AHMAD IBRAHIM SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2018
6093 BIOLOGY

BIOLOGY PAPER 1 **6093 / 01**

Secondary Four Express **Date: 20 Aug 2018**

Duration: 1 hour

Name: ……( ) Class: ……

Instructions to Candidates:

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**.**

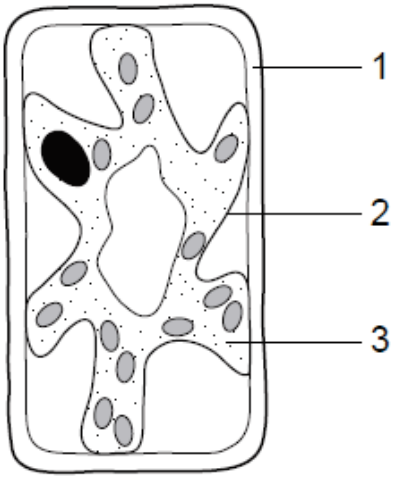
Read the instructions on the Answer Sheet very carefully.

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

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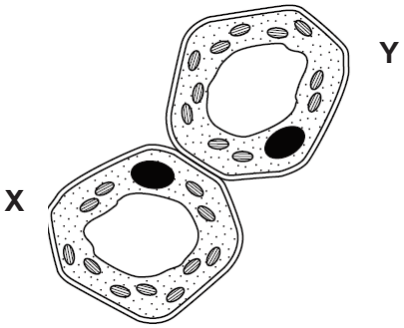
1 The diagram shows a typical plant cell after being placed in a concentrated salt solution for ten minutes.



Which numbered structures are partially permeable?

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

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



In which direction and by what process will water move between these two cells?

	direction	process
A	**X** to **Y**	active transport
B	**X** to **Y**	osmosis
C	**Y** to **X**	active transport
D	**Y** to **X**	osmosis

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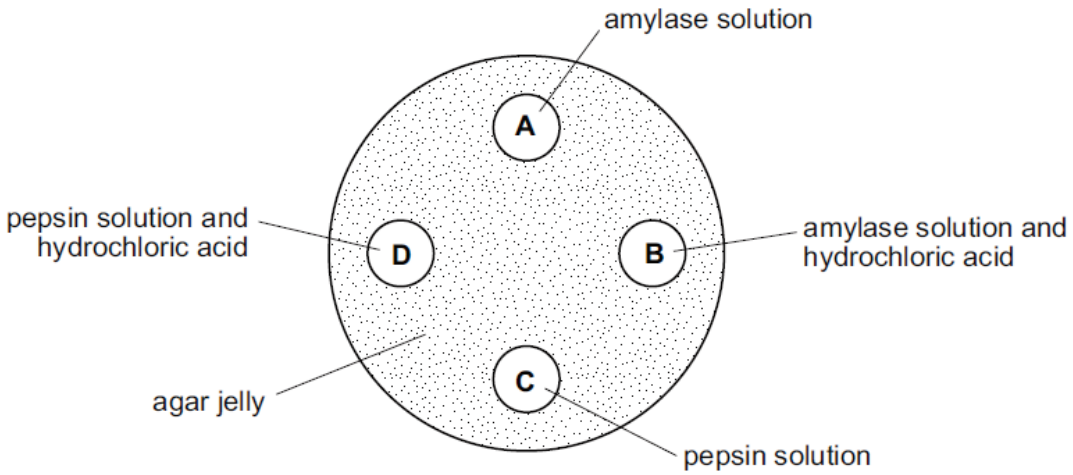
3 A series of cell processes is listed below.

1 mineral ions entering root hair cells
2 glucose uptake by villus cells
3 water entering root hair cells

Which of these involve active transport?

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

4 A dish is filled with agar jelly containing starch. Four holes are cut in the jelly and each hole is filled as shown. After 30 minutes, which hole will be surrounded by the largest area without starch?



5 The table shows the results of an investigation of the absorption of products of digestion in the presence and absence of oxygen.

product of digestion	absorption in the presence of oxygen / arbitrary units	absorption in the absence of oxygen / arbitrary units
amino acids	5.3	1.7
fatty acids	1.9	2.0
glucose	6.4	2.3
glycerol	4.8	4.7

Which conclusion can be drawn from these results?

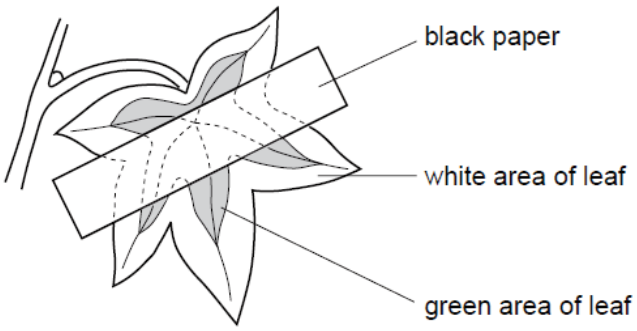
A All products of digestion are absorbed by both active transport and diffusion.
B All products of digestion are absorbed by diffusion only.
C Amino acids and glucose are absorbed by active transport only.
D Fatty acids and glycerol are absorbed mainly by diffusion.

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6 A geranium plant has leaves that are green in the centre but white around the edges.

The plant is destarched and then has one of its leaves partly covered with black paper on both sides of the leaf, as shown.



The plant is placed in bright light for 48 hours. The leaf is then tested for starch.

Which diagram correctly shows the areas that contain starch?

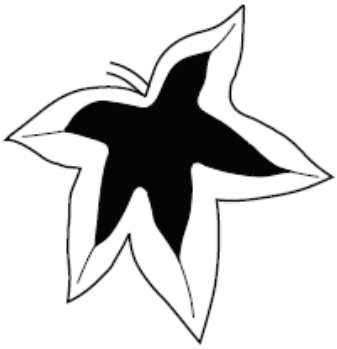
A



B



C



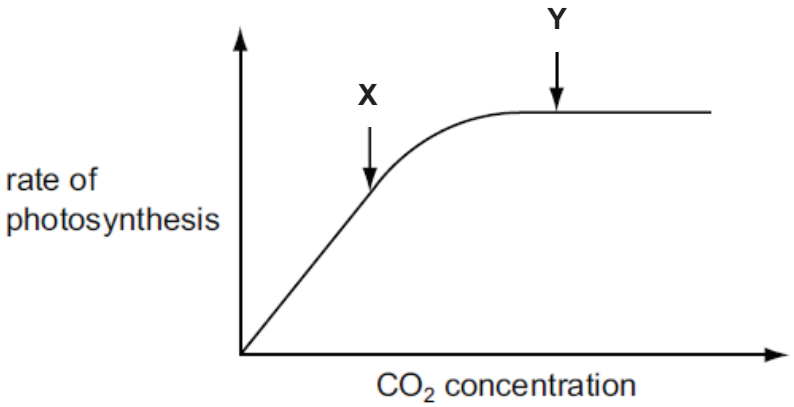
D



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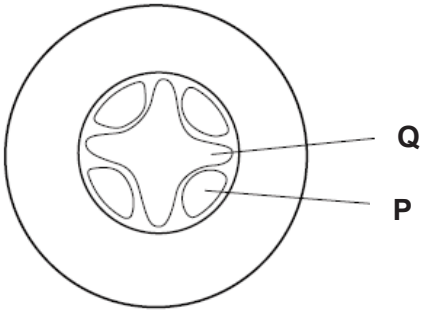
7 The graph shows the effect of carbon dioxide (CO_2) concentration on the rate of photosynthesis.



What could be limiting the rate of photosynthesis at points **X** and **Y**?

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

8 A dicotyledonous plant, growing in a nutrient solution, is placed in a well-lit experimental chamber through which humid air is being passed slowly. The diagram below shows a section through a root of the plant.



The speeds of movement of the fluids in tissues **P** and **Q** are measured. The humid air is then replaced by dry air and the speeds of movement of the fluids change.

What are these changes?

	tissue **P**	tissue **Q**
A	greatly increased upward movement	greatly increased downward movement
B	greatly increased downward movement	little change
C	little change	greatly increased downward movement
D	little change	greatly increased upward movement

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9 During translocation in plants, which substance is moved and in which direction?

	substance	from	to
A	sucrose	anthers	stigmas
B	sucrose	leaves	roots
C	water	roots	leaves
D	water	soil	root hairs

10 Which process does **not** require energy?

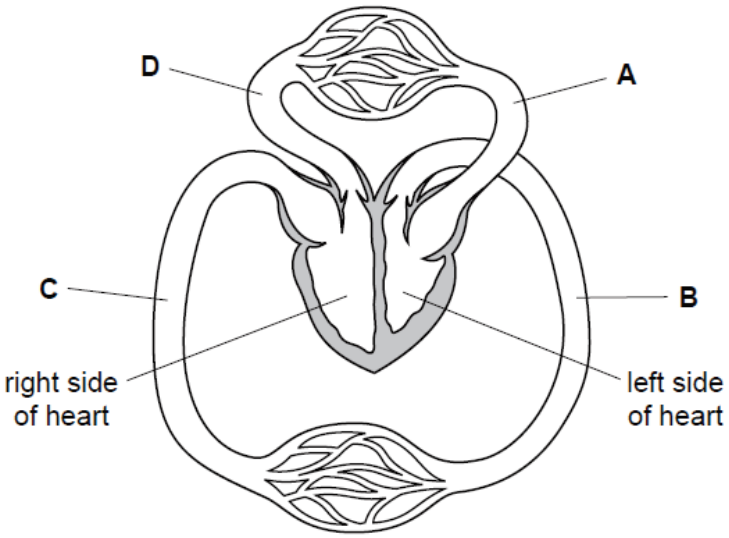
A contraction of muscles
B synthesis of proteins
C tissue respiration
D transmission of nerve impulses

11 Which of the following correctly states whether each of the named vessels contain valves?
Key: Yes - ✓ No - ×

	aorta	capillaries	renal artery	renal vein
A	✓	✓	×	×
B	✓	×	×	✓
C	×	✓	✓	×
D	×	×	×	✓

12 The diagram represents part of the human circulatory system.

Where is the blood pressure highest?

