Name _____( ) Class:_____

CHIJ KATONG CONVENT

PRELIMINARY EXAMINATIONS 2017

Secondary Four Express

BIOLOGY (WITH SPA) **5158/01**

Paper 1 Duration: 1 hour

Classes: 406

Additional Materials: Optical Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid/ tape.
Write your name, registration number and class on all the work you hand in.

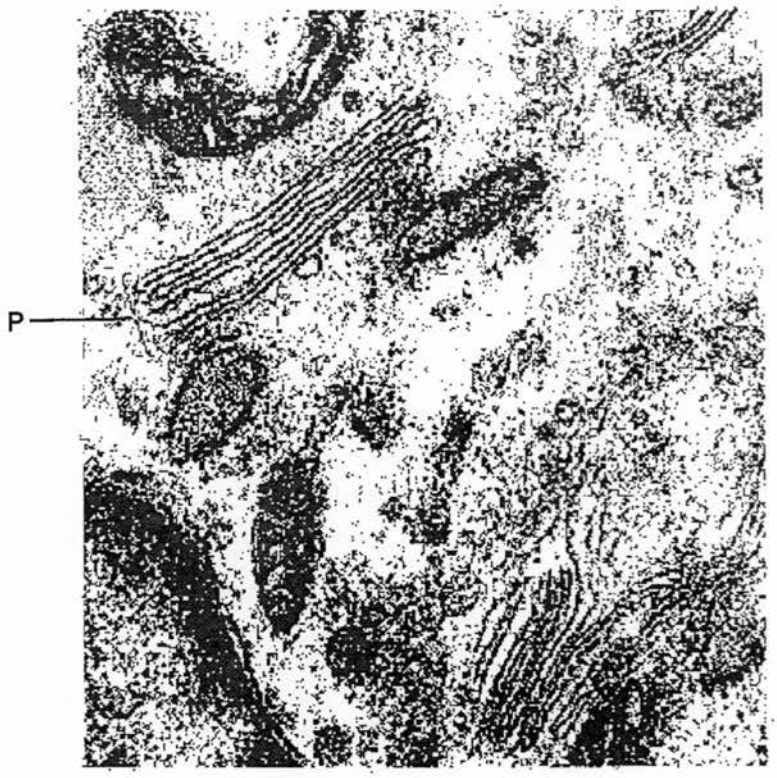
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C**, and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Optical Answer Sheet.

Read the instructions on the Optical 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 on the question paper.
The use of an approved scientific calculator is expected, where appropriate.

At the end of the examination, hand in:
(a) Optical Answer Sheet; and
(b) Question paper **separately**.

1 The photomicrograph shows a part of an animal cell.



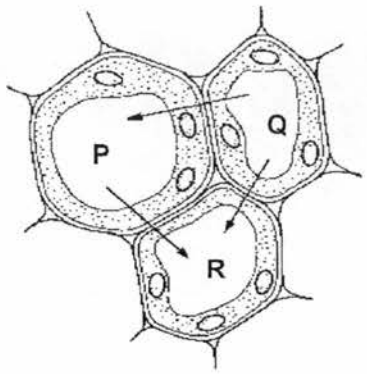
What is the function of structure P?

A carries out respiration
B controls cell activities
C package and stores proteins
D synthesises proteins

2 Which cell has both cytoplasm and cell walls?

A red blood cell
B root hair cell
C stomach cell
D xylem cell

3 The diagram shows three plant cells labelled **P**, **Q** and **R**. The arrows show the direction of water movement by osmosis.



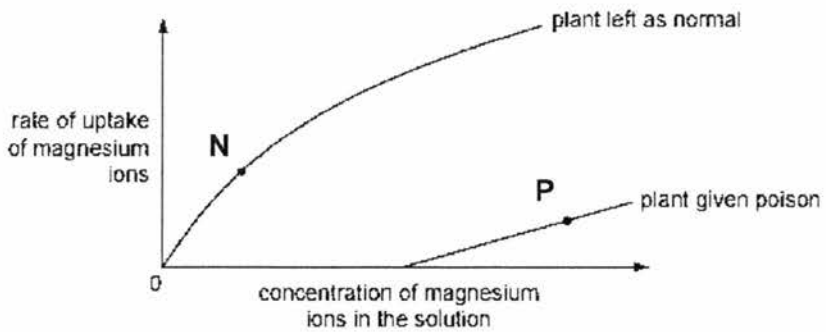
What is the correct order of water potential in the cells, from the highest to the lowest?

	highest	⟶	lowest
A	P	Q	R
B	P	R	Q
C	Q	P	R
D	R	P	Q

4 Which is an example of active transport?

A movement of glucose molecules into the cells of the villi
B movement of glucose molecules down a concentration gradient
C movement of ions in blood plasma
D movement of water in the transpiration stream

