AHMAD IBRAHIM SECONDARY SCHOOL
GCE O-LEVEL PRELIMINARY EXAMINATION 2022

SECONDARY 4 EXPRESS

Name:	Class:	Register No.:

BIOLOGY **6093 / 01**
Paper 1 Multiple Choice **30 August 2022**
1 hour

Additional Material: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, class and register number 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.

This paper consists of **20** printed pages.

[Turn over

1 The table shows comparisons between a red blood cell and a root hair cell.

feature number	feature	red blood cell	root hair cell
1	takes in oxygen	yes	yes
2	cytoplasm present	no	yes
3	large surface area to volume ratio	yes	yes
4	nucleus present	no	yes

Which comparisons are correct?

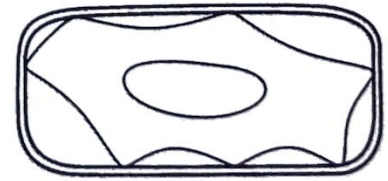
A 1 and 2 only
B 3 and 4 only
C 1, 2 and 3
D 1, 3 and 4

2 The heart, arteries, veins and capillaries work together.

Which level of organisation is shown by these structures working together?

A an organ
B an organism
C an organelle
D an organ system

3 The diagram shows a plant cell after it has been submerged in a solution, P, for 20 minutes.



Which row describes the water potential of solution P at the start of the experiment and the condition of the cell after 20 minutes?

	water potential of solution P at the start of the experiment	condition of the cell after 20 minutes
A	higher than the inside of the cell	plasmolysed and turgid
B	higher than the inside of the cell	under high turgor pressure
C	lower than the inside of the cell	plasmolysed and flaccid
D	the same as the inside of the cell	under low turgor pressure

4 Four tubes containing 5 cm^3 of 5 % starch solution were treated in different ways and then mixed with saliva. After 30 minutes, 1 cm^3 of iodine solution was added to each tube.

In which tubes will the contents be brown?

	tube incubated at 35 °C	tube incubated at 75 °C	tube incubated at pH 2.5	tube incubated at pH 6.9
A	✓		✓	
B	✓			✓
C		✓		✓
D		✓	✓	

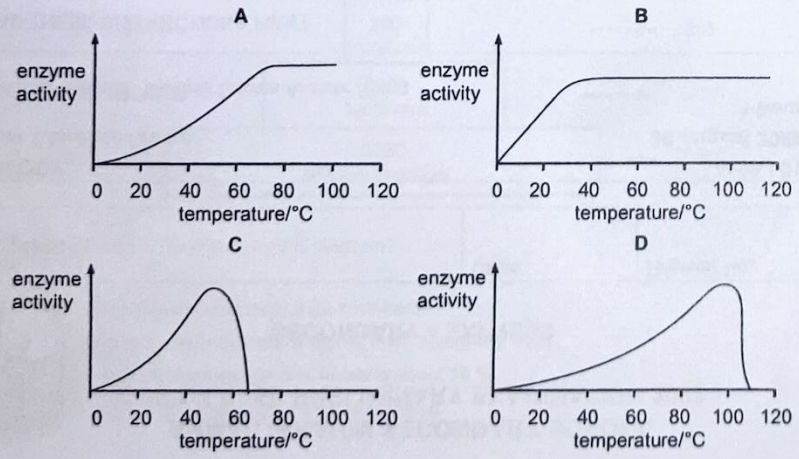
key
✓ = brown colour

5 Thrombin converts fibrinogen into strands of fibrin threads. According to the 'lock and key' hypothesis, which is the lock and which is the key for the reaction?

	lock	key
A	fibrin	thrombin
B	fibrinogen	fibrin
C	thrombin	fibrin
D	thrombin	fibrinogen