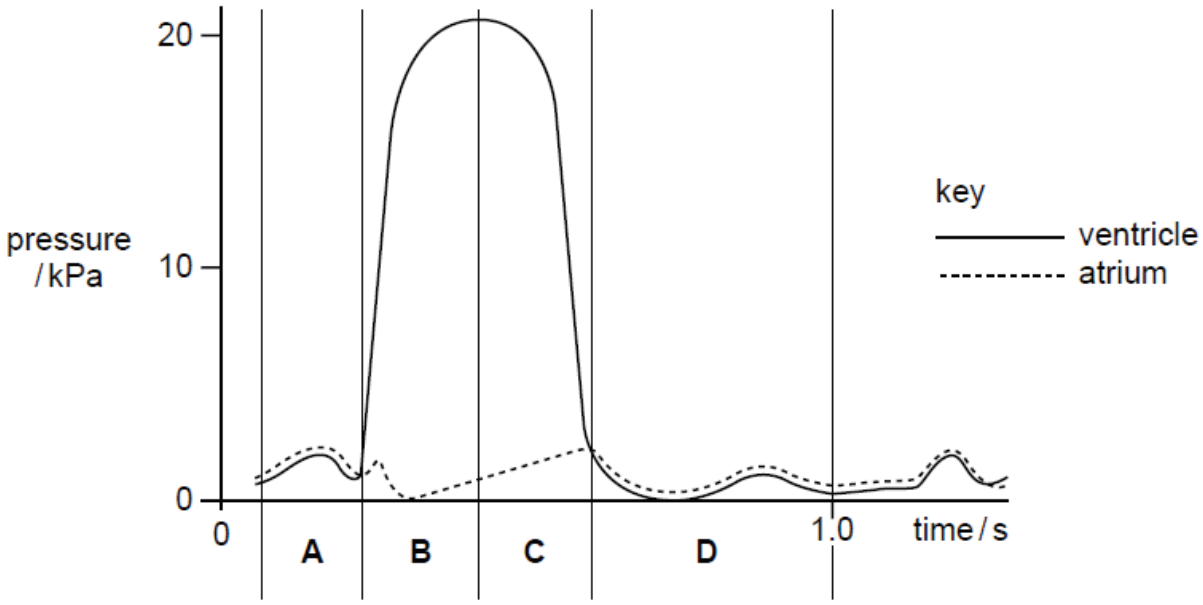


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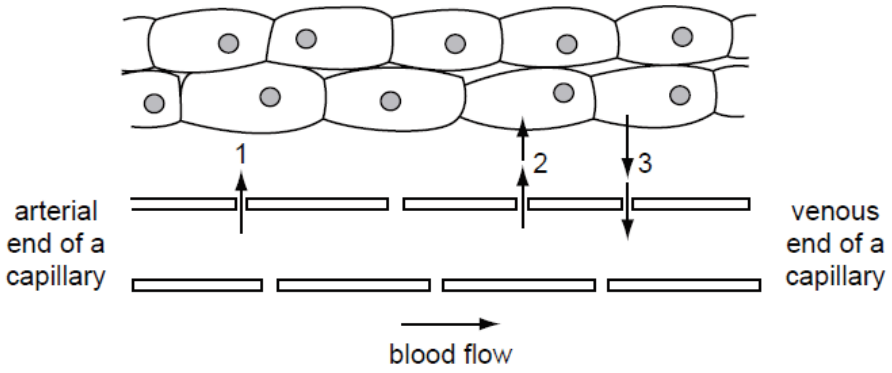
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13 The graph shows pressure changes in the left ventricle and the left atrium in one cycle of contraction of the heart.

During which period of time are the ventricle muscles contracting?



14 The diagram represents a tissue with an adjacent capillary.



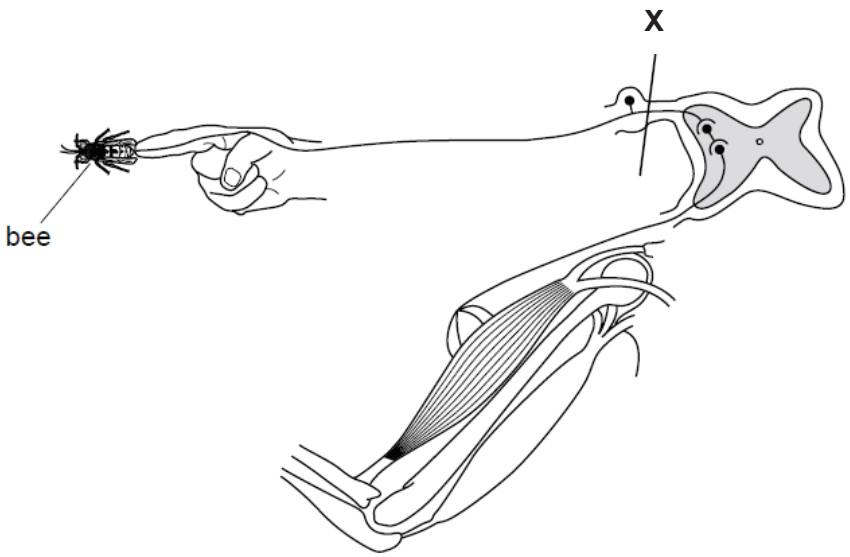
Which substances can 1, 2 and 3 represent?

	1	2	3
A	glucose	tissue fluid	carbon dioxide
B	oxygen	carbon dioxide	glucose
C	tissue fluid	glucose	oxygen
D	tissue fluid	oxygen	carbon dioxide

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15 The diagram shows part of the nervous system, including a reflex arc. It has been cut at **X**.



A bee stings a finger, as shown.

What are the effects of this sting?

	pain felt	arm moved
A	no	no
B	no	yes
C	yes	no
D	yes	yes

16 The urine of a person suffering from diabetes mellitus is likely to contain an abnormal amount of _____.

A amino acids
B fatty acids
C glucose
D urea

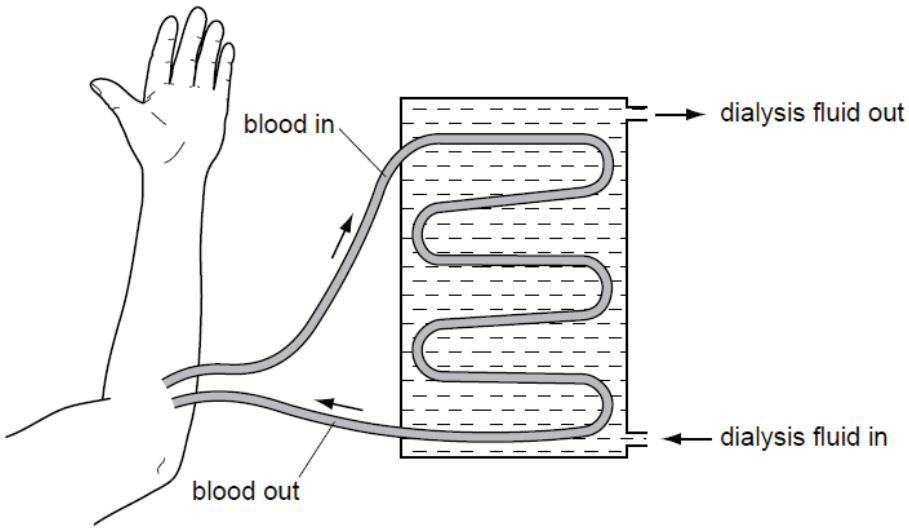
17 What happens to the diaphragm when breathing in?

	muscle action	shape
A	contraction	domed
B	relaxation	domed
C	contraction	flattened
D	relaxation	flattened

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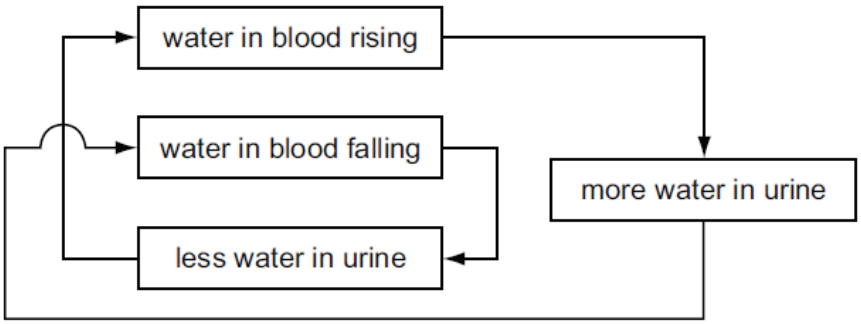
18 The diagram represents part of a dialysis machine.