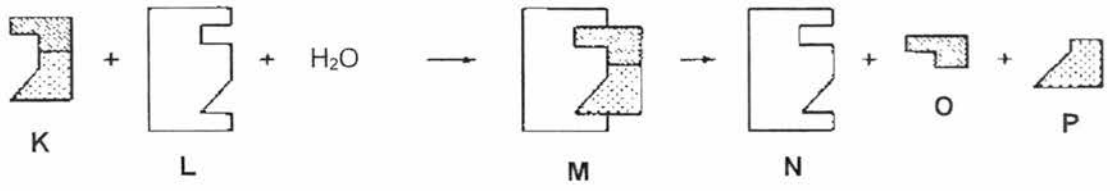
5 An experiment measured the rate at which plants take up magnesium ions from solution. One plant was given a poison that stops respiration. Another plant was left as normal. The graph shows the results.



What processes are taking place at point **N** and **P**?

	point **N**	point **P**
A	active transport	active transport
B	active transport	diffusion
C	diffusion	active transport
D	diffusion	diffusion

6 The diagram illustrates the reactions between different substances.



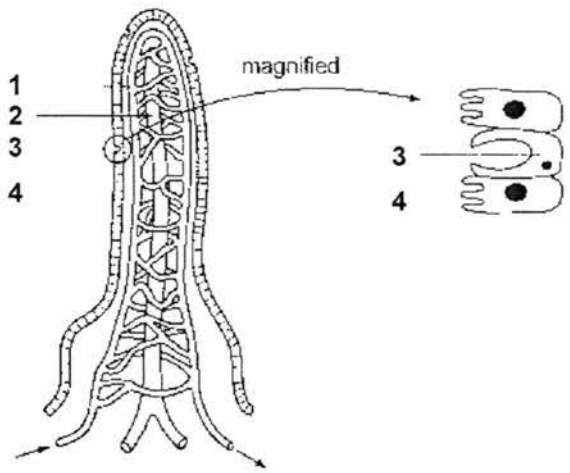
Which process is most likely illustrated by the diagram?

A digestion of starch
B formation of glycogen
C hydrolysis of sucrose
D synthesis of organic compounds

7 Which process involves the use of nutrients inside cells?

A absorption
B assimilation
C ingestion
D digestion

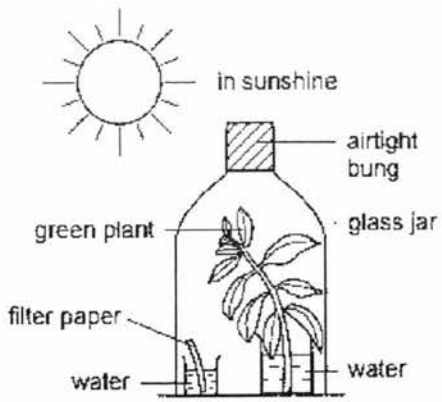
8 The diagram shows a section through a villus.



Which sequence correctly describes the functions of the numbered parts?

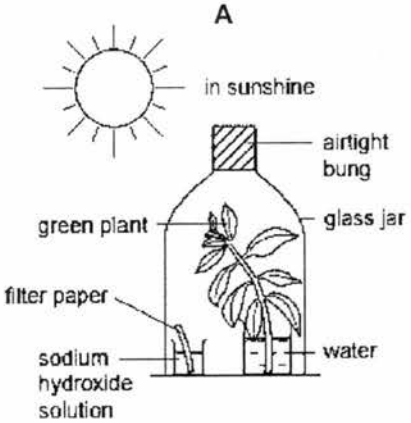
	1	2	3	4
A	transports digested fats	transports glucose	absorbs digested food	produces mucus
B	transport digested fats	transports glucose	produces mucus	absorbs digested food
C	transports glucose	transport digested fats	absorbs digested food	produces mucus
D	transports glucose	transport digested fats	produces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

9 The diagram shows a green shoot photosynthesising under a glass jar. This was used as a control experiment in a laboratory investigation.

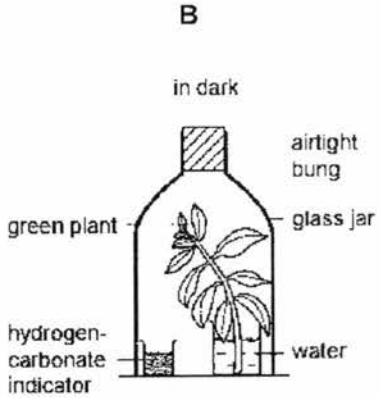


Which set-up could be used to investigate the need for carbon dioxide in photosynthesis?

