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4EX**BIOLOGY****6093/01**

Paper 1 Multiple Choice [40 Marks]

PRELIMINARY EXAMINATIONS**August 2024**

Additional Materials:
 Approved calculator
 OTAS

1 hour**Instruction to Candidates**

Do not start reading the questions 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 index number on the OTAS provided.

Information for CandidatesThere 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 OTAS.**Read the instructions on the OTAS very carefully.**

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

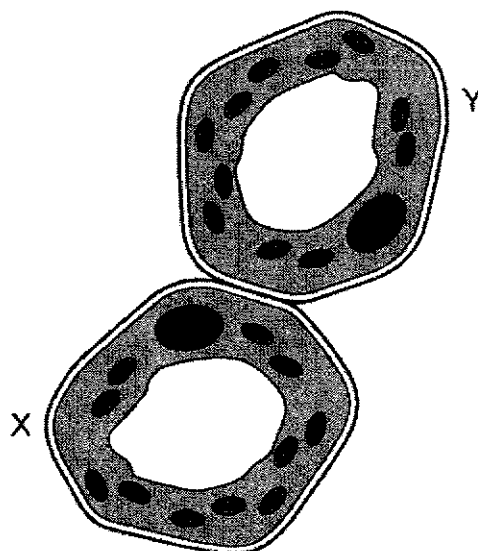
The use of an approved scientific calculator is expected, where appropriate.

Paper 1 (40 marks)

Answer all questions in the OTAS provided.

The diagram below shows two plant cells, X and Y. Cell X has a higher water potential than Y.

Use this information to answer questions 1 and 2.



1 What process will occur between these two cells?

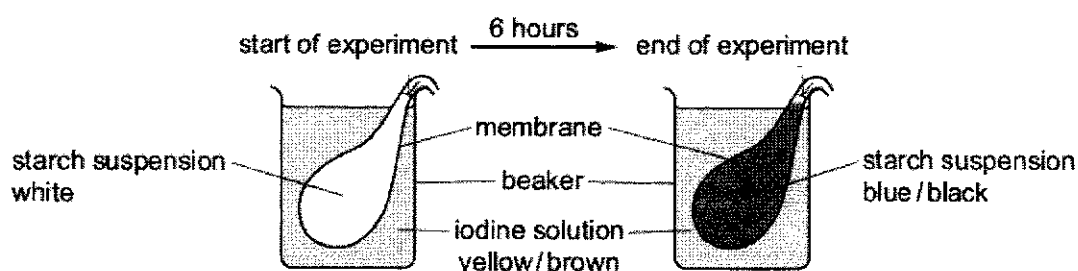
- A active transport
- B diffusion
- C osmosis
- D transpiration

2 Which row identifies the direction and the reason for movement of substances between X and Y?

	Direction	Reason
A	X to Y	Salt molecules move from X to Y because there is a higher concentration of salt molecules at X.
B	X to Y	Water molecules move from X to Y because there is a higher water potential at X.
C	Y to X	Salt molecules move from Y to X because there is a higher concentration of salt molecules at Y.
D	Y to X	Water molecules move from Y to X because there is a higher water potential at Y.

The diagram below shows an experiment.

Use this information to answer questions 3 and 4.



- 3 Why did the starch suspension change colour?
- A Iodine molecules diffused in through the membrane.
 - B Iodine molecules diffused out through the membrane.
 - C Starch molecules diffused in through the membrane.
 - D Starch molecules diffused out through the membrane.
- 4 Which method can increase the rate of reaction in this experiment?
- A Adding amylase into the iodine solution.
 - B Adding amylase into the starch suspension.
 - C Decreasing the temperature of the set up.
 - D Increasing the temperature the set up.
- 5 The following diagram shows a portion of a starch molecule.



Which diagram represents the outcome of the digestion of the starch molecule by amylase?

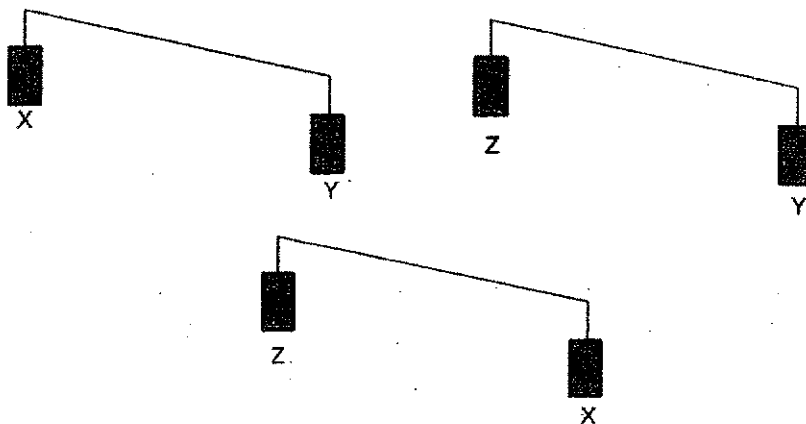
- A
- B
- C
- D

- 6 Several food tests were conducted on a sample of an isotonic drink.

Which row is an expected result?

	Benedict's test	Biuret test	Iodine test
A	brick-red precipitate formed	solution remains blue	solution remains yellow
B	solution turns violet	brick-red precipitate formed	solution remains blue
C	solution turns violet	solution remains blue	solution remains yellow
D	solution remains blue	brick-red precipitate formed	solution remains yellow

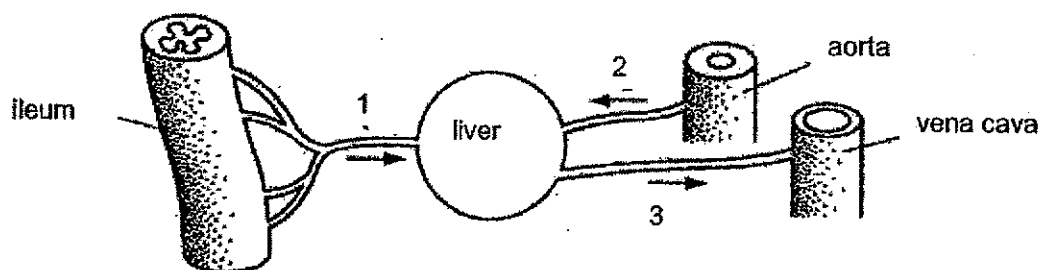
- 7 Three potato strips (X, Y and Z) with the same mass were placed into three different solutions for one hour. The mass of the three potato strips were then compared using a beam balance. The results are shown in the diagram below.



Which row identifies the solution each potato strip is placed in?

	X	Y	Z
A	10% sucrose solution	25% sucrose solution	distilled water
B	10% sucrose solution	distilled water	25% sucrose solution
C	25% sucrose solution	distilled water	10% sucrose solution
D	25% sucrose solution	10% sucrose solution	distilled water

- 8 Which statement describes enzyme-catalysed reactions?
- A All enzymes work best at 37°C.
 - B As an enzyme-catalysed reaction progresses, the concentration of reactants increases.
 - C As the temperature of an enzyme-catalysed reaction increases from 0°C to 20°C, the frequency of effective collisions increases.
 - D Enzymes are denatured as the temperature of an enzyme-catalysed reaction is lowered from 20°C to 0°C.
- 9 The diagram shows the blood supply of the liver.



Which row identifies blood vessel 1, 2 and 3?

	1	2	3
A	hepatic artery	hepatic portal vein	hepatic vein
B	hepatic artery	hepatic vein	hepatic portal vein
C	hepatic portal vein	hepatic artery	hepatic vein
D	hepatic portal vein	hepatic vein	hepatic artery

- 10 What is not likely to be an outcome of the removal of the pancreas?
- A decrease in the amount of glycogen production in liver and muscle cells
 - B decrease in the amount of protein digested
 - C diabetes mellitus
 - D increase in the pH of duodenum

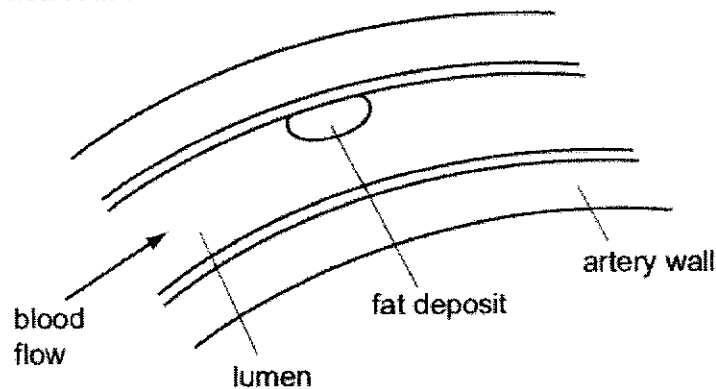
11 The following statements were made.