Which substance must be at the same concentration in the dialysis fluid and in the blood?

A glucose
B salt
C urea
D water

19 The diagram refers to the control of water potential in the blood.



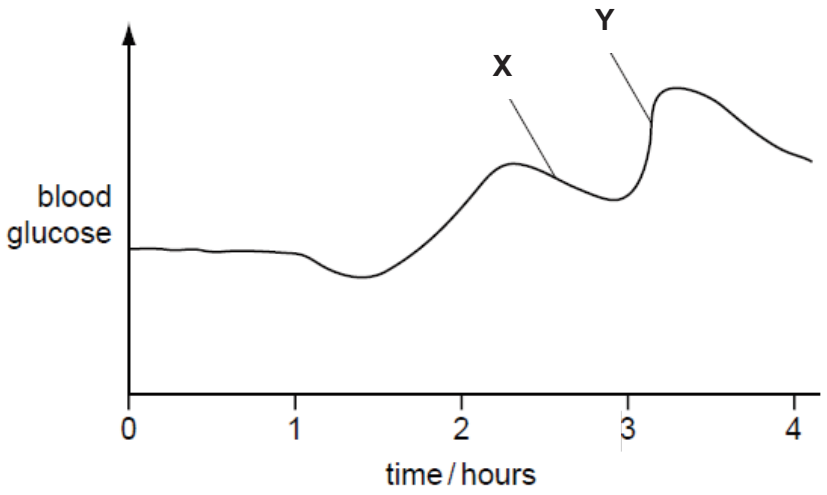
Why is this a negative feedback system?

A It decreases the amount of water in the blood.
B It increases any change in the amount of water in the blood.
C It increases the amount of water in the blood.
D It reverses any change in the amount of water in the blood.

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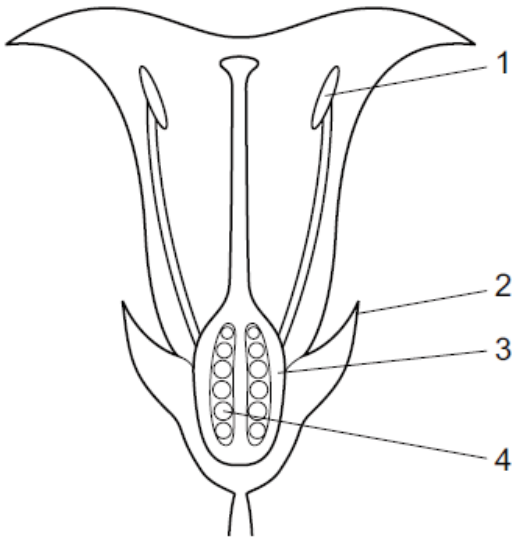
20 The graph shows changes in a person's blood glucose concentration over four hours.



What might cause the changes at **X** and **Y**?

	X	Y
A	decreased insulin	decreased adrenaline
B	decreased insulin	increased adrenaline
C	increased adrenaline	increased insulin
D	increased insulin	increased adrenaline

21 The diagram shows a section through a flower.



After the flower is fertilised, which parts will develop into the fruit and the seed?

	fruit	seed
A	1	2
B	1	4
C	2	3
D	3	4

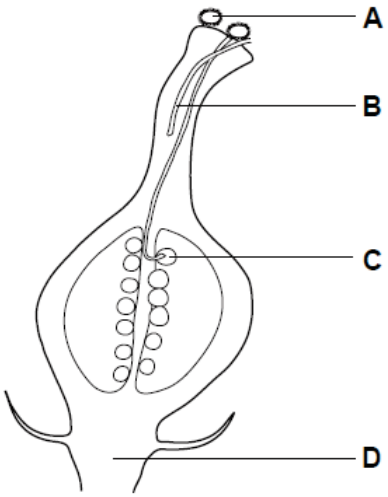
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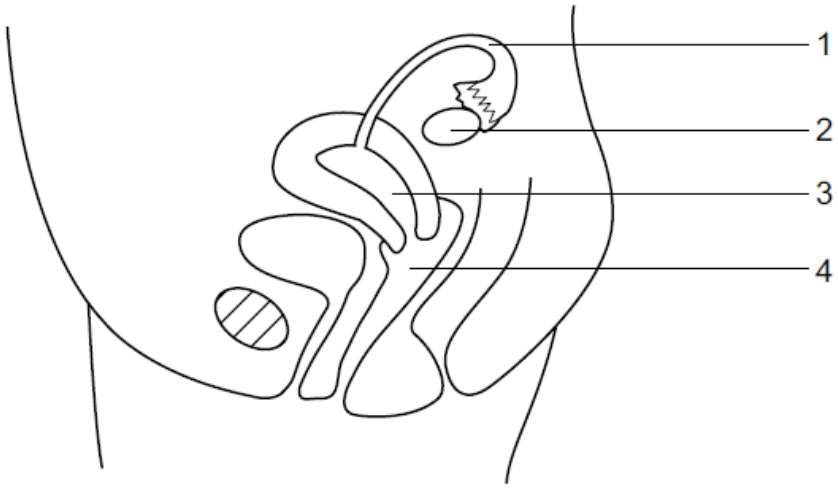
22 New plants may be grown from groups of cells that are taken from other plants.

The diagram shows part of plant **X**.

From which structure will cell samples grow into new plants that are genetically identical to plant **X**?



23 The diagram shows a side view of the female reproductive system.



In which region are sperms released during sexual intercourse and where does fertilisation usually take place?

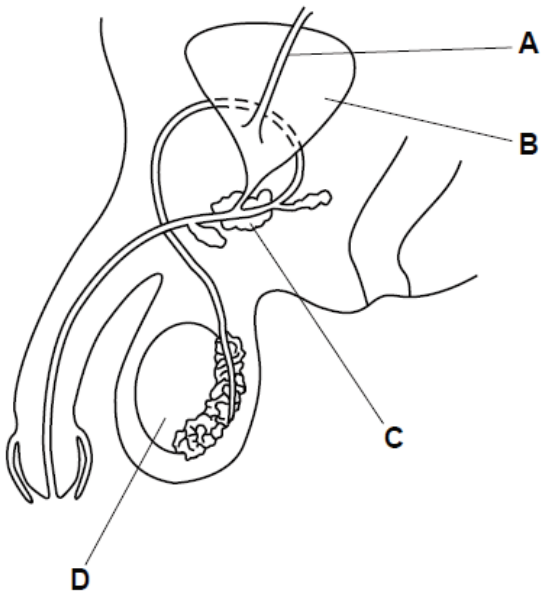
	sperms released	fertilisation
A	3	1
B	3	2
C	4	1
D	4	2

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24 The diagram shows the male reproductive and urinary systems.

Which structure produces the fluid part of semen?



25 When is ovulation most likely to occur?

A about halfway between the start of one menstruation and the next
B at the start of menstruation
C 1-5 days before the start of menstruation
D 5-10 days after the start of menstruation

26 Which statement about chromosomes is correct?

A Chromosomes are long DNA molecules called genes which are divided into sections.
B Chromosomes include a long molecule of DNA divided into sections called genes.
C Chromosomes include genes which are divided into sections called DNA molecules.
D Genes include long DNA molecules called chromosomes.

27 The results from mapping 100 nucleotides on a double-stranded DNA molecule are shown below.

nucleotide	quantity
adenine	26
guanine	24

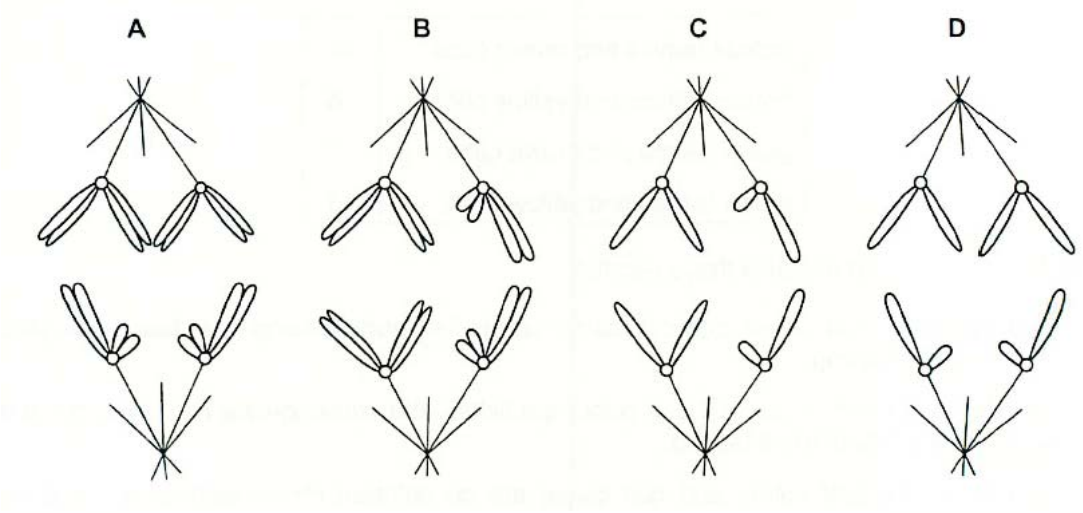
How many cytosine nucleotides are present in this DNA molecule?