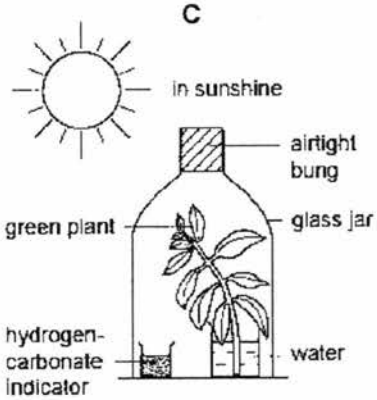
A



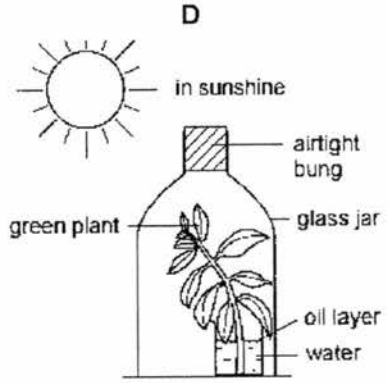
B



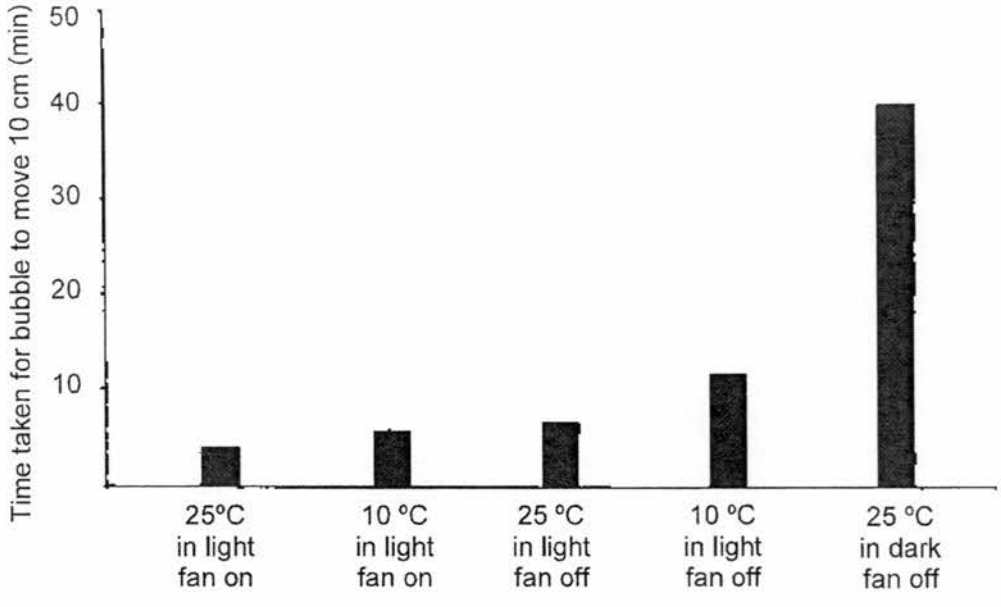
C



D



10 An experiment is conducted to investigate different environmental conditions on rate of water loss from a leafy shoot, using a potometer. The results are represented in the graph.



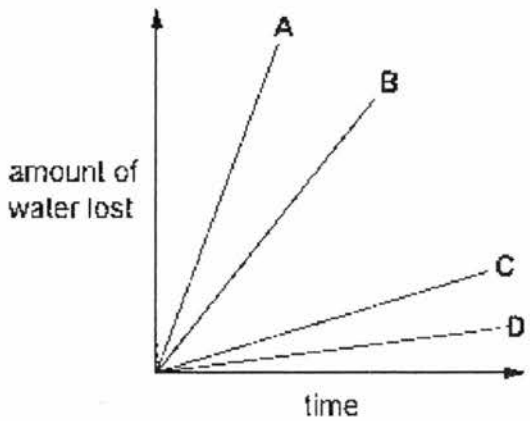
Which change in condition will result in the greatest decrease in water loss from the leafy shoot?

A decreasing the temperature from 25 °C to 10 °C
B increasing the temperature from 10 °C to 25 °C
C switching off the light
D switching off the fan

11 In an experiment to investigate transpiration, the leaves of four identical shoots, 1, 2, 3, and 4 are treated as follows:

1 upper surfaces covered with waterproof jelly
2 lower surfaces covered with waterproof jelly
3 untreated
4 upper and lower surfaces covered with waterproof jelly

The graph shows the amount of water lost by the four shoots over a period of time.



Which line shows the result for shoot 2?