- 1 the intake of food into the body through the mouth
- 2 the breakdown of large insoluble food molecules into small soluble ones
- 3 the uptake and use of food molecules in the cells of the body
- 4 the movement of food molecules through the wall of the intestine

Which row matches the definitions of digestion and assimilation?

	digestion	assimilation
A	1	3
B	2	3
C	1	4
D	2	4

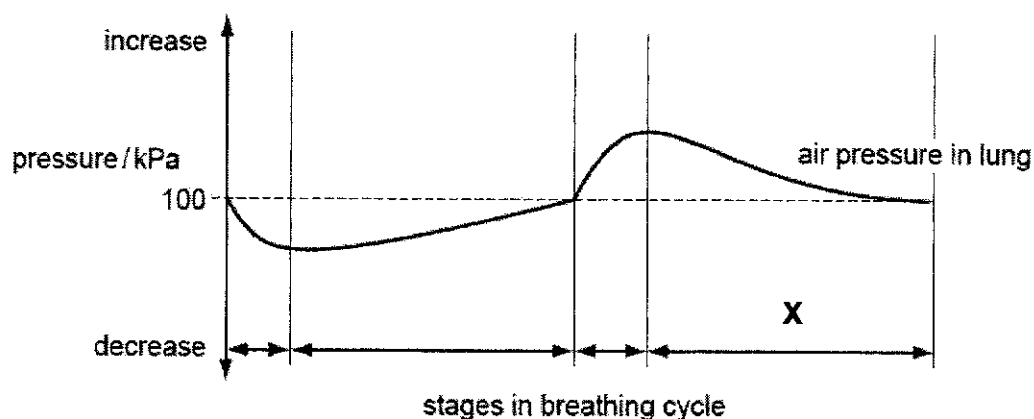
12 The following diagram shows a section of the coronary artery with deposition of fats that may result in a heart attack.



What statement describes the events that could lead to a heart attack?

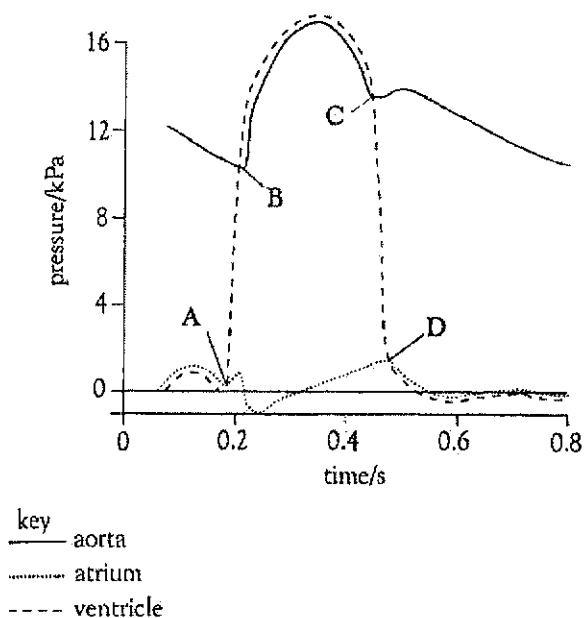
- A** Further fat deposits followed by platelet destruction.
- B** Further fat deposits followed by red blood cell destruction.
- C** Restriction of the artery lumen causing less oxygen supply.
- D** Hardening the artery wall preventing diffusion across the wall.

- 13 The graph shows changes in the air pressure within the lungs during one breathing cycle.



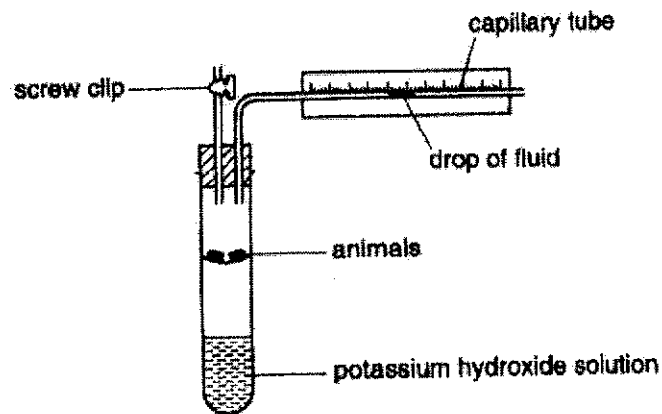
What causes the change in air pressure during stage X?

- A contraction of diaphragm
 - B movement of ribs upwards and outwards
 - C relaxation of external intercostal muscles
 - B relaxation of internal intercostal muscles
- 14 The diagram gives information about blood pressure in various parts of the circulatory system during the cardiac cycle.



At which point does the semilunar valve of the aorta close?

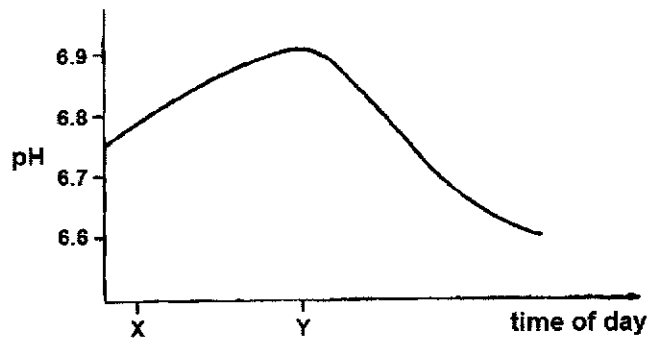
- 15 The diagram shows an apparatus used to measure the respiration rate of small animals.



Which row correctly states and explains if the screw clip should be left open or closed?

	screw clip	reason
A	closed	to measure output of carbon dioxide
B	closed	to measure uptake of oxygen
C	open	to allow entry of air
D	open	to allow for temperature fluctuations

- 16 The graph shows changes in the pH of water in a freshwater lake on a summer's day. Y represents midday.

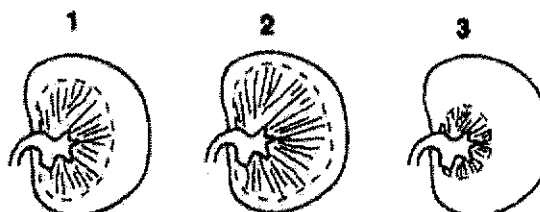


Which statement explains the shape of the graph between time X and Y?

- A decreased levels of carbon dioxide due to photosynthesis
- B increased biological oxygen demand by consumers
- C increased levels of carbon dioxide due to respiration
- D increased oxygen released by producers

- 17 Coypu are found in fresh water and are never short of water to drink. Brown rats can go some days without drinking. Kangaroo rats can live in deserts without drinking for months.

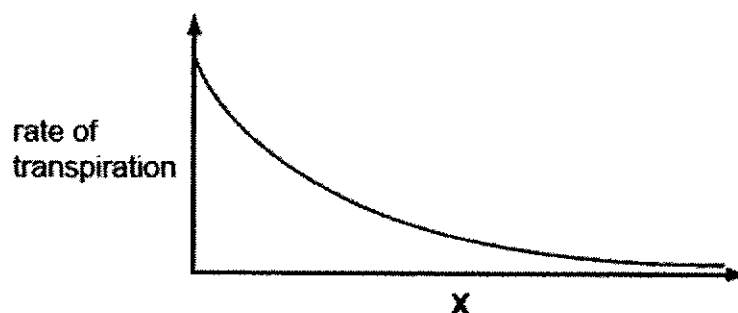
The diagram shows vertical sections of kidneys of coypu, brown rat and kangaroo rat, showing the relative sizes of cortex and medulla.



Which row correctly identifies the animal which the kidney belongs to?