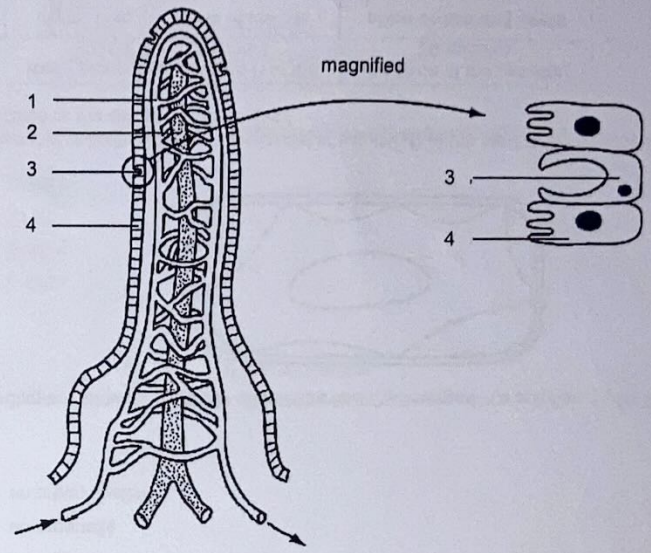
6 A type of bacteria lives in the hot spring area with temperatures of 85 °C to 95 °C.

Which of the following graph represents the activity of enzymes found in these bacteria?



[Turn over

7 The diagram shows a section through a villus.



Which row describes the functions of the numbered parts?

	1	2	3	4
A	transports glucose	transports fats	produces mucus	absorbs glucose
B	transports glucose	transports fats	absorbs glucose	produces mucus
C	transports fats	transports glucose	produces mucus	absorbs glucose
D	transports fats	transports glucose	absorbs glucose	produces mucus

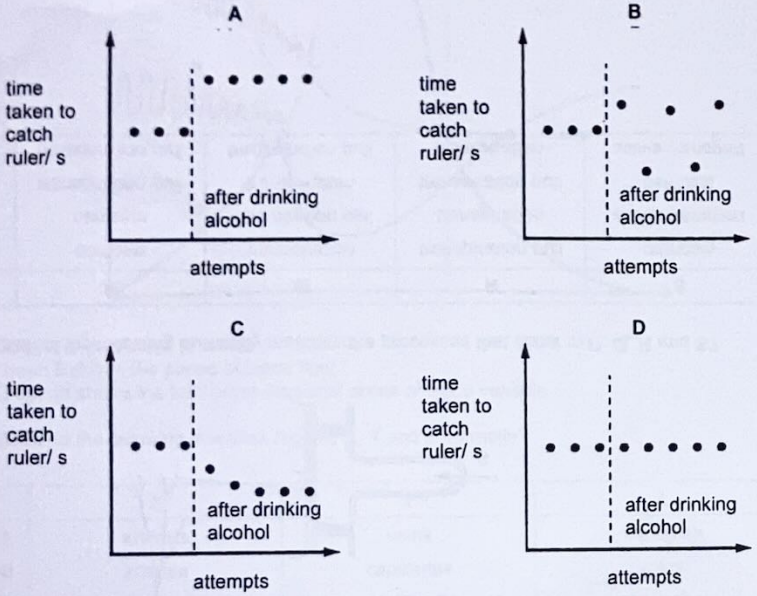
8 A person has a high protein diet. Which effect will this have on the composition of the blood in the hepatic portal vein and in the hepatic vein?

	hepatic portal vein	hepatic vein
A	high in amino acids	high in urea
B	high in amino acids	high in protein
C	high in protein	high in amino acids
D	high in urea	high in protein

9 In an experiment, two girls wanted to test their reactions by measuring the time taken for each girl to catch a ruler that was dropped by the other girl.

They then repeated the test some time after drinking alcohol.

Which graph shows their results?



10 Which of the following shows the correct chemical equation for photosynthesis?

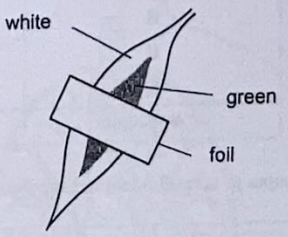
A $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

B $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

C $C_6H_{12}O_6 + 6CO_2 \rightarrow 6O_2 + 6H_2O$

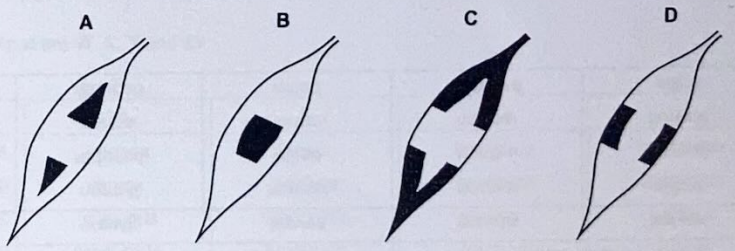
D $6O_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6CO_2$