12 Which factor contributes to the wilting of plant leaves?

A the mesophyll cells lose turgor
B the phloem stops translocating
C the stomata close
D the xylem fills with air

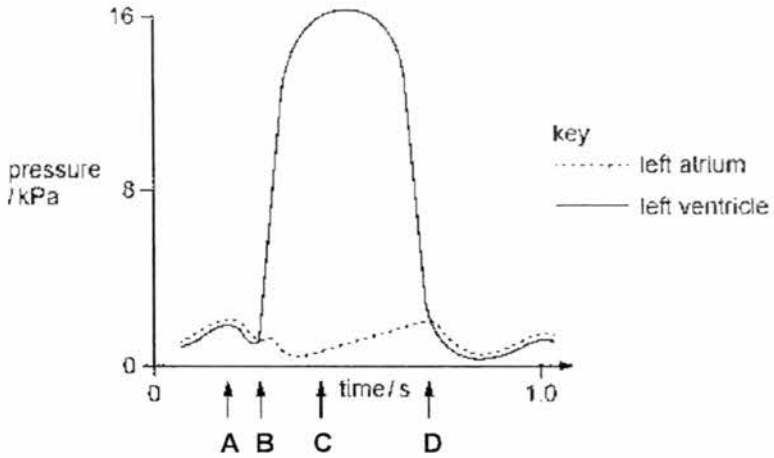
13 Which row correctly identifies how veins differ from arteries?

	width of lumen	wall thickness	elastic fibres	muscles in wall
A	narrower	thicker	more	less
B	narrower	thinner	less	more
C	wider	thicker	more	more
D	wider	thinner	less	less

14 Which is a difference between plasma and tissue fluid?

	plasma	tissue fluid
A	less dissolved glucose	more dissolved glucose
B	dissolved glucose present	no dissolved glucose
C	more protein molecules	fewer protein molecules
D	no white blood cells	white blood cells present

15 The graph shows the pressure changes in the left atrium and the left ventricle while the heart is beating.



At which point, does the atrio-ventricular (bicuspid) valve start to close?

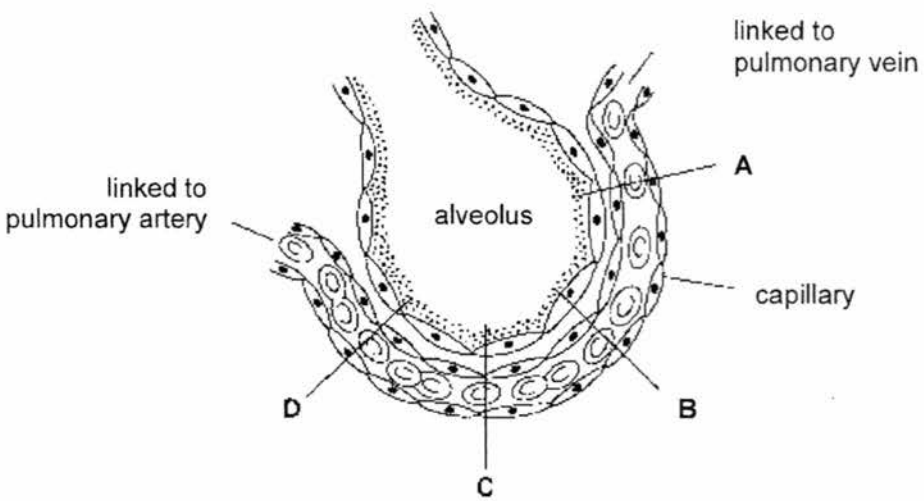
16 Space shuttles have a closed ventilation system which is closely monitored for the levels of carbon dioxide and oxygen. This had caused numerous astronauts to black out in a space shuttle.

Which statement best explains this observation?

A The astronauts suffered from damaged red blood cells due to high levels of atmospheric oxygen.
B The lungs were unable to expand completely because of the lack of gravity.
C There was insufficient carbon dioxide in the space shuttle atmosphere.
D There was insufficient oxygen in the space shuttle atmosphere.

17 The diagram shows an alveolus and an associated blood capillary.

At which point will the greatest rate of diffusion of carbon dioxide occur?