	1	2	3
A	brown rat	coypu	kangaroo rat
B	brown rat	kangaroo rat	coypu
C	kangaroo rat	brown rat	coypu
D	kangaroo rat	coypu	brown rat

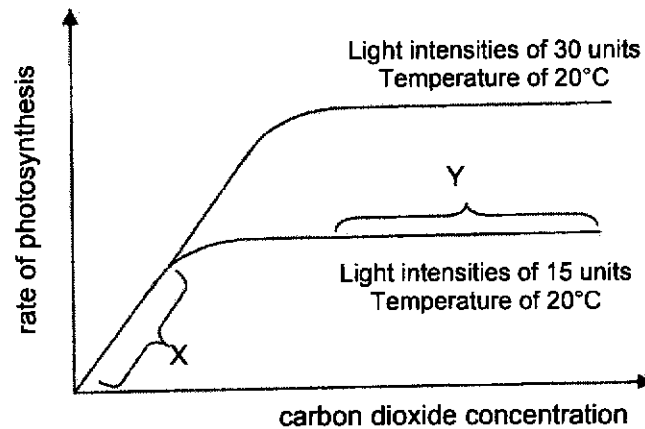
- 18 The graph shows how the rate of transpiration is affected by X.



What is X?

- A humidity
- B light intensity
- C soil moisture
- D temperature

- 19 The graph below shows the effects of varying the carbon dioxide concentration at two different light intensities on the rate of photosynthesis.



What are the limiting factors of regions X and Y?

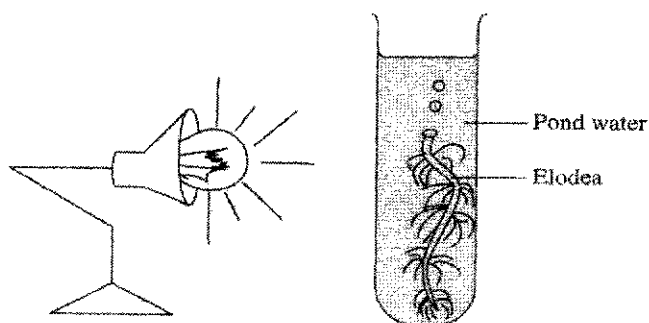
	region X	region Y
A	carbon dioxide concentration	light intensity
B	carbon dioxide concentration	temperature
C	light intensity	carbon dioxide concentration
D	light intensity	temperature

- 20 Which statement explains why removing a complete ring of bark from the branch of a fruit tree results in the production of larger fruits at the branch?
- A Less organic nutrients are transported away from the branches.
 - B More minerals can be transported to the branches to support growth.
 - C More oxygen can enter the branches to facilitate energy release.
 - D More water can be transported to the branches to support growth.
- 21 The trigeminal nerve in humans connects the brain with the teeth and the skin on the face. When the dentist administers a local anaesthesia by injection, you can no longer feel pain and you cannot smile properly.

Which statement correctly explains the effects of the local anaesthesia?

- A The trigeminal nerve carries impulses from the brain to the teeth and back.
- B The trigeminal nerve contains motor neurones.
- C The trigeminal nerve contains motor and sensory neurones.
- D The trigeminal nerve contains sensory neurones.

- 22 The diagram shows an experiment set up to measure the rate of photosynthesis.

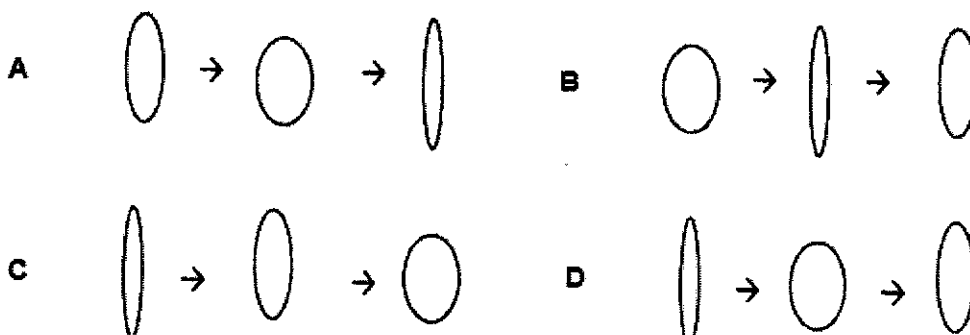


Which row correctly states the conditions that cause *Elodea* to photosynthesize at a maximum rate?

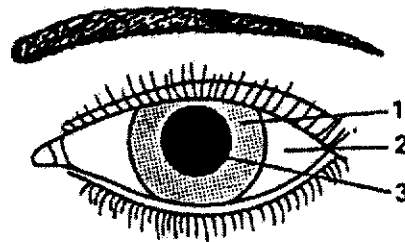
	Distance (cm)	Amount of sodium bicarbonate (g)	Temperature (°C)
A	10	5	35
B	10	5	50
C	20	5	35
D	10	0	35

- 23 Li Tao looks out of the window at the palm tree in the quadrangle. He turns and reads the time on his wrist watch, glances at the teacher in front of the class and runs out of the classroom through the back door.

Which diagram shows the sequence of the changes in the shape of the lens of his eyes?



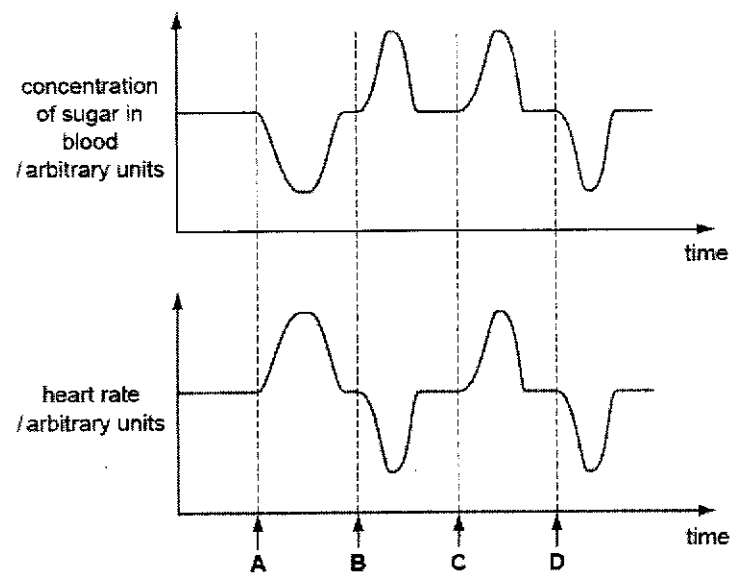
- 24 The diagram below shows the front view of the eye.



Which row shows the correct labels of the structures?

	1	2	3
A	cornea	choroid	iris
B	cornea	retina	choroid
C	iris	retina	pupil
D	iris	sclera	pupil

- 25 The graphs show changes in the rate of heartbeat and in the concentration of sugar in the blood over the same period of time.

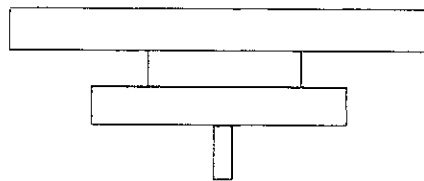


Which arrow represents the time when adrenaline is secreted?

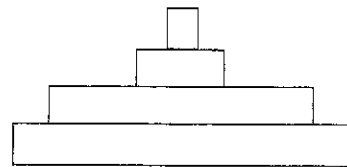
- 26** What is the difference between Acquired Immune Deficiency Syndrome and influenza?
- A** Acquired Immune Deficiency Syndrome is caused by a bacterium while influenza is caused by a virus.
 - B** Acquired Immune Deficiency Syndrome is caused by a virus while influenza is caused by a bacterium.
 - C** Both diseases can be treated by antibiotics.
 - D** Both diseases cannot be treated by antibiotics.
- 27** The food chain below is found in a forest.

Tree → Maggot → Bird → Intestinal parasite

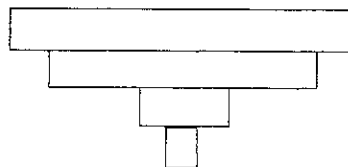
Four ecological pyramids are shown below.