A 24
B 26
C 48
D 52

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28 Which diagram shows early anaphase of the first division of meiosis (anaphase I) of a nucleus containing two pairs of homologous chromosomes?

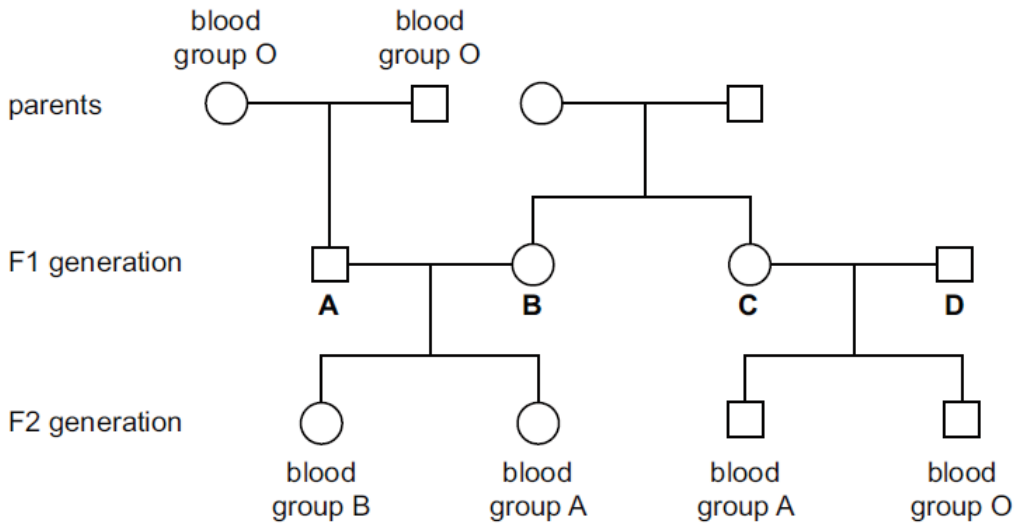


29 What is a correct description of the centrioles, nuclear envelope and spindle during each phase of mitosis in animal cells?

	phase	centrioles	nuclear envelope	spindle
A	anaphase	replicate	absent	present
B	metaphase	present	reforms	present
C	prophase	move apart	breaks up	forms
D	telophase	replicate	breaks up	breaks up

30 The diagram shows the blood group phenotypes of some members of a family.

Which member of the F_1 generation must be heterozygous, with codominant alleles?



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31 A variety of snail has an inherited condition that affects the thickness of the shell.

$S^t S^t$ have thick shells.
$S^t S^n$ have thin shells.
$S^n S^n$ do **not** survive.

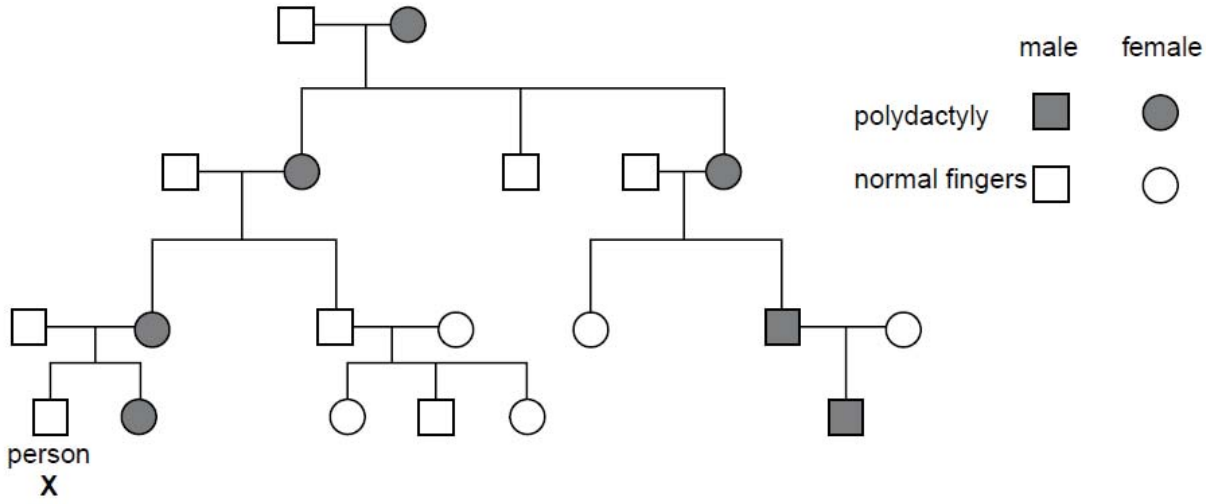
Two heterozygous snails are mated.

What is the probability that a surviving snail of the next generation is a heterozygote?

A 0.00
B 0.25
C 0.50
D 0.67

32 Polydactyly is a rare condition that causes the development of extra fingers. This condition is caused by a dominant allele.

The diagram shows the inheritance of polydactyly in a family.



What is the probability that children of person **X** have inherited polydactyly from him?

A 0.00
B 0.25
C 0.50
D 1.00

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33 Flower colour is controlled by a single pair of alleles. The allele for red flowers is dominant to the allele for white flowers.

A plant homozygous for red flowers is crossed with a plant homozygous for white flowers. All the resulting plants have red flowers (F_1 generation).

When the F_1 generation are crossed with each other, 18 plants are obtained. 12 plants have red flowers and 6 have white flowers (F_2 generation).

What ratio is expected in the F_2 generation and what ratio has been obtained?

	expected ratio red to white	obtained ratio red to white
A	1:1	2:1
B	1:1	3:1
C	3:1	2:1
D	3:1	3:1

34 Which of the following is a result of natural selection?

A dogs that are friendly to humans
B grapes that contain no seeds
C mosquitoes that are resistant to insecticides
D onion crops that have a pleasant taste

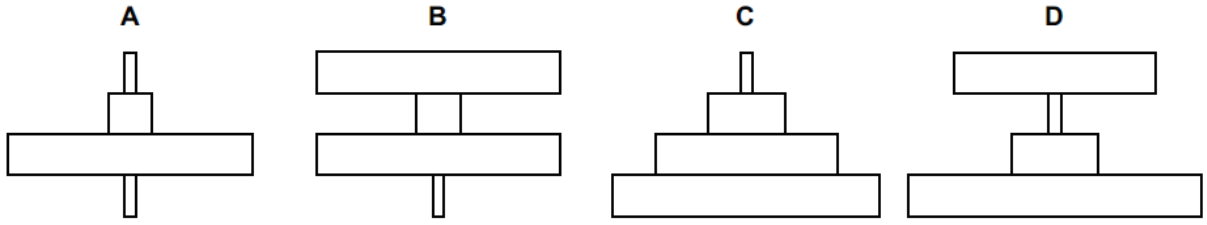
35 In the commercial manufacture of insulin, a human gene is inserted into which of these?

A a chromosome of a human cell
B a protein molecule in a yeast cell
C the DNA of a bacterium
D the nucleic acid in a virus

36 A food chain is shown below.

grass → rabbit → fox → flea

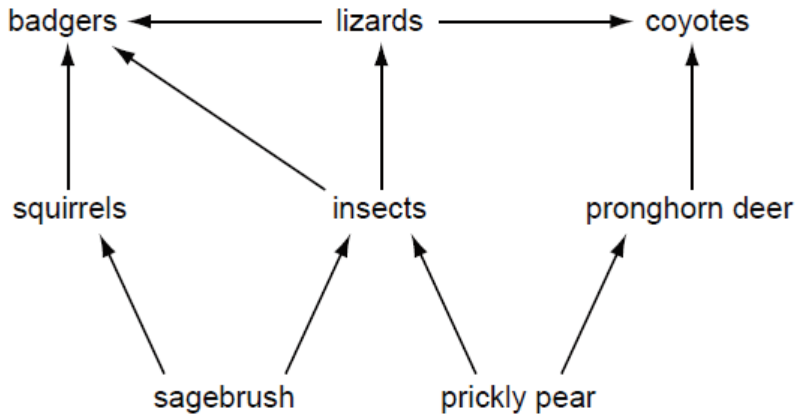
Which pyramid of numbers matches this food chain?



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37 The diagram shows a food web from an ecosystem.



If the population of insects decreases, which other population will decrease the most?