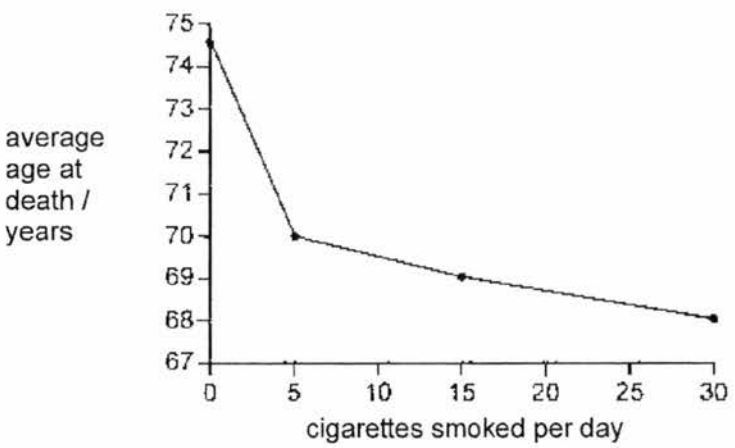
18 The table shows the effect of exercise on the rate and depth of breathing.

	breathing rate / breaths per minute	volume of each breath/ cm^3
at rest	12	500
after exercise	24	1000

What is the increase in the volume of air exchanged per minute after exercise, compared to at rest?

A 1000 cm^3
B 6000 cm^3
C 18 000 cm^3
D 24 000 cm^3

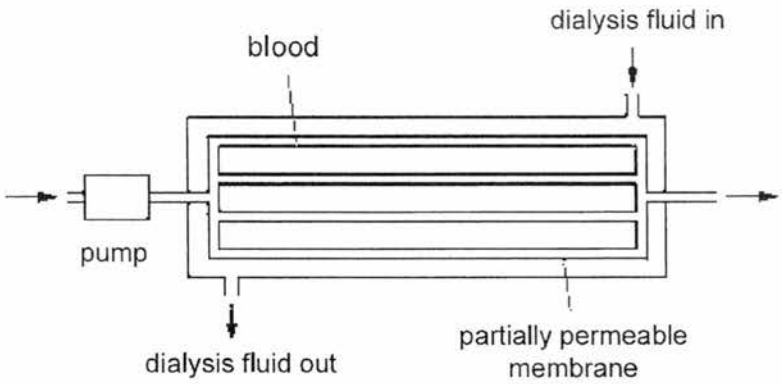
19 The graph shows the relationship between the average age at death and the number of cigarettes smoked per day.



Which conclusion from the graph is correct?

A Most people living longer than 74 years are non-smokers.
B People smoking five cigarettes a day live longer on average than those smoking 15 cigarettes a day.
C The average length of life of people who smoke is 4.5 years less than that of non-smokers.
D The main cause of death in people who smoke 30 cigarettes a day is lung cancer.

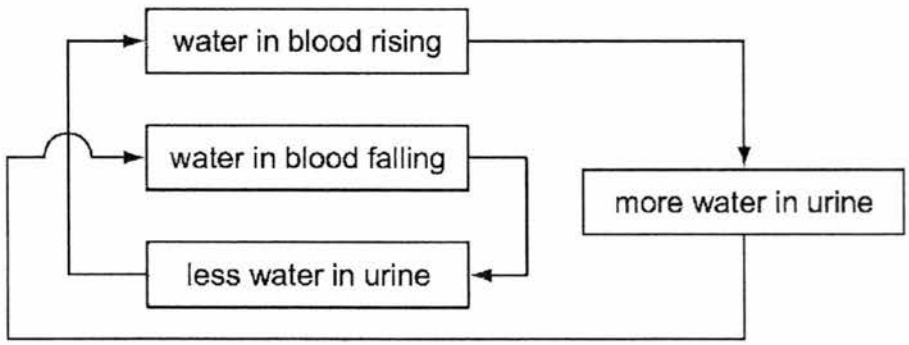
20 The diagram represents a kidney machine.



Which two substances are both present in the dialysis fluid entering the machine?

A glucose and protein
B glucose and salts
C protein and urea
D urea and salts

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



Which statement best explains why this is 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.

22 What are the functions of the relay, motor and sensory neurones in a reflex response?

	relay neurone	motor neurone	sensory neurone
A	to connect neurones within the central nervous system	to conduct impulses to the effector from the central nervous system	to conduct impulses from the receptor to the central nervous system
B	to conduct impulses to the effector	to connect neurones within the central nervous system	to receive the stimulus
C	to conduct impulses from the central nervous system to the effector	to conduct impulses from the receptor to the central nervous system	effector to connect neurones within the central nervous system
D	to conduct impulses from the receptor to the central nervous system	to conduct impulses from the receptor to the central nervous system	to conduct impulses to the effector

23 Opticians sometimes place drops of a chemical in a patient's eye to keep the pupil wide open.

Which muscles contract when this chemical is used?