11 A piece of foil was placed over one green and white leaf on a plant.

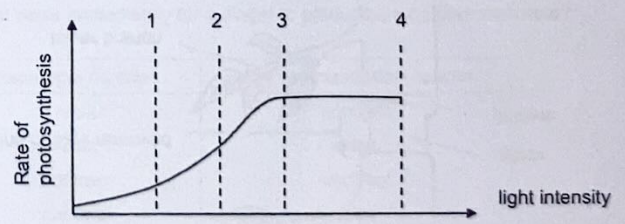


The plant was placed under a bright light for 24 hours and then tested for starch with iodine solution.

Which of the following shows the areas of the leaf that would stain blue-black with iodine solution?



12 The graph shows the rate of photosynthesis in a pea plant in an atmosphere containing 0.04% carbon dioxide at different light intensities.



At which point(s) on the graph is carbon dioxide concentration a possible limiting factor?

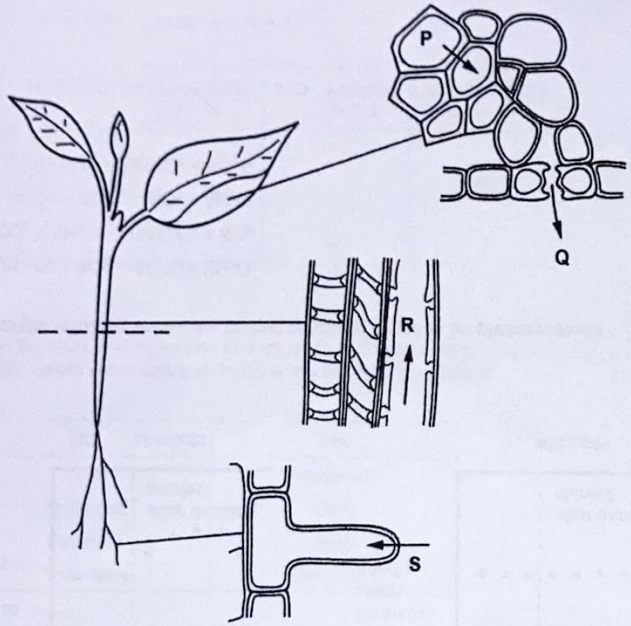
A 1 only

B 1 and 2 only

C 2 and 3 only

D 3 and 4 only

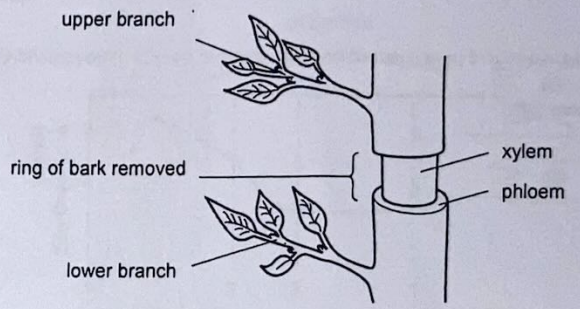
13 The diagram below shows stages in the passage of water through a plant.



Which of the following **correctly** matches the processes that occur in **P**, **Q**, **R** and **S**?

	P	Q	R	S
A	osmosis	transpiration	transpiration pull	osmosis
B	osmosis	transpiration pull	transpiration	active transport
C	transpiration pull	transpiration	transpiration pull	osmosis
D	transpiration pull	transpiration pull	transpiration	active transport

14 The diagram shows part of the trunk of a small tree with a ring of bark removed. Removing the ring of bark takes away the phloem but leaves the xylem intact.