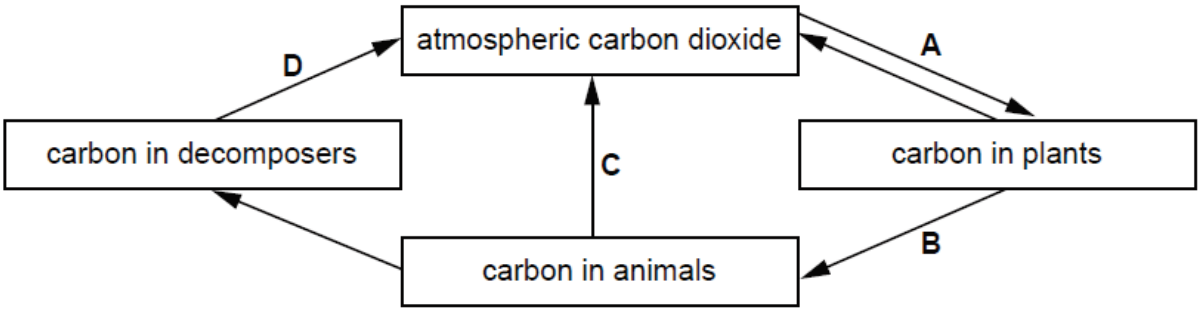
A badgers
B lizards
C sagebrush
D squirrels

38 In a food chain, which trophic level has the most energy passing through it?

A carnivores
B decomposers
C herbivores
D producers

39 The diagram shows part of the carbon cycle.

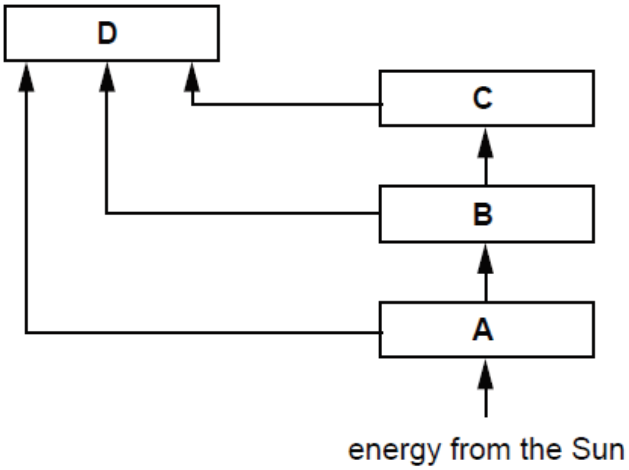
Where in the cycle is there a food chain?



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40 The diagram represents the flow of energy in an ecosystem during one year.
Which box represents the largest total mass of living organisms?



Setter : Mr Teo Soon Hock

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AHMAD IBRAHIM SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2018
6093 BIOLOGY

BIOLOGY PAPER 2 **6093 / 02**

Secondary Four Express **Date: 15 Aug 2018**

Duration: 1 hr 45 mins

Name: ……..……( ) Class: ……

Instructions to Candidates:

Section A
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Section B
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.
You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B. The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE	
Section A	**/ 50**
1 [8]	
2 [6]	
3 [5]	
4 [9]	
5 [8]	
6 [9]	
7 [5]	
Section B	**/ 30**
8 [10]	
9 [10]	
10 [10]	
TOTAL	**/ 80**

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Section A

Answer **all** questions.

Write your answers in the boxes below.

1 Fig. 1.1 shows diagrammatically the action of enzymes on two different food molecules.

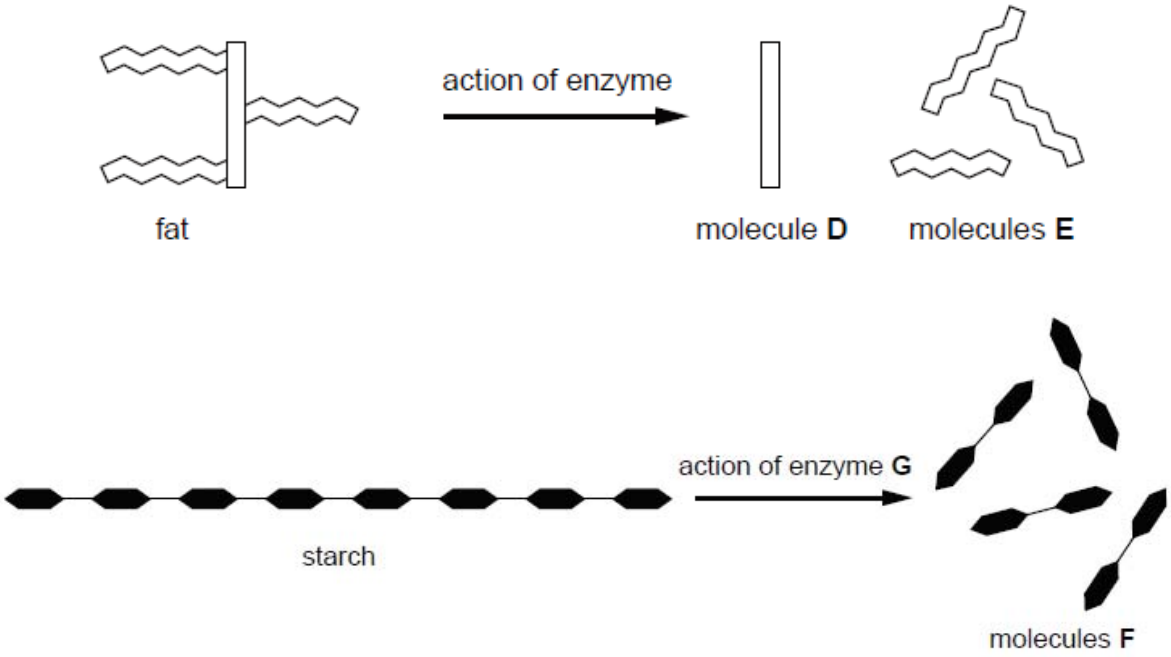


Fig. 1.1

(a) Identify the molecules **D**, **E**, **F** and enzyme **G** shown in Fig. 1.1.

D .....

E .....

F .....

G ..... [2]

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(b) It has been found that fresh pineapple contains an enzyme that can be used to make meat more tender.

Explain why the pineapple is placed on the meat a few hours before, rather than during, cooking.

……

……

……

……[2]

(c) **(i)** Name the organ that makes bile.

……[1]

(ii) Name the organ that produces lipase and is joined to the small intestine.

……[1]

(iii) Describe the role of bile in the digestion of fats.

……

……

……

……[2]

[Total: 8]

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2 A student investigated the effect of light intensity on the rate of photosynthesis of algae. Fig. 2.1 shows the apparatus set up for the investigation.

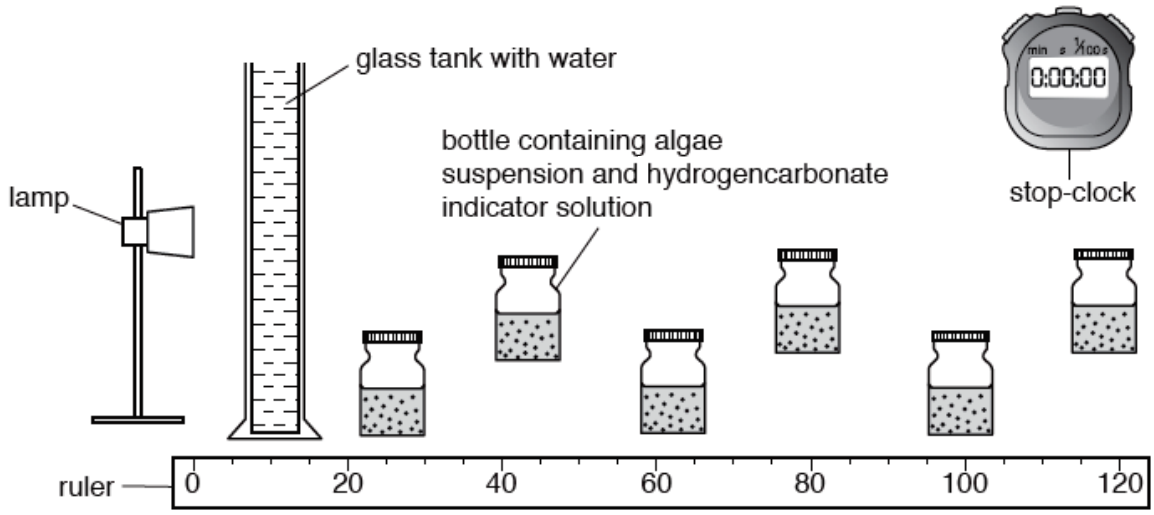


Fig. 2.1

(a) Suggest and explain why a glass tank with water was placed between the lamp and the bottle in the investigation.

……..

……..

……..

…….....[2]

(b) The hydrogencarbonate indicator solution changes colour when the pH changes. At pH 8.4 it is red, at pH 7.6 it is yellow and at pH 9 it is purple.

Predict the colour of the hydrogencarbonate indicator solution in the bottle nearest the lamp at the end of the investigation. Explain your answer.

……..

……..

……..

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……..

…….....[4]

[Total: 6]

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3 Fig. 3.1 shows the events that occur during sexual reproduction in birds. The numbers in brackets indicate the number of chromosomes in the nuclei of the cells of the common emerald dove.

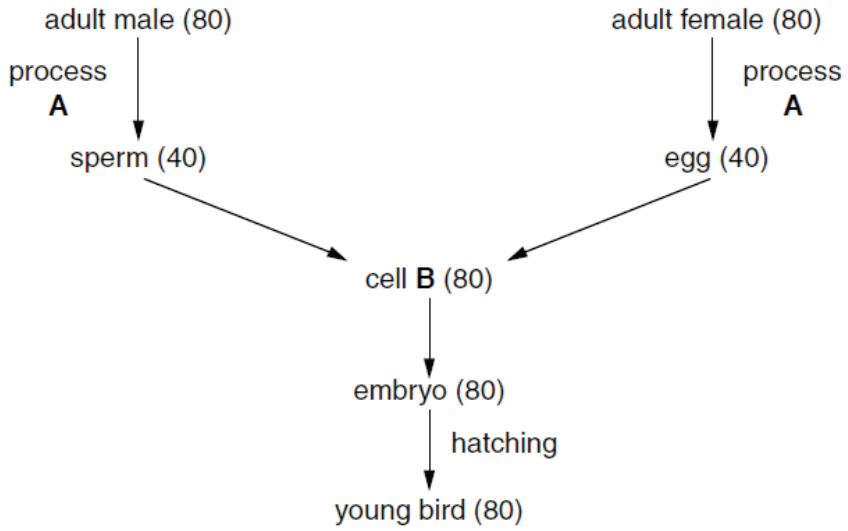


Fig. 3.1

(a) Name process **A** and cell **B**.