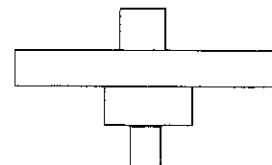
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2



3

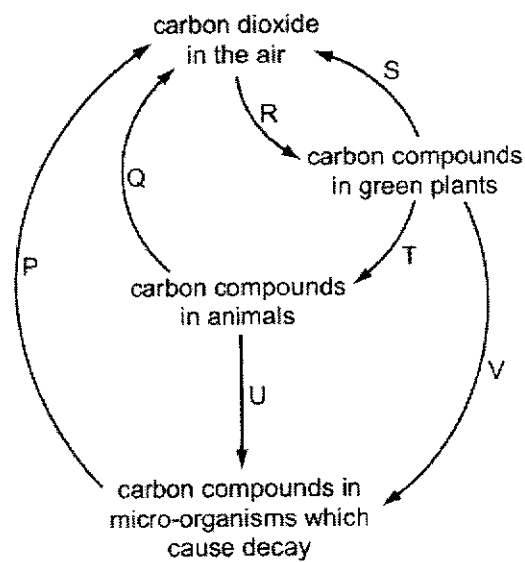


4

Which row correctly represents the pyramid of numbers and the pyramid of biomass of this food chain?

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

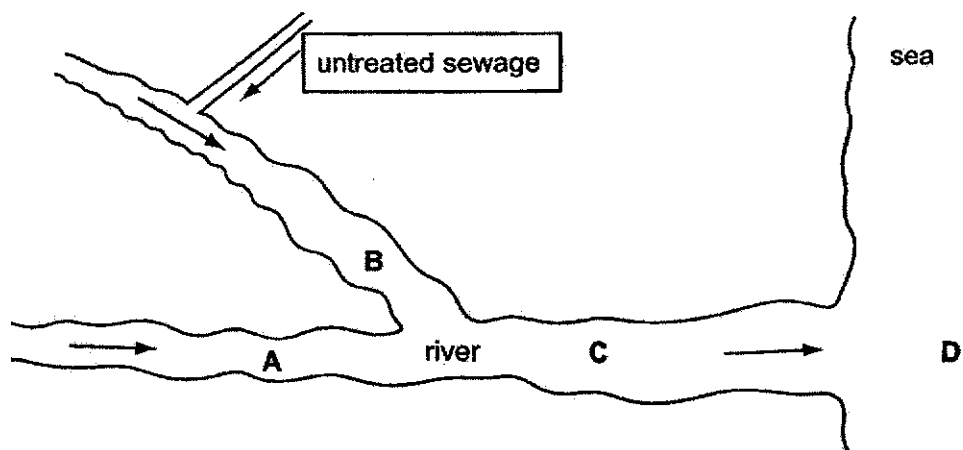
- 28 The diagram shows the carbon cycle.



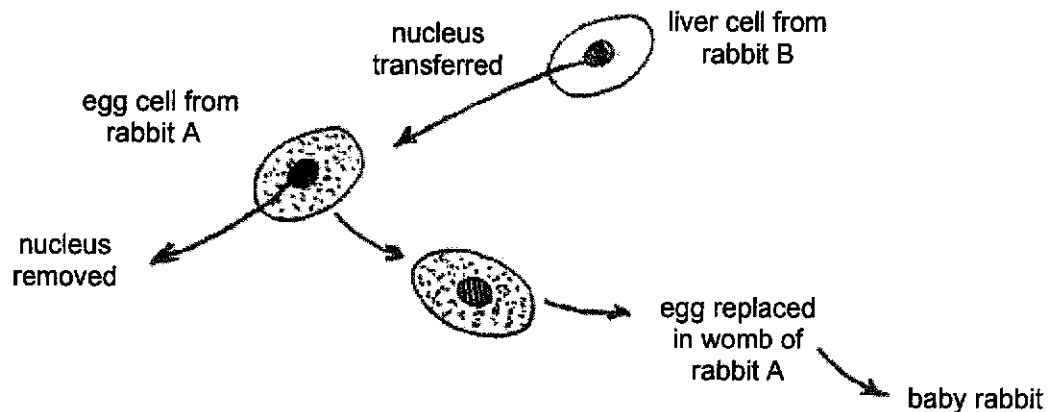
Which letters represent respiration?

- A P, Q and R
 - B P, Q and S
 - C S, T and V
 - D T, U and V
- 29 The map below shows a river flowing into the sea. The river is polluted by untreated sewage.

At which labelled point will the oxygen content of the water be the lowest?



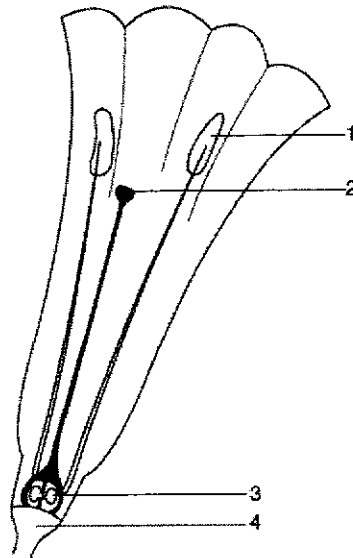
- 30 Which of the following is not a valid example of evolution by means of natural selection?
- A Development of antibiotic-resistance bacteria.
 - B Development of birds with different kinds of beaks for different food sources.
 - C Development of giraffes with longer necks as earlier generations stretched their necks more to obtain food.
 - D Development of orchids with different flower shapes that attract specific pollinators.
- 31 The diagram shows the main stages in a process where a liver cell from one rabbit is used to provide a nucleus, which was then placed into the egg of another rabbit.



Which statement best describe the appearance of the baby rabbit?

- A The baby rabbit looks like both rabbit A and B.
 - B The baby rabbit looks like rabbit A.
 - C The baby rabbit looks like rabbit B.
 - D The baby rabbit will not look like both rabbit A or B.
- 32 Which statement of cross-pollination is the most accurate?
- A It can involve flowers on the same plant or different plants of the same species.
 - B It must involve different plants of different species.
 - C It must involve different plants of the same species.
 - D It must involve two flowers.
- 33 Which microbes are used in the treatment of sewage?
- A bacteria only
 - B bacteria and virus
 - C fungi only
 - D fungi and virus

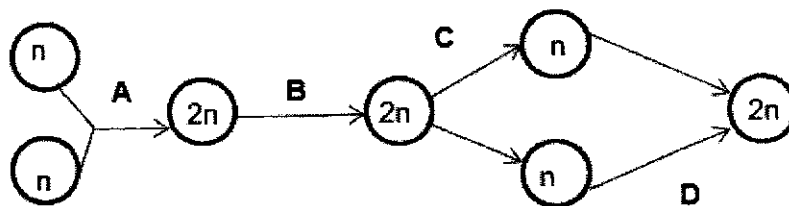
- 34 The diagram shows a section through a flower.



Which labelled parts contain haploid nuclei formed by reduction division?

- A 1 and 2
 - B 1 and 3
 - C 2 and 3
 - D 2 and 4
- 35 The diagram below shows the life cycle of an animal.

Which arrow best represents mitosis?

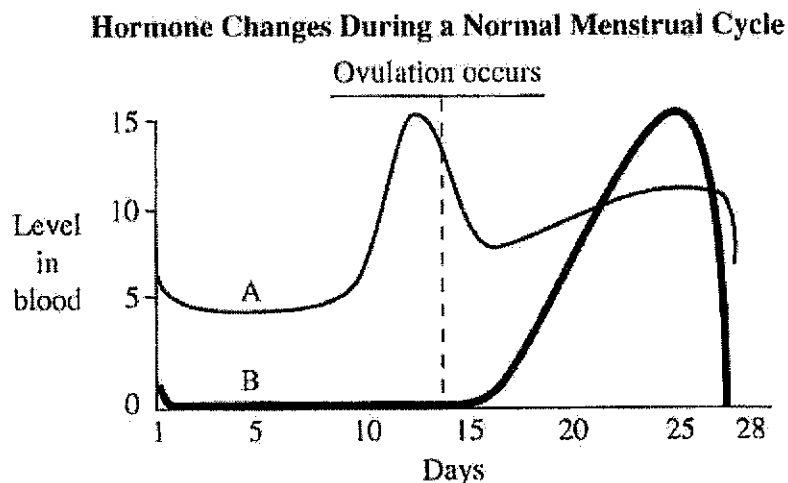


- 36 Which method would most likely produce flowers of the same type and colour?