What effects will removing the bark have on the two branches?

	lower branch		upper branch	
	growth	leaves	growth	leaves
A	normal	normal	normal	wilted
B	reduced	wilted	normal	normal
C	normal	normal	normal	normal
D	reduced	wilted	reduced	wilted

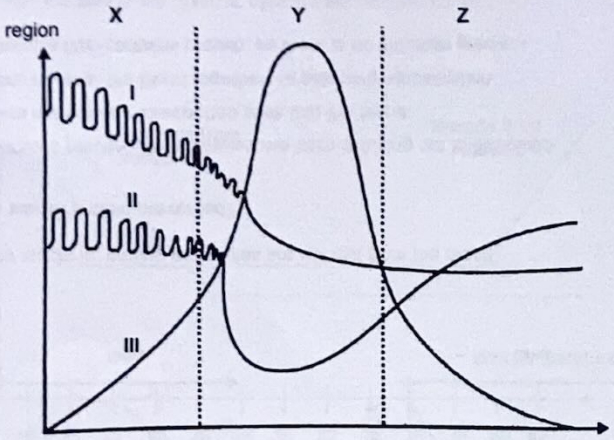
15 The table shows two individuals and the type of blood each received safely in a compatible blood transfusion.

individual	blood type received in transfusion
1	AB
2	B

Which of the following shows the possible blood groups of individuals 1 and 2?

	individual 1	individual 2
A	AB	O
B	B	B
C	AB	B
D	B	O

16 The diagram below shows the characteristics of three types of blood vessels.



Graph **I** shows blood pressure.
Graph **II** shows the speed of blood flow.
Graph **III** shows the total cross-sectional areas of blood vessels.

Which of the following identifies regions **X**, **Y** and **Z** correctly?

	X	Y	Z
A	arteries	veins	capillaries
B	arteries	capillaries	veins
C	veins	arteries	capillaries
D	veins	capillaries	arteries

17 Some factors associated with coronary heart disease are listed.

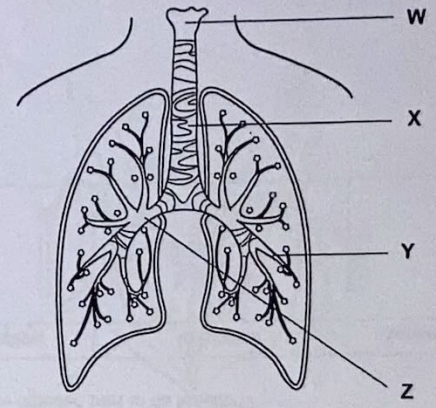
1. High blood pressure
2. High amount of exercise
3. High intake of saturated fats
4. Low blood cholesterol
5. Low intake of processed food

Which factors decrease the risk of coronary heart disease?

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

[Turn over

18 The diagram shows part of the human respiratory system.



What are **W**, **X**, **Y** and **Z**?

	W	X	Y	Z
A	trachea	larynx	bronchus	bronchiole
B	larynx	trachea	bronchiole	bronchus
C	bronchus	bronchiole	larynx	trachea
D	bronchiole	bronchus	trachea	larynx

19 A singer uses certain muscles to control his breath.

What must occur immediately for a singer to produce a long unbroken note?

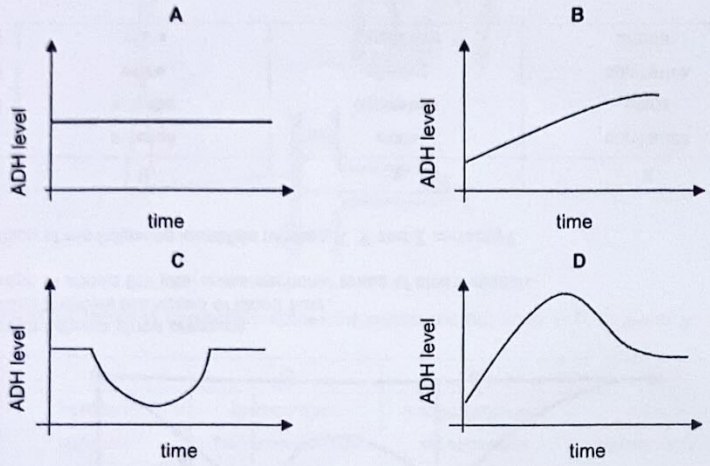
	diaphragm muscles	external intercostal muscles
A	relax	contract
B	relax	relax
C	contract	contract
D	contract	relax

20 One of the effects of tobacco smoke on the gas exchange system is that haemoglobin carries oxygen around the body less efficiently.

Which component of tobacco smoke is responsible for this effect?