Process **A** ……

Cell **B** …… [1]

(b) State why cell **B** is described as a diploid cell.

……..

……..[1]

(c) Sexual reproduction usually leads to variation. Suggest and explain why variation is an advantage for a species such as the common emerald dove.

……..

……..

……..

……..

……..

……..[3]

[Total: 5]

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4 Fig. 4.1 shows a person taking part in an experiment on the eye's response to light. The lamp was placed at different positions on the line **A** – **B**.

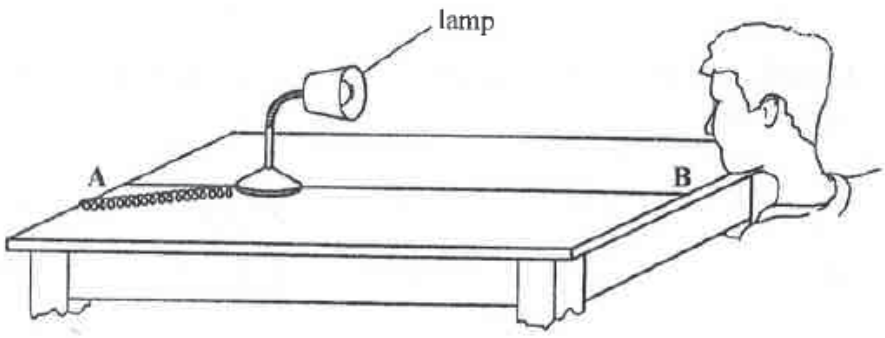


Fig. 4.1

Table 4.1 shows the diameter of the person's pupil when the light was placed at seven different positions.

Table 4.1

Position of lamp	Diameter of pupil / mm
1	3.1
2	4.0
3	4.5
4	4.9
5	3.8
6	2.4
7	1.7

(a) In which position was the lamp furthest from the eye.

……[1]

(b) Explain what is happening to the iris of the eye as the lamp moves from position **1** to position **2**.

……

……

……

……

……

……[3]

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(c) **(i)** State the type of response being shown by the eye.

……[1]

(ii) Explain how does this response benefit the eye.

……

……

……

……[2]

(d) Fig. 4.2 shows a section of the eye.

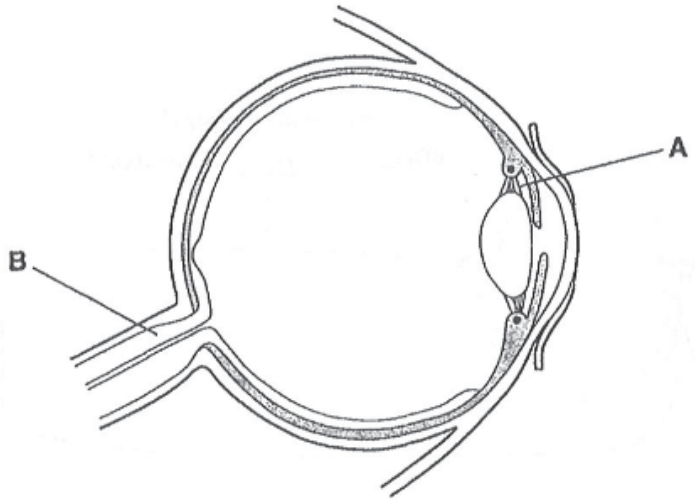


Fig. 4.2

(i) Name **A** and **B**.

A: ……

B: ……

[1]

(ii) Describe the function of **B**.

……

……[1]

[Total: 9]

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5 A man had three animals of the same species, one male and two females, and all of them had brown fur. He allowed them to breed and each female had eight young. In the first family, all the young had brown fur but in the second family, there were two offspring with yellow fur and six offspring with brown fur.

(a) In the space below, use a genetic diagram to illustrate how the offspring are produced in the second family.

[3]

(b) If the young from the first family were allowed to interbreed, explain why there are offspring with yellow fur in the next generation.

……..

……..

……..

……..

……..

…….....[3]

(c) State and explain the type of variation shown by the fur colour.

……..

……..

……..

…….....[2]

[Total: 8]

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6 Fig. 6.1 is a diagram of a developing mammalian fetus and part of the uterus wall.

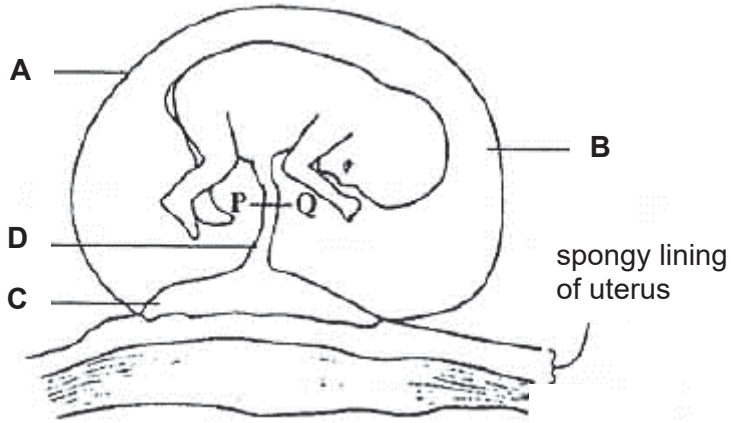


Fig. 6.1

(a) Identify **A** and **B** and describe their functions.

……..

……..

……..

……..

……..

……..

……..

……..[4]

(b) Suggest how smoking affects the supply of oxygen and nutrients to structure **C** during pregnancy.

……..

……..

……..

……..

……..

……..[3]

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(c) Fig. 6.2 shows a section through structure **D** taken at **P** – **Q**.

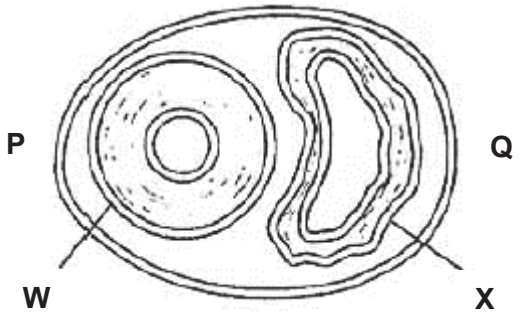


Fig. 6.2

Based on your knowledge about structure **D**, state two ways in which the structure of **W** differs from the structure of **X**.

……..

……..

……..

…….....[2]

[Total: 9]

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7 Fig. 7.1 shows a town and surrounding countryside.

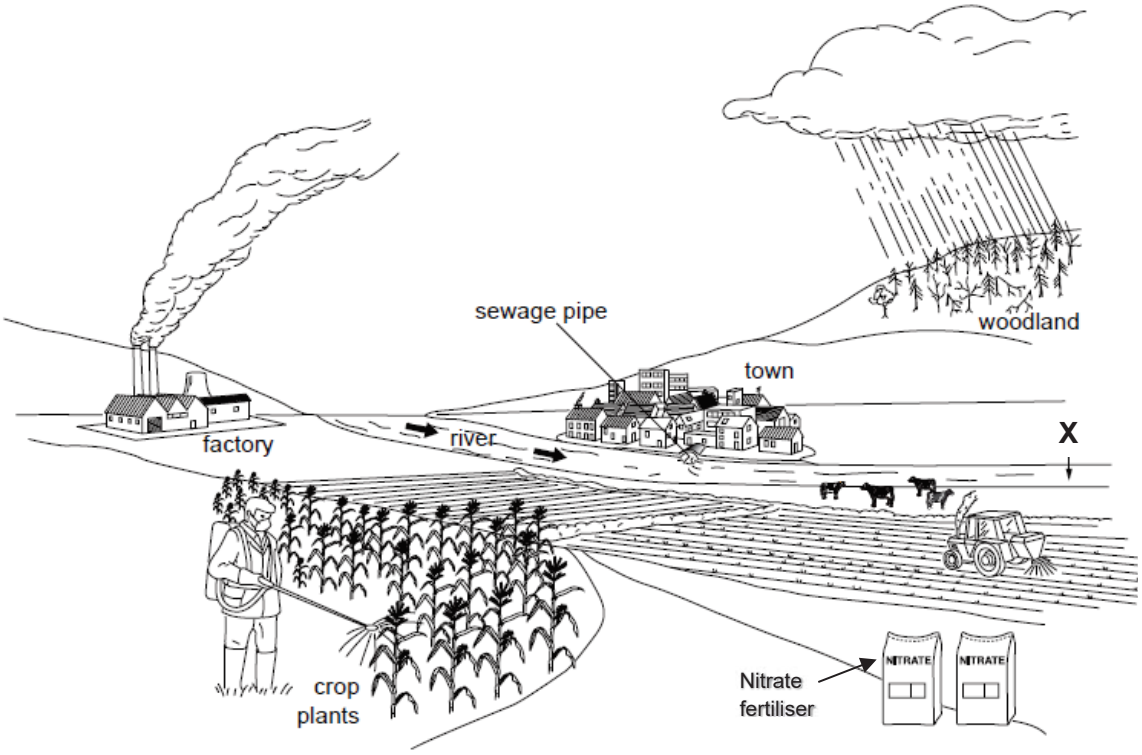


Fig. 7.1

(a) Downstream from point **X** in Fig. 7.1, plants in the river grow rapidly and in large numbers.

