower	feathery
C	small	inside flower	smooth
D	small	outside flower	feathery

Downloaded from SingaKids.com

35 Amniotic band syndrome is a rare condition suffered by pregnant women in which the lining of the amniotic sac becomes damaged.

What is a possible effect of amniotic band syndrome?

A foetus has a higher chance of getting injured

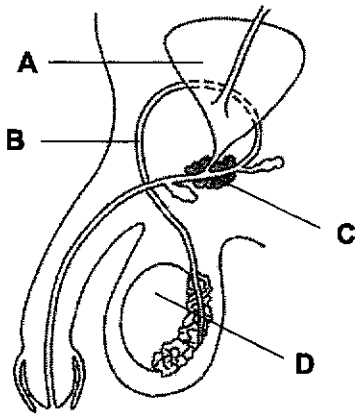
B foetus receives less nutrients from the mother

C increased chance of uterus being damaged by the foetus

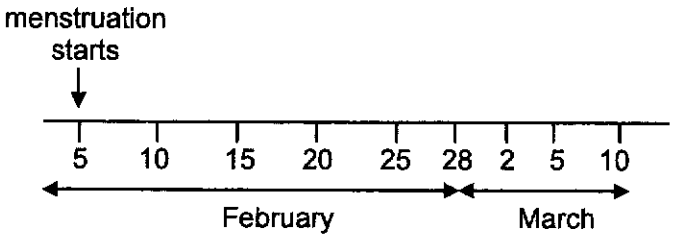
D more than one zygote can implant itself on the uterus wall

36 The diagram below shows a section through the male reproductive system.

Which structure produces fluid to nourish and activate sperm cells?



37 The diagram shows a calendar for 33 days in February and March.



A girl with a menstrual cycle of 28 days begins menstruation on 5 February.

During which dates will her progesterone levels in the blood increase most rapidly?

A 5 – 12 February

B 13 – 19 February

C 20 – 26 February

D 27 February – 5 March

Downloaded from SingaKids.com

38 In goats, the allele for black hair is dominant to the allele for grey hair. Two black haired goats produced eleven offspring. Eight of them had black hair whilst three had grey hair.

What is the probability that the twelfth offspring will have grey hair?

A 25%

B 33%

C 50%

D 75%

39 Which fertilisation would result in a male with Down syndrome?

	chromosome in ovum	fertilised by	chromosome in sperm
A	22 + 1X		22 + 1Y
B	22 + 1X		23 + 1Y
C	23 + 1Y		22 + 1X
D	23 + 1Y		23 + 1X

40 The diagram below shows a group of male students in a classroom. They are of the same age.



The students show both continuous and discontinuous variation in some of their traits.

Which row shows the correct characteristics?

	discontinuous variation	continuous variation
A	blood group, gender	length of arm, skin colour
B	gender, length of arm	blood group, skin colour
C	gender, skin colour	blood group, length of arm
D	length of arm, skin colour	blood group, gender

End of Paper

Downloaded from SingaKids.com

BP~339

Jurongville Secondary School

Marking Scheme

Assessment: **Preliminary Examination 4E Biology (6093)**

Qn	Marking Scheme
1	C
2	B
3	C
4	B
5	A
6	A
7	D
8	D
9	C
10	B
11	A
12	C
13	B
14	C
15	A
16	C
17	A
18	C
19	D
20	D
21	B
22	D
23	D
24	D
25	D
26	D
27	A
28	A

Downloaded from SingaKids.com

Qn	Marking Scheme
29	D
30	B
31	D
32	B
33	B
34	D
35	A
36	C
37	C
38	A
39	B
40	A

Downloaded from SingaKids.com