A tar
B nicotine
C carbon monoxide
D smoke particles

21 Which graph best represents the levels of anti-diuretic hormone in the blood of a person who has drunk a large cup of water?



22 In a dialysis machine, protein molecules are not lost from the blood.

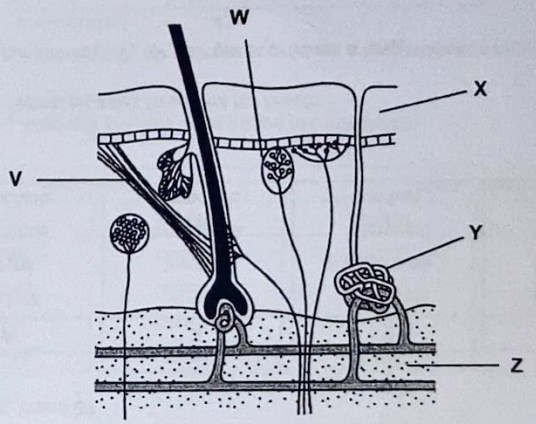
How is the loss of protein prevented?

A Membranes prevent protein molecules from diffusing out of the blood.
B Proteins are actively transported back into the blood.
C Proteins re-enter the blood together via selective reabsorption.
D The dialysis fluid contains protein, so there is no diffusion gradient.

23 Which process is **not** a result of negative feedback?

A A decrease in the surrounding temperature leads to a decrease in respiration rate.
B A decrease in the surrounding temperature leads to a decrease in sweating.
C A decrease in the surrounding temperature leads to shivering.
D A decrease in the surrounding temperature leads to a decrease in blood flow through the skin surface.

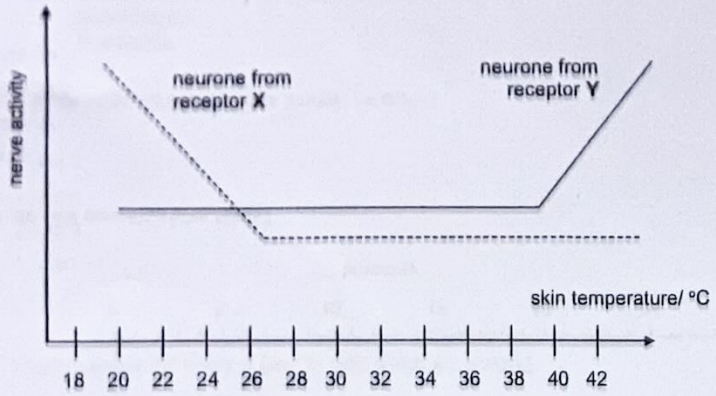
24 The diagram shows a section through human skin.



Which row matches the labelled part to its function?

	sweat production	insulation	sensing temperature
A	X	Y	V
B	V	X	W
C	Y	Z	V
D	Y	Z	W

25 The graph shows the number of nerve impulses per second traveling along two sensory neurons from the skin to the brain, at different skin temperatures.



Which of the following is most likely to be true?

A Neurone **X** activity would increase when withdrawing a hand from a hot stove.
B Neurone **Y** activity would increase when touching an ice cube.
C Activity of both neurones **X** and **Y** would increase when entering a cold room.
D Activity of both neurones **X** and **Y** would be lowest at 30 °C.

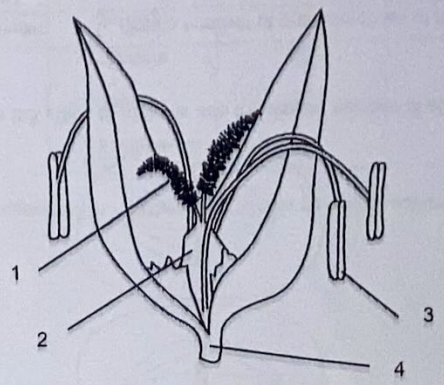
26 Which statements define the term hormone?

1. It is destroyed by the kidney.
2. It is produced in minute quantities.
3. It is transported by the bloodstream.
4. It is a chemical substance produced by an endocrine gland.