State **three** possible reasons for this.

……..

……..

……..

……..

……..

……..[3]

(b) Explain why there are large numbers of bacteria but very few plants and animals in the water between the town and point **X**,

……..

……..

……..

……..[2]

[Total: 5]

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Section B

Answer **three** questions.

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

8 Fig. 8.1 shows an apparatus used to investigate the uptake of water by a cut stem of a fresh green plant.

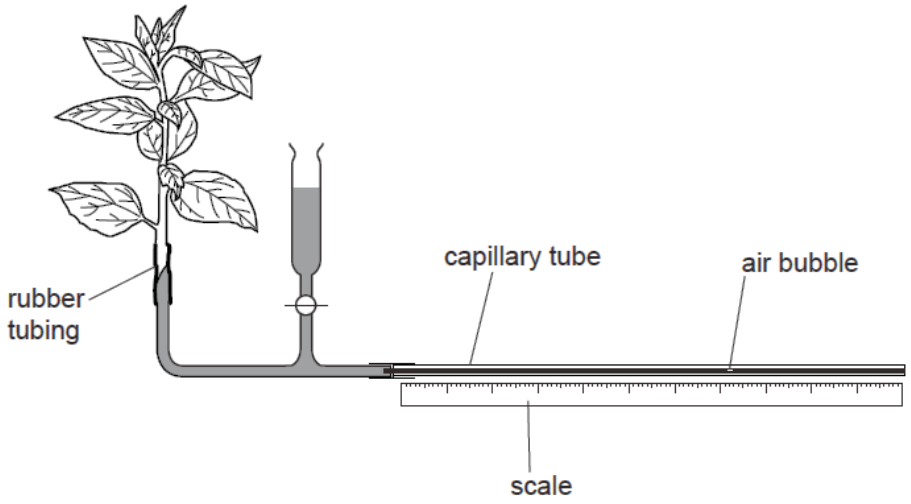


Fig. 8.1

(a) Draw an arrow on Fig. 8.1 to show the direction in which the air bubble moves when the plant takes up water. [1]

(b) The water enters the cut stem of the plant. Describe the path taken by the water from the point at which it enters the cut stem to the atmosphere around the shoot.

……..

……..

……..

……..

……..

…….....[3]

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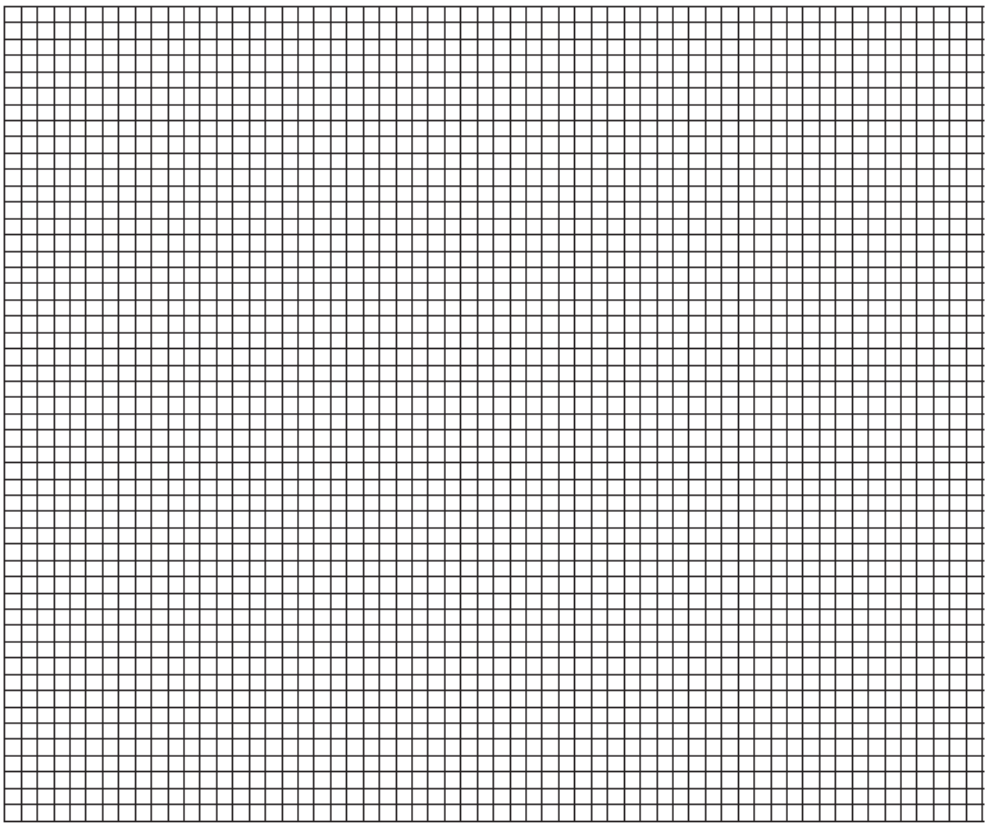
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(c) A student carried out an investigation using the apparatus shown in Fig. 8.1, of water uptake by the cut stem. The data collected is shown in Table 8.1.

Table 8.1

time of day	distance moved by bubble / mm per min
06.00	1
08.00	3
10.00	8
12.00 mid-day	16
14.00	14
15.00	11
18.00	2

Construct a line graph of the data on the grid below. [4]



(d) Describe the pattern of water uptake between 0600 and 1800 hours.

……..

…….....[1]

(e) Suggest two external factors that might have changed to cause this pattern of water uptake.

…….....[1]

[Total: 10]

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9 **(a)** State the equation for anaerobic respiration in humans.

……[1]

(b) Describe and explain the changes that occur to breathing rate and heart rate as a person climbs a mountain.

……

……

……

……

……

……[3]

(c) Suggest how mountain climbing may affect the concentration of anti-diuretic hormone (ADH) in the blood.

……

……

……

……[2]

(d) Describe the role of carbonic anhydrase in the excretion of carbon dioxide.

……

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……

……[4]

[Total: 10]

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10 Either

(a) Describe how excretory products formed from excess amino acids are transported in the blood from their site of production to their site of removal from the human body.

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……..[5]

(b) Describe and explain the effects of excessive alcohol consumption.

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……..

……..[5]

[Total: 10]

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10 Or

(a) Describe the properties of enzymes.

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……..

……..[5]

(b) Outline the role of forests and oceans as carbon sinks.

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……..

……..[5]

[Total: 10]

End of Paper

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Sec 4E Pure Bio Preliminary Exam 2018 Answer Scheme

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
D	B	A	A	D	B	B	D	B	C	B	B	B	D	A	C	C	A	D	D

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
D	D	C	C	A	B	A	B	C	B	D	A	C	C	C	D	B	D	B	A

1	**(a)**		**D**: glycerol **E**: fatty acid **F**: maltose **G**: amylase Any 2 points, 1 mark.	[2]
	(b)		• During cooking, there is **strong heat** / the **temperature is high**, this **denatures the enzymes** in the fresh pineapples. • Therefore, the pineapple is placed a few hours before to **allow time for the enzyme to work** and enable the **meat to be tenderise.** / **placing enzymes in during cooking**, **meat cannot be tenderise**.	[2]
	(c)	**(i)**	Liver	[1]
		(ii)	Pancreas	[1]
		(iii)	• Bile salts **emulsify fats / oils** by **breaking fats into tiny fat droplets** and **increasing their surface area to volume ratio** for digestion. • Bile is an **alkaline fluid** which will neutralise the acidic chyme and provide **an alkaline medium / environment** for pancreatic and intestinal enzymes to function.	[2]
2	**(a)**		• The tank of water acts as **heat filter / absorbs heat from lamp / reduces heat effect of the lamp**. • This **maintains constant temperature** within the bottles / make sure temperature is not another variable.	[2]
	(b)		Colour prediction: **purple** • The bottle **nearest to the lamp** will receive the **highest light intensity** and thus the algae in the bottle will have the **highest rate of photosynthesis**. • CO_2 is an acidic gas / **forms carbonic acid** when dissolved in water. • CO_2 been used up / taken in / **absorbed by the algae for photosynthesis** • When there is **more photosynthesis than respiration**, the **concentration of CO_2** within the bottle **will decrease**. • This causes **pH to increase** / **be more alkaline** / **be less acidic**. Any 3 points.	[1] [3]
3	**(a)**		Process **A** - meiosis Cell **B** - zygote	[1]
	(b)		The cell/nucleus has **two sets of chromosomes** / has **twice the number of chromosomes as the gametes**.	[1]
	(c)		• When the **environment / habitat / ecosystem <u>changes</u>**, **variation** within the genes will allow the species to be **better adapted** to these changes.	[3]