- A Growing all the plants from the seeds from one parent plant.
- B Growing all the plants from the cutting from one parent plant.
- C Growing all the plants in the same conditions.
- D Growing flowers from the same plant can never be identical.

The graph shows the hormone changes during a normal menstrual cycle.

Refer to the graph to answer questions 37 and 38.



37 Which row correctly identifies the hormones and its graph?

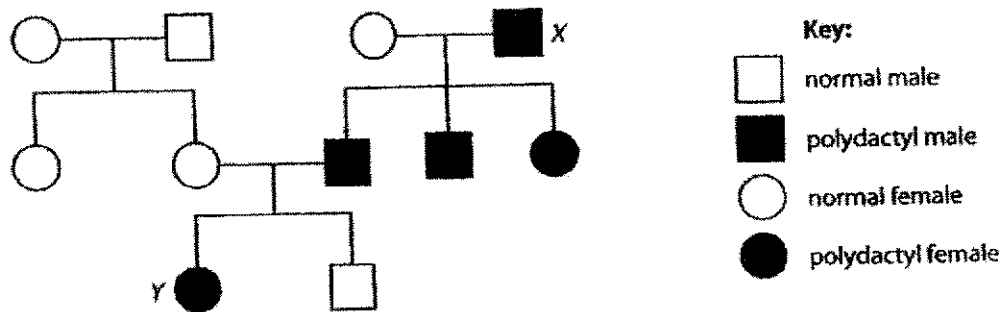
	Graph A	Graph B
A	progesterone	oestrogen
B	progesterone	testosterone
C	oestrogen	progesterone
D	oestrogen	testosterone

38 What would be a likely consequence if the hormone represented by graph B is lacking in a adult female?

- A The adult's uterine lining might not be sufficiently stable to support an implanted embryo.
- B The levels of the hormone represented by graph B would be higher than normal.
- C There would be a delay in puberty.
- D There would be no significant effect since the functions of the hormones overlap.

Polydactyly is a genetically inherited abnormality caused by a dominant allele, D. Affected individuals have one or more extra digits on the hand or feet.

The diagram below that shows the pedigree chart of a family. Refer to the diagram to answer questions 39 and 40.



39 What is the genotype of X?

- A DD
- B Dd
- C dD
- D dd

40 If Y marries a man who is heterozygous for polydactyl, what would be the probability that their first child is polydactyl?

- A 0%
- B 25%
- C 75%
- D 100%

Name

Reg. No

Class



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4EX

BIOLOGY**6093/02**

Paper 2 [80 Marks]

PRELIMINARY EXAMINATION**August 2024**

Additional Materials
 Approved Calculator

1 hour 45 minutes**INSTRUCTIONS TO CANDIDATES****Do not start reading the questions until you are told to do so.**

Write your name, class, and index number on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use paper clips, highlighters, glue or correction fluid.

This paper consists of **Section A** and **Section B**.**Section A**Answer **all** questions.

Write your answers in the spaces provided on the Question Paper.

Section BQuestion **10** is in the **Either or Or** format.

Write your answers in the spaces provided on the Question Paper.

FOR EXAMINER'S USE	
Paper	Marks
A Total	/ 70
B Total	/ 10
Paper 2 Total	/ 80

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

Candidates are reminded that **all** quantitative answers should include appropriate units.

Candidates are advised to show all their working in a clear and orderly manner.

The use of an approved scientific calculator is expected, where appropriate.

 This question paper consists of **16** printed pages.

[Turn over

Section A (70 marks)

Answer all the questions in the spaces provided.

- 1 Pneumococcal diseases are one of the major causes of death worldwide. It is caused by a bacteria called *streptococcus pneumoniae*.

- (a) Define the term pathogen.

.....
 [1]

- (b) Antibiotics are drugs that can treat pneumococcal diseases. Complete the table below to list any three of the structures present in a bacterial *streptococcus pneumoniae* cell. Explain how the antibiotics acts on each of them to destroy this bacterium.

Structure	How the antibiotic acts on this structure

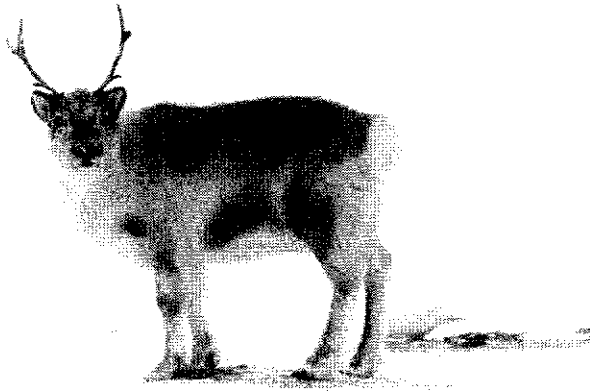
[3]

- (c) "Superbugs" can develop when bacteria become resistance to antibiotics. Discuss two ways how antibiotic resistance can be reduced.

.....

 [2]

- 2 In the Artic, food is scarce. The reindeer depends on limited resources like grasses for food.



- (a) The reindeer is in turn eaten by brown bears.

Brown bears are very adaptable like human. They consume a wide range of foods, including ground squirrels and grasses.

Ground squirrels are mostly herbivorous and feed on grasses.

Construct a food web to show the flow of energy between organisms in this ecosystem.

[3]

- (b) Explain in detail why the food chains found in the above food web consist not more than three organisms.

.....

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[3]

- (c) During some time of the year, grasses are not available. The reindeer has to turn to alternative food source. This alternative source of food contains a carbohydrate called lichenan.

Reindeer are the only animals that can feed on lichenan.

- (i) List the three elements present in lichenan.

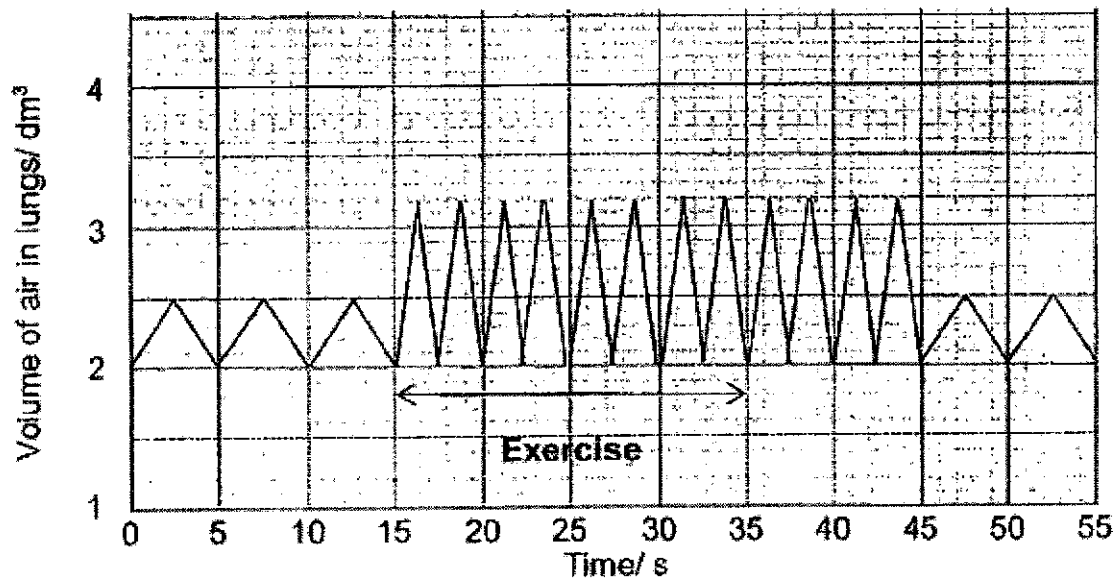
.....
 [1]

- (ii) Explain why reindeers are the only animals that can feed on lichenan.

.....

 [2]

- 3 The figure below shows the changes in the lung volume of an athlete before, during and after his exercise.



- (a) (i) Calculate the differences in the number of breaths per minute that the athlete took when at rest and when exercise.