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

[Turn over

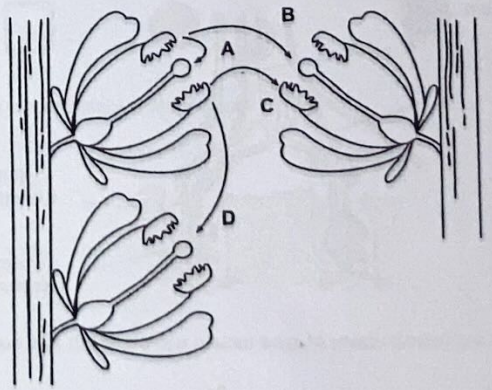
27 The diagram shows a wind pollinated flower. Where does pollination and fertilisation take place?



	pollination	fertilisation
A	1	2
B	1	4
C	3	4
D	3	1

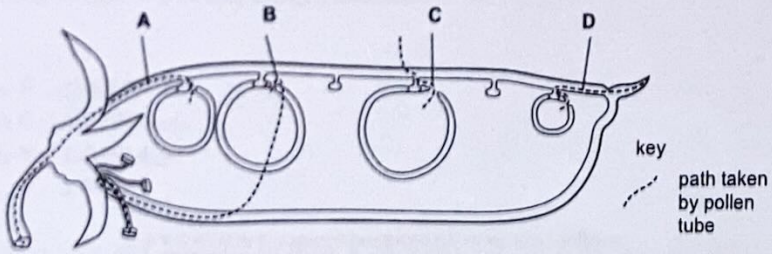
28 The diagram shows two plants of the same species.

Which arrow represents the type of pollination that would result in greater adaptability of this species to potential environmental changes?



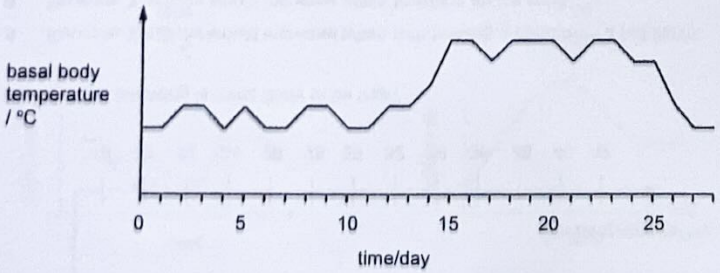
29 The diagram shows a developing fruit (pod) of a pea plant.

Which line correctly shows the path that was taken by a pollen tube to an ovule?



30 A person's basal body temperature refer to the temperature when they first wake up in the morning. In woman, an increase in blood progesterone concentration causes a small rise in basal body temperature.

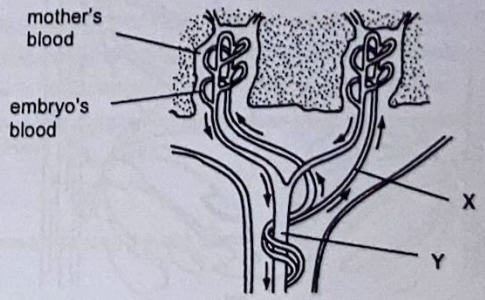
The graph shows one woman's basal body temperature over a period of 28 days.



Which day did ovulation take place?

A day 7
B day 14
C day 21
D day 28

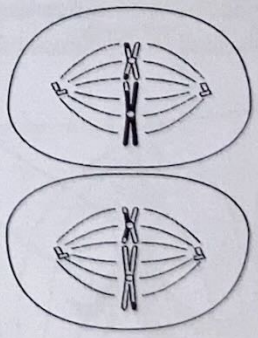
31 The diagram shows how the blood of a human embryo flows close to the mother's blood in the placenta.



Which substances present at **X** are in higher concentration than at **Y**?

A carbon dioxide and glucose
B carbon dioxide and urea
C glucose and oxygen
D glucose and urea

32 The diagram below shows a cell undergoing a stage of meiosis.



Which correctly shows the stage of meiosis and the diploid number of chromosomes of the cell?

	stage of meiosis	diploid number of chromosomes of the cell
A	anaphase I	4
B	anaphase II	8
C	metaphase I	2
D	metaphase II	4

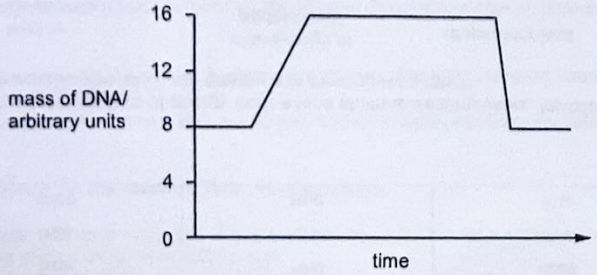
33 The stages listed are involved in the formation of a diploid zygote.