A ciliary muscles
B circular iris muscles
C muscles that move the eyeball
D radial iris muscle

24 An antelope is grazing under a tree. It hears men shouting in the distance.

Which changes take place in the antelope's eyes as it raises its head to look at the men?

	ciliary bodies	suspensory ligaments	lenses
A	contract	pulled taut	more convex
B	contract	slackened	less convex
C	relax	pulled taut	less convex
D	relax	slackened	more convex

25 Which row shows how adrenaline affect glucose uptake by muscle cells and carbohydrate conversion by liver cells?

	glucose uptake	carbohydrate conversion
A	decreases	glucose to glycogen
B	decreases	glycogen to glucose
C	increases	glucose to glycogen
D	increases	glycogen to glucose

26 Which statement about self-pollination in plants is correct?

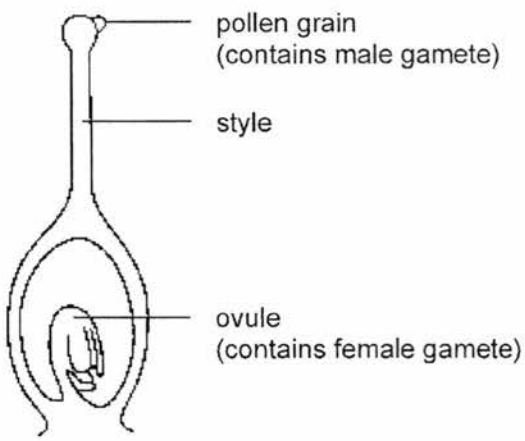
A It needs a lot of pollen but can happen when a plant is on its own.
B It needs little pollen but there is a high chance of pollination.
C It needs no agent to transfer pollen but pollination is unlikely.
D It needs two plants of the same species but there is little variation in the offspring.

27 A plant has flowers whose anthers mature and fall off before the stigma is fully developed.

What type of pollination is most unlikely to occur?

A cross-pollination
B insect-pollination
C self-pollination
D wind-pollination

28 The diagram shows part of a flower at the time of pollination.



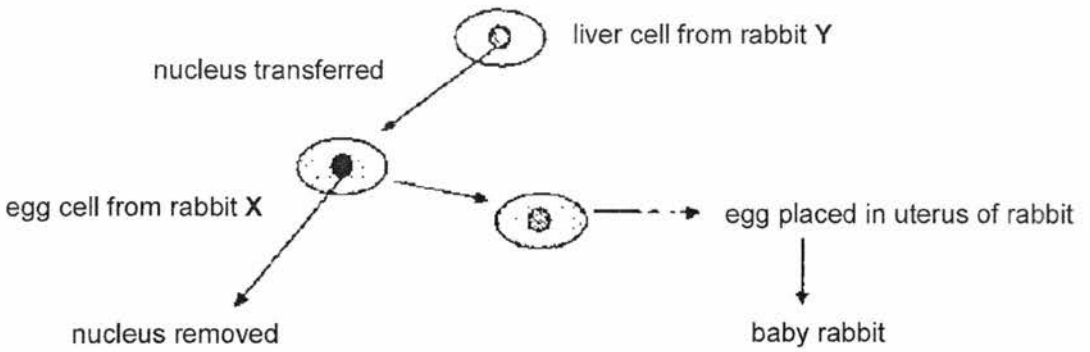
How does the male gamete reach the female gamete?

A A pollen tube grows down the style.
B The pollen grain moves down the style.
C The male gamete digests its way down the style.
D The male gamete swims down the style.

29 Which structure in humans would serve a similar function as an anther in a flower?

A endometrium
B oviduct
C sperm duct
D testis

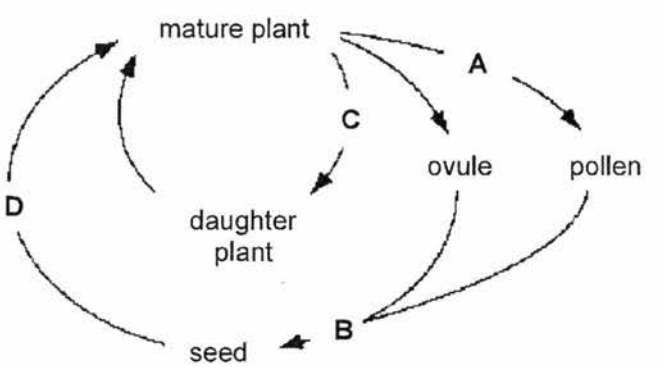
30 The diagram shows the main stages in a process where a liver cell from rabbit **Y** is used to provide a nucleus which is then placed into the egg of another rabbit **X**.



Which rabbit will the baby rabbit look like?

A rabbit **X**
B rabbit **Y**
C both rabbits **X** and **Y**
D neither rabbits **X** nor **Y**

31 The diagram shows the life cycle of a species of a plant.



Which stage did reduction division occur?

32 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.

33 The DNA of a particular cell contains 35% adenine (A) bases.

What is the percentage of cytosine (C) bases in this DNA?