Differences in the number of breathes per minute: [3]

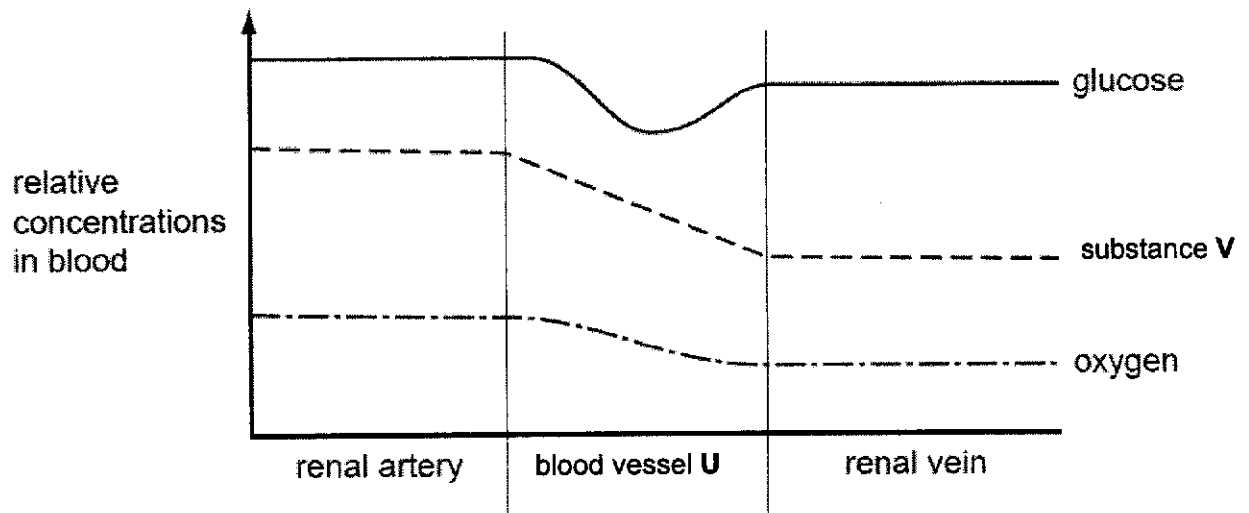
- (ii) Explain why there is a difference in the number of breaths per minutes taken at rest and while exercising.

.....
.....
.....
..... [2]

- (b) Explain why the volume of air in the lungs remains high in the next ten minutes following the end of exercise.

.....
.....
.....
..... [2]

- 4 The figure below shows the changes in the relative concentrations of three substances in the blood plasma of a healthy person. These changes happen when the blood flows through the renal artery, an unknown blood vessel **U** and the renal vein.



- (a) Suggest the identity of blood vessel **U** and substance **V**.

blood vessel **U**:

substance **V**:

[2]

- (b) Describe and explain the differences in the relative concentration of the glucose in blood plasma between the renal artery and renal vein.

.....

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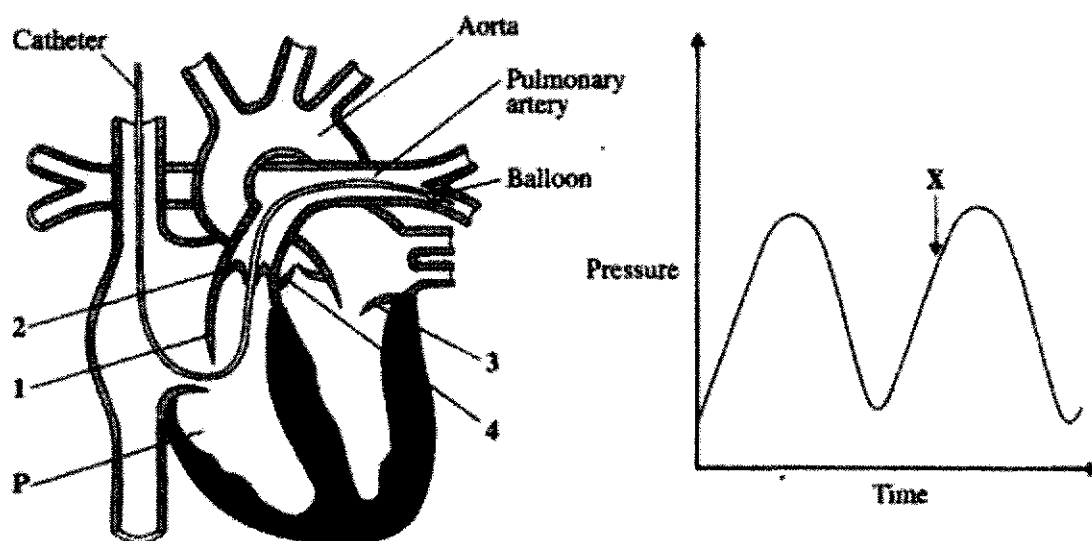
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[3]

- 5 A small tube called a catheter can be inserted into the blood system through a vein. It can be threaded through the vein and into and through the heart until its tip is in the pulmonary artery. A tiny balloon at the tip can then be used to measure the pressure changes in the pulmonary artery.

The figure below shows a section through the heart with the catheter in place. The graph shows the pressure changes recorded in the pulmonary artery.



- (a) Name the parts labeled 3 and P.

3:

P: [2]

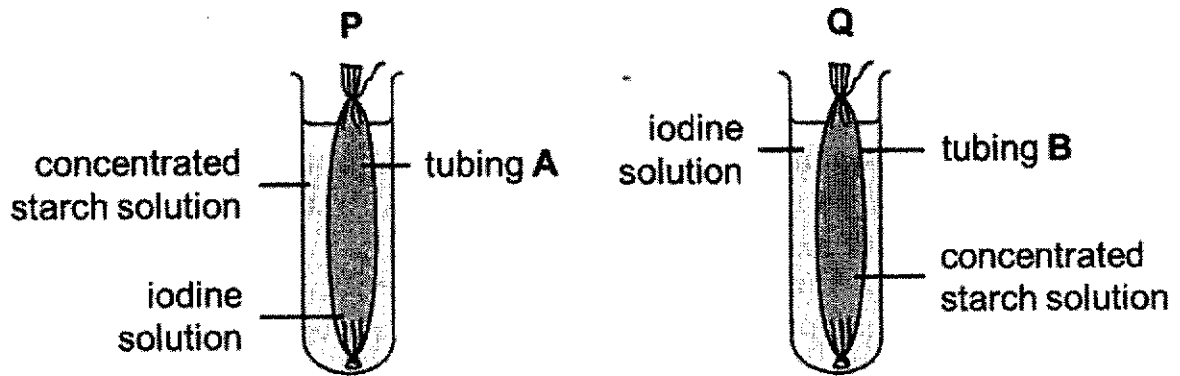
- (b) Complete the table to show whether the valves 1 to 4 in the figure above are open or closed at time X shown in the graph.

Valve	1	2	3	4
Open / Closed				

[2]

- (c) Sketch an additional curve on the graph above to show the pressure changes that would be measured in the aorta at the same time. [2]

- 6 The below shows two experimental set-ups containing a Visking tubing each. Both set-ups were left to stand for 25 minutes.



- (a) Predict what would be seen in the following after 25 minutes.

- (i) Visking tubing A

.....
 [1]

- (ii) Visking tubing B

.....
 [1]

- (b) Explain your prediction for (a)(ii).

.....

 [3]

- (c) Suggest and explain which part of the alimentary canal does this set up represents.

.....

 [3]

- 7 Geranium species are cultivated for horticultural use and for pharmaceutical products. Geranium plants produce a unique chemical compound in its petals to defend itself from Japanese beetles. Within 30 minutes of ingestion, the chemical paralyses the Japanese beetles.

The picture below shows a flower of one of the Geranium species.



- (a) Suggest the agent of pollination and list two observable features to support your answer.

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[3]

- (b) Suggest the advantages and disadvantages of using the type of pollination stated in (a).