1. prophase I
2. metaphase I
3. metaphase II
4. fertilisation

Which of the listed stages increase genetic variation?

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

34 The diagram shows the mass of DNA in cells which are dividing.



Which row describes this type of cell division?

	type of cell division	this type of cell division gives rise to
A	mitosis	genetically identical offspring
B	mitosis	genetically non-identical offspring
C	meiosis	genetically identical offspring
D	meiosis	genetically non-identical offspring

[Turn over

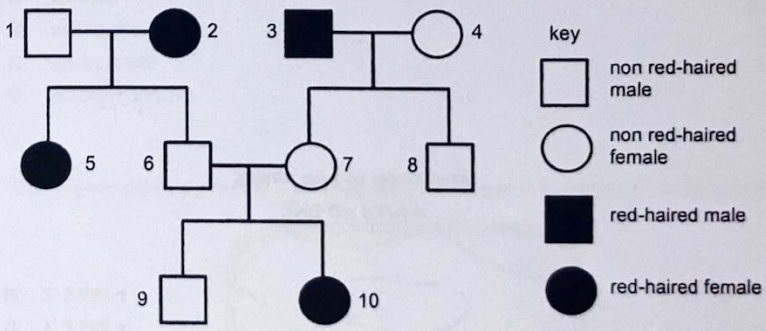
35 The table shows the results of mapping 100 nucleotides on a single strand of DNA.

nucleotide	quantity
adenine	22
cytosine	20
guanine	47
thymine	11

How many thymine molecules are there on the double-stranded molecule of this DNA?

A 11
B 22
C 33
D 66

36 The diagram shows a family tree for the red-haired trait.



Which individuals are definitely heterozygous?

A 1, 6, 7, 8
B 1, 4, 6, 7
C 2, 3, 5, 10
D 6, 7, 8, 9

37 Which statement best describes an example of artificial selection?

A It has been found that some strains of bacteria produce antibiotics.

B It is common practice to mate bulls with cows that produce the most milk.

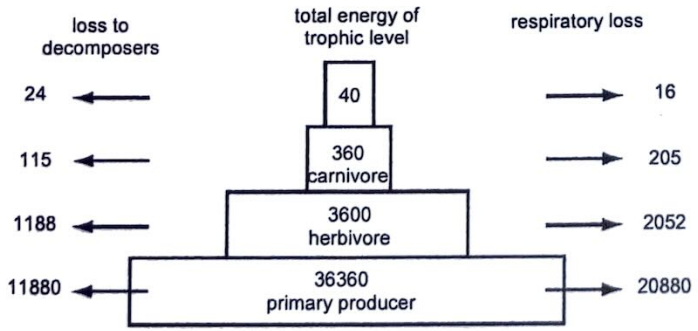
C Mosquitoes have developed strains that are resistant to insecticides.

D It is possible to control caterpillars on food crops by releasing small wasps which lay their eggs in caterpillars and kill them.

38 Which statements about natural selection are correct?

	natural selection can lead to better adapted species surviving	natural selection can lead to extinction of a species	natural selection can lead to gene mutations occurring
A	true	true	true
B	true	true	false
C	true	false	true
D	false	true	true

39 The diagram represents loss of energy from a food chain to decomposers, transfer of energy to the next trophic level and energy loss through respiration.



What conclusion is illustrated by this diagram?

A Carnivores lose more energy than herbivores.

B Energy loss to decomposers is higher than respiratory loss.

C Energy transfer between trophic levels is about 10 %.

D The energy in the final trophic level is not used.

40 The list shows activities that happen in a forest.

1. replanting trees
2. educating people about forests
3. cutting down trees to grow crop plants
4. cutting down only selected trees

Which activities are likely to ensure the forest is used sustainably?

A 1, 2 and 3

B 1, 2 and 4

C 1, 3 and 4

D 2, 3 and 4

END OF PAPER

Setter: Mr Tan Hong Chan