A 15 %
B 30 %
C 65 %
D 70 %

34 Bacteria can be genetically engineered to produce human insulin. Before this method was developed, the only insulin available was that from cattle or pigs. It was obtained from extracts of animal pancreas.

Which statements about the two methods are correct?

1 Large numbers of bacteria can be cultured in a small space.
2 Bacteria reproduce very quickly and make insulin quickly.
3 People sometimes develop diseases from insulin taken from cows or pigs.
4 The insulin produced in bacteria is not the same as that produced in the human pancreas.

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

35 The inheritance of blood groups in humans is controlled by a single gene. The gene has two alleles, I^A and I^B, that are co-dominant.

The offspring of two parents were two boys of blood group AB and A and a girl of blood group B.

What are possible genotypes of the parents?

	father's genotype	mother's genotype
A	I^AI^A	I^AI^B
B	I^AI^B	I^AI^B
C	I^BI^B	I^AI^A
D	I^BI^B	I^AI^B

36 A person with Down's syndrome is born with 47 chromosomes in each cell, instead of 46.

What could cause this?

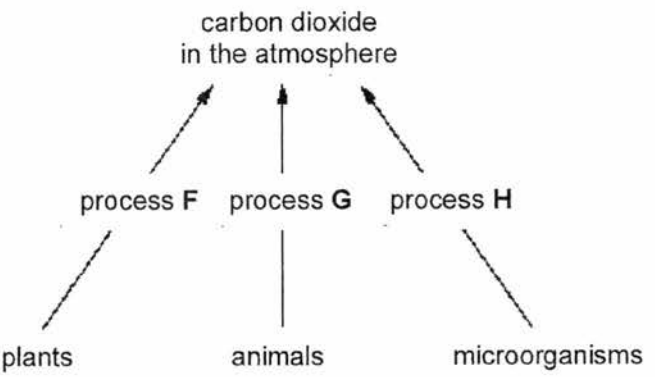
A A mutation happened during the production of the ovum cell.
B More than one sperm fused with the ovum at fertilisation.
C Radiation caused a change in structure of a gene in the father's sperm.
D The mother was exposed to harmful chemicals while she was pregnant.

37 Over time, a species of bird develops a more pointed beak. The more pointed shape of the beak helps the birds to catch small insects that may be hiding in cracks in the rocks.

What is a reason for the change in the shape of the birds' beaks?

A Birds develop more pointed beaks as they search for insects in cracks in the rocks.
B Birds with less pointed beaks are better fitted to their environment and more likely to survive.
C Birds with more pointed beaks are better able to compete for food.
D When reproducing, birds are more likely to seek out mates with less pointed beaks because these are better adapted.

38 The diagram shows some of the stages in the carbon cycle.



What are processes **F**, **G** and **H**?

	process **F**	process **G**	process **H**
A	photosynthesis	respiration	photosynthesis
B	photosynthesis	respiration	respiration
C	respiration	respiration	respiration
D	respiration	photosynthesis	photosynthesis

39 A scientist tested the level of pesticides in an estuary, specifically in the following food chain:

plankton → clams → flounder → white–bellied sea eagle

Which row shows the obtained results? (ppm = parts per million)

	plankton/ ppm	clam/ ppm	flounder/ ppm	white–bellied sea eagle/ ppm
A	0.03	0.23	2.05	18.45
B	0.03	0.06	0.09	1.00
C	0.03	0.03	0.30	3.30
D	0.03	0.003	0.0003	0.00003

40 Which row shows a cause and an effect of eutrophication?

	cause	effect
A	the overuse of insecticides	an algal bloom in ponds and streams
B	the release of fertilisers	acidification of the atmosphere
C	the release of oxides of nitrogen	warming of the atmosphere
D	the release of sewage	anaerobic conditions in ponds and streams

Name: _____( ) Class:_____

CHIJ KATONG CONVENT
PRELIMINARY EXAMINATIONS 2017
Secondary Four Express

BIOLOGY (WITH SPA) 5158/02

Paper 2 Duration: 1 hour 45 minutes

Classes: 406

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, registration number and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid/ tape.

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.
At the end of the examination faster all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE	
Paper 1	/ 40
Paper 2	
Section A	/ 50
Section B	/ 30
TOTAL	/ 120

This question paper consists of **18** printed pages.

[Turn over

Section A

Answer **all** the questions.
Write your answers in the spaces provided.