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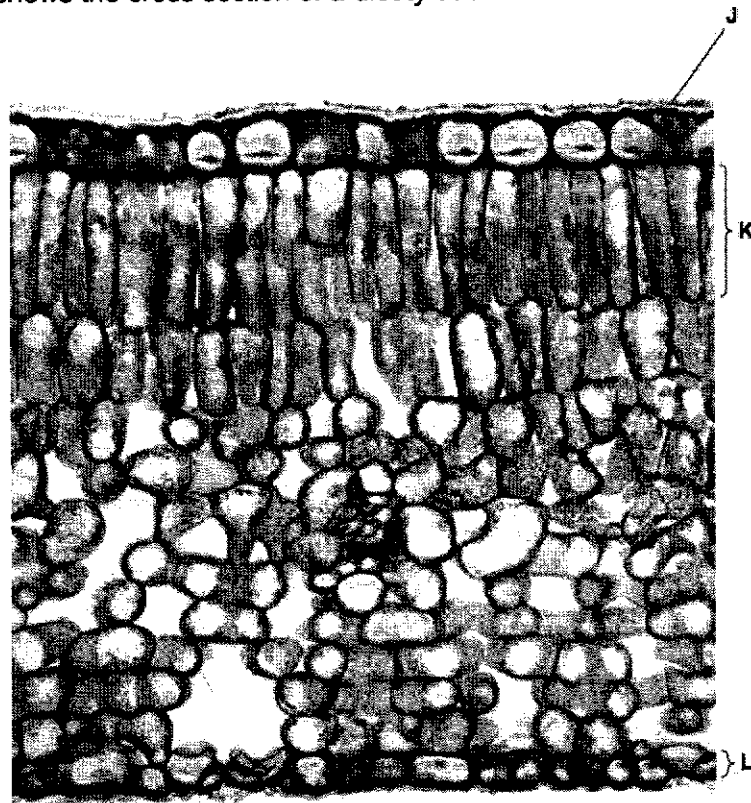
[3]

- (c) Suggest how Geranium plants evolved to become pest-resistant.

.....
.....
.....
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.....

[3]

- 8 The figure below shows the cross section of a dicotyledonous leaf.



- (a) Identify structures J, K and L and explain the importance of each in the process of photosynthesis.

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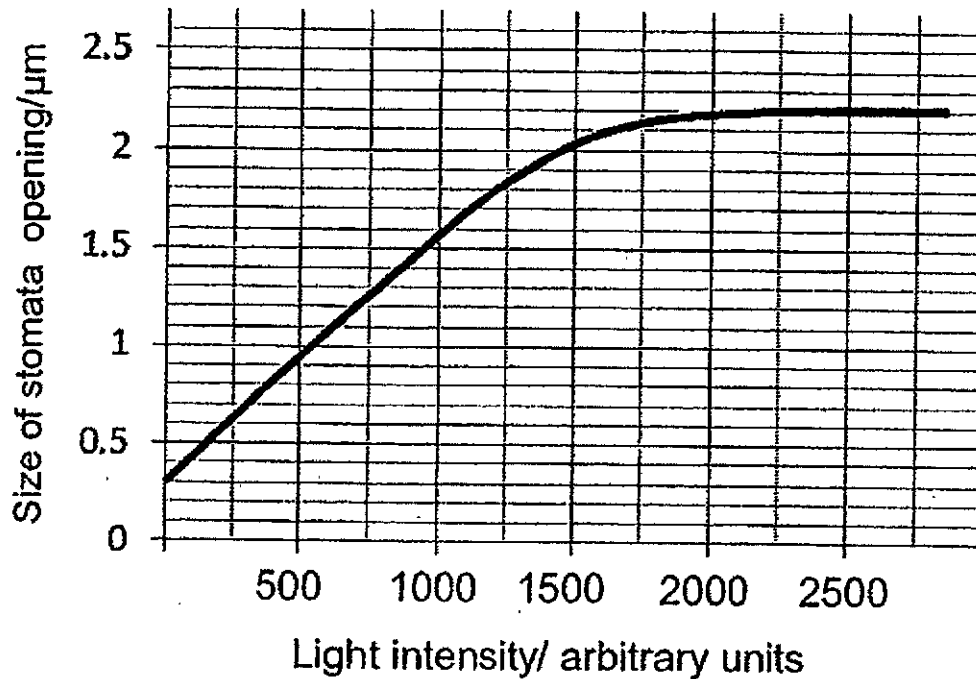
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- (b) This plant was exposed to carbon dioxide concentration of 0.03%. The size of the stomata opening on the plant is measure at different light intensity.

The results were plotted as follows.



- (i) With reference to the graph above, describe the relationship between light intensity and size of stomata opening.

.....

[2]

- (ii) Describe and explain how light intensity affects transpiration rate.

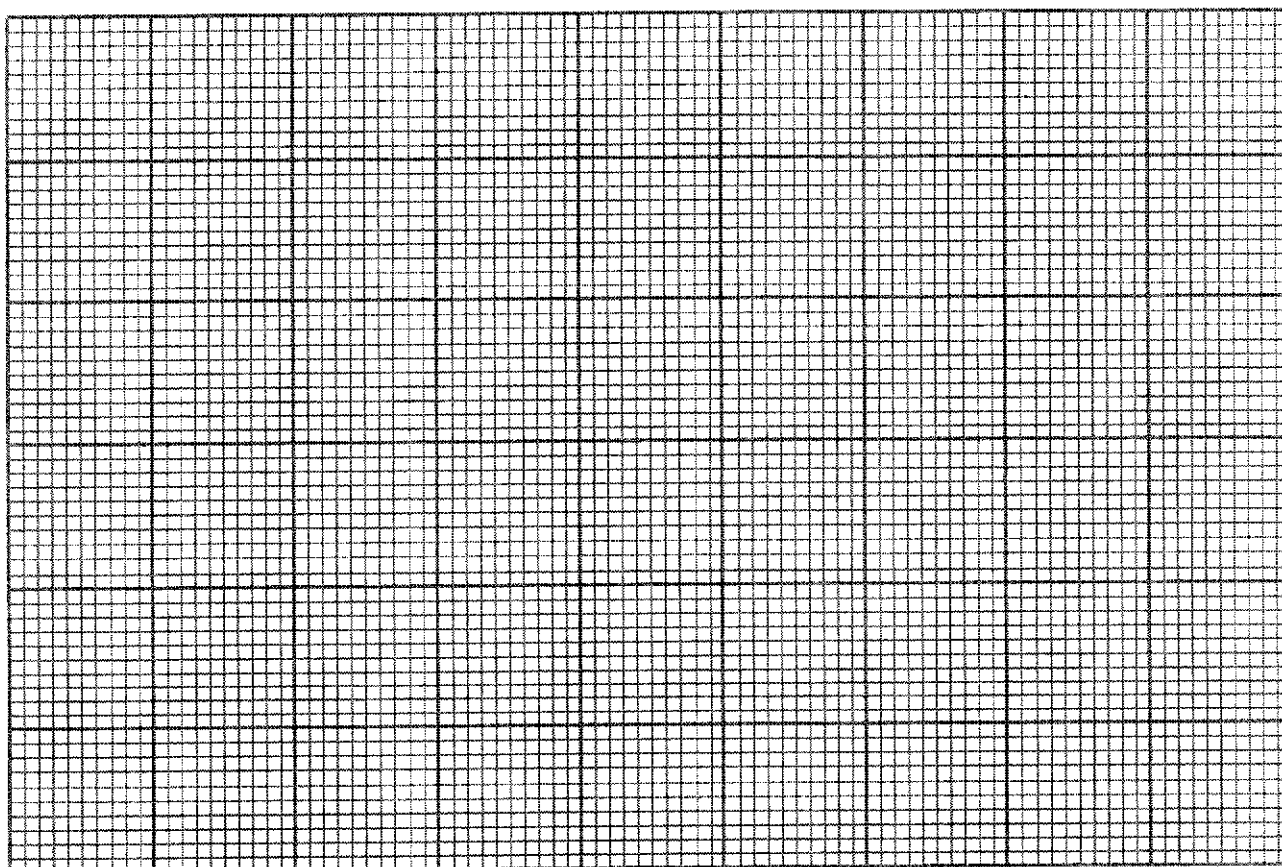
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[3]

- 9 The table below shows the thickness of the uterine lining of a woman for a 40-day assessment period.

time / day of assessment	thickness of uterine lining / arbitrary unit
10	3
16	9
20	21
24	21
28	21
32	24
36	24
40	24

- (a) Using the information above, plot a graph to show the thickness of the uterine lining of a woman for a 40-day assessment period.