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			• For instance, some doves may have **alleles which give them resistance to diseases** / **enable them to camouflage from new predators**. • Variation enables **natural selection to occur** and enables the species to **evolve**. • Thus, **variation increases the chances of survival of the species** / reduces the chance of extinction by increasing the gene pool. Any 3 points.	
4	**(a)**		Position **4**	[1]
	(b)		As the lamp moves **from position 1 to position 2**, the **pupil dilates / enlarges**. This is brought about by the **contraction of radial muscles** and the **relaxation of circular muscles** in the **iris**. Hence, **increasing** the amount of **light entering the eye**.	[1] [1] [1]
	(c)	**(i)**	**Pupil reflex**	[1]
		(ii)	This is a reflex action and it **takes place very quickly / immediately**. The eye is **protected from excessive/too much light entering it** and **damaging the retina**.	[1] [1]
	(d)	**(i)**	**A**: Suspensory ligament **B**: optic nerve	[1]
		(ii)	Function: **Transmits nerve impulses** from the **photoreceptors** in the **retina** to the **brain**. **R**: signals; information; messages; receptors.	[1]
5	**(a)**		Parental phenotype : Brown fur x Brown fur Parental genotype : Bb x Bb Parental gametes : (B) (b) (B) (b) (gametes must be circled) Offspring genotype : BB Bb Bb bb Offspring phenotype : brown brown brown yellow Offspring phenotypic ratio : 3 brown : 1 yellow	[1] [1] [1]
	(b)		• The brown offspring in F_1 could be **heterozygous for brown colour**. • When these brown offspring interbreed, **each parent could then pass on one recessive allele to their offspring**. **ORA** • This offspring which is **homozygous recessive** will be yellow.	[1] [1] [1]
	(c)		**Discontinuous variation** **No intermediate** values / distinct / discrete / separate categories of **brown or yellow**.	[1] [1]
6	**(a)**		• **A** is the **amniotic sac** and **B** is the **amniotic fluid**. • **Supports and cushions the fetus**. • **Absorbs shocks** and as it cannot be compressed, **protects the fetus against physical injury**. • Amniotic fluid **lubricates and reduces friction** in the vagina or birth canal during birth • Allows fetus **space for movement during growth**. Any 3 points.	[1] [3]

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	(b)		• Structure C is the **placenta**. **Cigarette smoke** contains **nicotine** which causes the release of **adrenaline**. This will cause the **maternal arteries to become narrow** and the **blood supply to the placenta to decrease**. • **Cigarette smoke** also contains **carbon monoxide**, **which bind irreversibly to haemoglobin to form carboxyhaemoglobin**, reducing the ability of haemoglobin to carry oxygen in the red blood cells. • There will be a **decrease in oxygen and nutrients supplied to the placenta and hence to the fetus**, causing development of the fetus to be slower.	[3]
	(c)		• Structure W which is an **artery** has **thicker and more muscular walls** than structure X which is a **vein**, has thinner, less muscular walls. • X has **semi-lunar valves** but not W. • The walls of W are **more elastic** than the walls of X. • W has **narrower/smaller lumen** relative to diameter compared to X. Any 2 points.	[2]
7	**(a)**		• **Fertilisers** used by the farmer on crop plants contain **nitrates/ions/nutrients**, **excess** fertilisers that are **not absorbed by crops** are washed from farms to the river. • **Sewage from the town** contains **urine and faeces** and has **nitrates** and **phosphates**, which are nutrients for water plants and enable them to grow quickly. • **Cow dung from farm / Chemicals from the factories** have **nitrates** and **phosphates**, which are nutrients for water plants and enable them to grow quickly. • Drainage/Runoff from woodland contain **nitrates/ions/nutrients** and are washed into the river after the rain. Any 3 points.	[3]
	(b)		• **Bacteria** in **sewage / cow dung decompose** the faeces. • **They use up** the **oxygen** in the water through **aerobic respiration** as they grow and **multiply / reproduce**. • **With** a much **lower concentration of oxygen** present in water, this **led to the death** of other organisms as the **animals and plants** are **unable to respire**. Hence, there are very few plants and animals in the water. Any 2 points.	[2]
8	**(a)**		Arrow pointing to left, part above/below capillary tube	[1]
	(b)		• The **water molecule moves up the xylem vessel** by **transpiration pull** in the cut stem and enters the **xylem vessels** in the vascular bundles in the leaves. • **Water molecules then enters the mesophyll cells** and out of them to form a **thin film of moisture** over their surfaces. • **Water** will then **evaporate** from this thin film of moisture into the **intercellular air spaces** as **water vapour**. • **Water vapour** will then **diffuse out of the leaves through the stomata**. Any 3 points.	[3]
	(c)		• Scale of graph is correct	[4]

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			• Lines are smooth (accept either data plot / line of best fit) • Axes labelled with suitable scales o y-axis: distance moved by bubble / mm per min o x-axis: time of the day • Points are plotted correctly	
	(d)		The water intake **increases up to noon** and **then decreases**.	[1]
	(e)		• Light intensity • Humidity of air • Temperature of air • Wind speed / Air movement Any 2 points.	[1]
9	**(a)**		glucose → lactic acid + small amount of energy	[1]
	(b)		• When the person climbs a mountain, the person will be **breathing faster** and deeper and the heart will **beat faster**. • There will be **faster circulation of blood** which will supply **more oxygen** to the **muscles** to **release of more energy from aerobic respiration.** • The faster circulation of blood will also **remove carbon dioxide produced** by aerobic respiration more quickly.	[3]
	(c)		• During vigorous exercise, the **loss of water from the body** through **sweating increases**. • This causes a **decrease in water potential in the blood**, which stimulates **increased production of ADH in hypothalamus which is released from the pituitary gland into the blood stream** leading to an **increase in concentration of ADH** in the blood;	[2]
	(d)		• Carbon dioxide in the blood plasma **diffuses into red blood cells**, and carbonic anhydrase **catalyses the conversion of carbon dioxide into carbonic acid**. • Carbonic acid is converted into **hydrogencarbonate ions**; • Hydrogencarbonate ions is **transported in the blood plasma** towards the lungs; • At the lungs, hydrogencarbonate ions diffuse back into red blood cells and are **converted back into carbonic acid**; • **Carbonic anhydrase** then **catalyse the conversion of carbonic acid to carbon dioxide**; • Carbon dioxide then **diffuse out of the red blood cell into the blood plasma**, and diffuses into the **alveoli** before it is expelled when we breathe out. Any 4 points.	[4]
10E	**(a)**		• Excess amino acids are broken down in the **liver via deamination to form** excretory products such as **urea.** • The excretory products **leave the liver via hepatic vein** and are **transported to the kidney** via the **renal artery**. • They are filtered **from the blood** through the capillary walls of the **glomerulus into the Bowman's capsule** by **ultrafiltration**. • They travel from the **proximal convoluted tubule** of the kidney tubule to the **loop of Henle**, • and the **distal convoluted tubule**, then the **collecting duct**.	[5]

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	(b)		• They are then transported **via the ureter** to the **urinary bladder**. • The excretory products are removed from the human body **in the urine** through the **urethra**. Any 5 points • Alcohol is **a depressant** and it **slows down some brain functions**. • This will also lead to **slower / longer / increased** reaction time. • Under the influence of alcohol, a person becomes carefree as alcohol takes away his inhibitions, leading to **a reduction in self-control**. • **Alcohol stimulates acid secretion in the stomach**, excess stomach acid increases the risk of **gastric ulcers**. • Prolonged alcohol abuse may lead to **cirrhosis of the liver / liver damage** and can result in **liver failure**. • There are also **social implications** when a person is addicted to drinking alcohol, such as **they may exhibit violent behaviour towards family / neglect work and family / commit crime while under influence of alcohol**.	[5]
10O	**(a)**		• Enzymes are **biological catalysts** that **speed up chemical reactions**. • Enzymes are **required in small amounts**. • They **remain chemically unchanged** at the end of a reaction. • Enzymes are **protein in nature**. • Enzyme activity is **affected by temperature and pH**. • Enzymes speed up chemical reactions by **lowering the activation energy of the reaction**. • Enzymes have a unique three-dimensional shape, and **an active site** which is has a specific shape that is **complementary to a specific substrate**. / Enzymes are **specific in nature**. Any 5 points.	[5]
	(b)		• The **plants** in the forests **absorb atmospheric carbon dioxide** which is used in **photosynthesis**. • In forests, **a large amount of carbohydrates / carbon compounds is stored** in **trees**. When trees die, their remains may be **buried deep in the ground**. After millions of years, these remains form **coal**, a **fossil fuel**. • Oceans are carbon sinks as **atmospheric carbon dioxide can dissolve / is soluble in the ocean's water**. • The carbon dioxide that dissolves in the ocean is **taken in by phytoplankton and** photosynthetic **algae in photosynthesis**. • The **carbon is stored as organic compounds such as carbohydrates, proteins and fats** in these producers. • When organisms in the oceans die, they may sink and be **buried deep in the seabed** and may form fossil fuels. This **stores carbon in the form of carbon compounds in the sea-bed**. Any 5 points.	[5]

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