- (b) The woman's menstrual cycle lasts an average of 28 days. Using the data from the graph, state the day or the range of days during which the following key biological events would have taken place.

Describe the processes involved and how the level of hormones could have affected the thickness of the uterine lining.

- (i) Ovulation

.....
.....
.....
..... [2]

- (ii) Fertilization

.....
.....
.....
.....
.....
..... [3]

- (c) A foetus in a woman's womb is suspended in amniotic fluid. State one function of amniotic fluid.

.....
..... [1]

Section B (10 marks)

Question 10 is in the form of an **Either/Or** question. Only one part should be answered.

10 Either

- (a) The figure below shows a biological molecule.



Name this structure and describe the structure of this molecule.

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[5]

- (b) Using a named example, explain how a transgenic organism can be produced.

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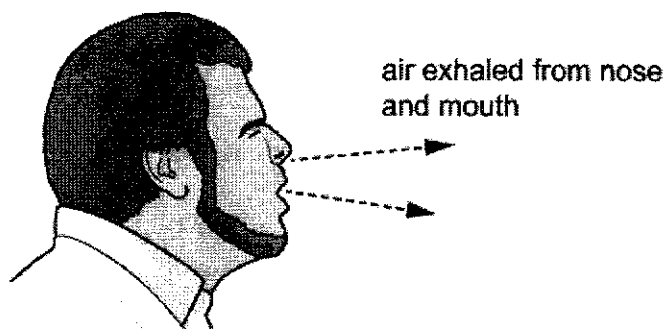
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[5]

10 OR

A sneeze can be triggered by dust irritating receptor cells in the lining of the nose or throat. During a sneeze, air is exhaled from the lungs with some force and the eyelids close.



- (a) Suggest how the closure of the eyelids during a sneeze is coordinated.

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[4]

- (b) A sudden increase in light intensity can trigger sneezing in some people. This is called photic sneezing. It is estimated that 18 – 35% of the human population can be triggered to sneeze by an increase in light intensity.

The genetic basis for photic sneezing is not fully understood but it is thought that this is caused by a dominant allele.

- (i) Describe what is meant by the term *dominant allele*.

.....

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.....

.....

[2]

- (ii) Using a genetic diagram, discuss the probability of an offspring inheriting the photic sneeze reflex if the mother does not have this condition and the father is heterozygous for the gene responsible for it.

[4]

- End of Paper 2 -

Answers

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

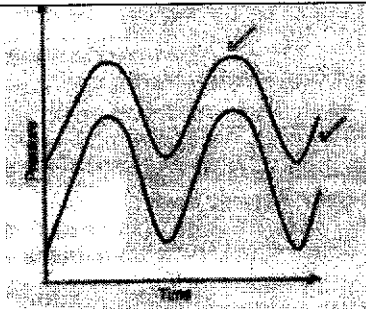
11	12	13	14	15	16	17	18	19	20
B	C	C	C	B	A	B	A	A	A

21	22	23	24	25	26	27	28	29	30
C	A	D	D	C	D	B	B	B	A

31	32	33	34	35	36	37	38	39	40
C	C	A	B	B	B	C	A	A	C

Answers

Qnt	Answer	
1a	Organisms that spread diseases from one person to another ;	
1b	Cell wall – maintain the shape ; Cell membrane – control substances in and out of cell ; DNA/plasmid – contains genetic materials ; Cytoplasm – chemical reactions happens ; Reject nucleus, RER, SER	
1c	Complete dose of antibiotics ; Use antibiotics only when necessary ;	
2a	all four organisms in a diagram ; producer/s and consumer/s linked by lines to reindeer ; correct arrow/s from (grasses ferns and mosses) to ground squirrels ;	
2b	Only 10% of energy is pass to next trophic level : Energy is lost through uneaten body parts ; heat ; undigested food ; (any two for two marks)	
2ci	carbon / C + hydrogen / H + oxygen / O	
2cii	no enzyme to digest lichenan ; as there is no this enzyme gene ;	
3ai	Breathing rate at rest = 1 breath every 5 seconds = 12 breathes per minute; Breathing rate while exercising = 1 breath every 2.5 seconds = 24 breathes per minute; Differences = 24 – 12 = 12 breathes per minute	
3ail	During exercise, require more energy, through aerobic respiration; Body need to take in more oxygen as substrate for aerobic respiration;	
3b	body incurred <u>an oxygen debt</u> and accumulation of lactic acid, produced by <u>anaerobic respiration</u> ; oxygen is needed to convert the <u>lactic acid back to sugar/glucose</u> in the liver;	
4a	U: Capillaries; reject glomerulus V: Urea;	
4b	fall in glucose concentration then concentration rises; Kidney filters all glucose but is selectively reabsorbed into blood at proximal convoluted tubule; however, final concentration lower than original as some is used in respiration for energy ;	
5	3: bicuspid valve ; P: right ventricle ;	
5b	1: Closed 2: Open 3: Closed 4: Open for every 2 correct answers	

5c	 Graph higher than original ; Crests and troughs at similar time points as original ;	
6abi	The level of iodine solution in tubing A decreased ;	
6aii	The concentrated starch solution in tubing B turned blue-black ;	
6b	There is a higher concentration of iodine molecules in tubing B as compared to the surrounding concentrated starch solution ; Iodine molecules are small enough to diffuse through the pores of tubing B into the starch solution. react with starch, turning the starch solution blue-black ; Starch molecules are too large to pass through the pores of tubing B. ;	
6c	Ileum; Starch is too huge to pass through the walls of the ileum; Must be digested into small soluble glucose before it can be absorbed ;	
7a	Insect/ Bee/ Butterfly ; Nectar guides/ non-feathery stigma/ large petals/ non-pendulous stamens (R: colourful/ sweet smelling/ nectar present as these are not observable)	
7b	Disadvantage: Energy consuming as need to attract insects ; Advantages: Use less pollen grain ; Pollinate flowers far away, increases genetic variation ;	
7c	Spontaneous mutation takes place, resulting in variation in the organisms; Natural selection occurs where best adapted organisms, with favourable traits, survive; These plants reproduce and pass on their favourable genes to their offspring;	
8a	(J) cuticle ; transparent / allows light through ; (K) palisade ; chloroplasts / chlorophyll + absorb light AW ; (L) lower epidermis ; guard cells / stomata for gaseous exchange ; correct identification 2 for 1 mark, 3 for 2 marks.	

8bi	As light intensity increases from 0 to 2000 arbitrary units the size increase from 0.3 to 2.2 micro m. As light intensity increase after 2000 arbitrary units, the stomata opening remains at 2.2 micro m.	
8bii	Light intensity increase, increase rate of photosynthesis; Guard cell will use the energy and cause the stomata to open wider; More water vapor will be lost and increase the rate of transpiration.	
9a	Correct scale Correct labelling of axes with unit Correct plot Best fit with no extrapolation	
9bi	Day 16 – 20 (accept day within this range); Developing follicle (ovary) secretes estrogen for the repair and thickening of uterine lining; Estrogen level at its peak will trigger ovulation.	
9bii	accept any 3 days plus minus answer in 6bi ; After fertilization, zygote undergoes repeated cell division to form embryo and moves from the oviduct to the uterus for implantation; Corpus luteum secretes progesterone to cause further thickening of the uterine lining for implantation of the embryo.	
9c	Provides protection for the developing foetus against shock and impact / surrounds the developing foetus and allows for foetal movement / lubricates the vagina during child birth. (Accepts any one reasonable function) (reject: Amniotic fluid contains nutrients and oxygen that diffuses into foetal blood and nourishes baby)	
Ea	DNA ; two / double strands, double helix ; made of nucleotides made of deoxyribose, phosphate group and nitrogenous base; strands held together by bonds between the bases ; complementary bases / A – T and C – G ;	
ORa	impulse in sensory neurone ; passes to CNS / brain ; relay neurone ; motor neurone to effector / muscle ; contraction of muscle closes eyelid ;	
ORbi	dominant: always expressed ; allele: alternative form of a gene / variation of a gene ;	
ORbii	Mother rr and father Rr; Gametes correct and circled; Correct cross ; Probability of 0.5	