1 Fig. 1.1 shows some structures in a section through human skin.

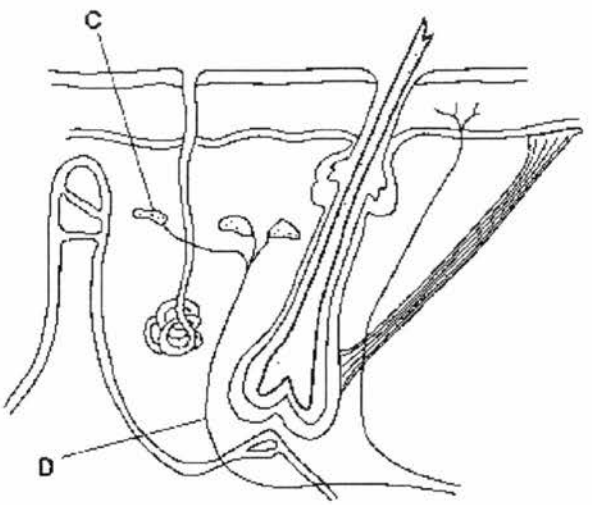


Fig. 1.1

(a) The body is able to maintain its internal environment within narrow limits.

Name this process.

.....[1]

(b) Structures **C** and **D** are involved in the process of temperature regulation. Identify structures **C** and **D** and state their functions in the process stated in **(a)**.

C .....

function .....

.....

D .....

function .....

.....[4]

1 (c) The consumption of alcohol causes the muscles in artery walls to relax.

Taking this into consideration, suggest why people who work in environmental temperatures below 5 °C might be advised not to drink alcohol before or during work.

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.....[3]

[Total:8]

2 Fig. 2.1 shows a kidney and its associated structures. The arrows show the direction of flow of fluids in these structures.

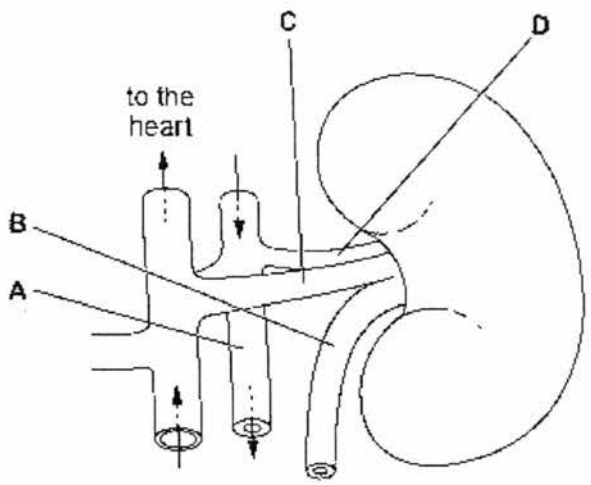

Fig.2.1

(a) (i) Name the structure labelled **A**.

..... [1]

(ii) Name the chamber of the heart through which blood in structure **A** last passed.

..... [1]

2 (b) Table 2.1 shows the relative concentrations of various substances in structures **B** and **C**.

Complete the table to show the possible concentrations of these substances in structure **D**.

Table 2.1

substance	relative concentration in structure		
	B	**C**	**D**
amino acids	0.00	0.05	
mineral ions	1.50	0.72	
proteins	0.00	8.00	
urea	2.00	0.03	

[4]

(c) Explain how the relative concentrations of glucose might change in structures **B**, **C** and **D** in a person with diabetes.

.....

.....

.....

.....

.....

.....[3]

[Total: 9]

3 Table 3.1 shows the mean daily water intake and loss by a person.

Table 3.1

water intake / dm^3		water loss / dm^3	
drinks	1.50	faeces	0.10
food	0.75	sweat	0.52
		urine	1.50
		exhaled air	0.38
total	2.25	total	2.50

(a) The difference between water intake and water loss by a person is accounted for by water produced by a metabolic process in the body.

Name this metabolic process.

..... [1]

3 (b) Although 2.25 dm^3 of water is taken in through the mouth, the faeces contain only 0.10 dm^3 of water.

Explain why this is possible.

.....

.....

.....

..... [2]

[Total:3]

4 Over a period of several months, a student recorded some activities of the wild life in a particular habitat. The observations she recorded are shown in Fig. 4.1.

1. *Young shoots of a crop of bean plants covered with greenflies (aphids) sucking food from the stems.*
2. *Saw a large bird (hawk), which usually catches mice, swoop to take a small yellow bird clinging to a bean stem. Noticed that these small birds often visit the bean field to eat some of the aphids or butterflies.*
3. *Flowers of beans being visited by many different species of butterfly.*
4. *Mice seen nibbling at some dispersed bean seeds.*
5. *Spider's web constructed between two bean plants with 5 large black flies caught in it. Rotting body of a mouse nearby attracting similar flies.*

Fig. 4.1

4 **(a)** Complete Fig. 4.2 by filling in the names of the organisms to show the feeding relationships in this community.

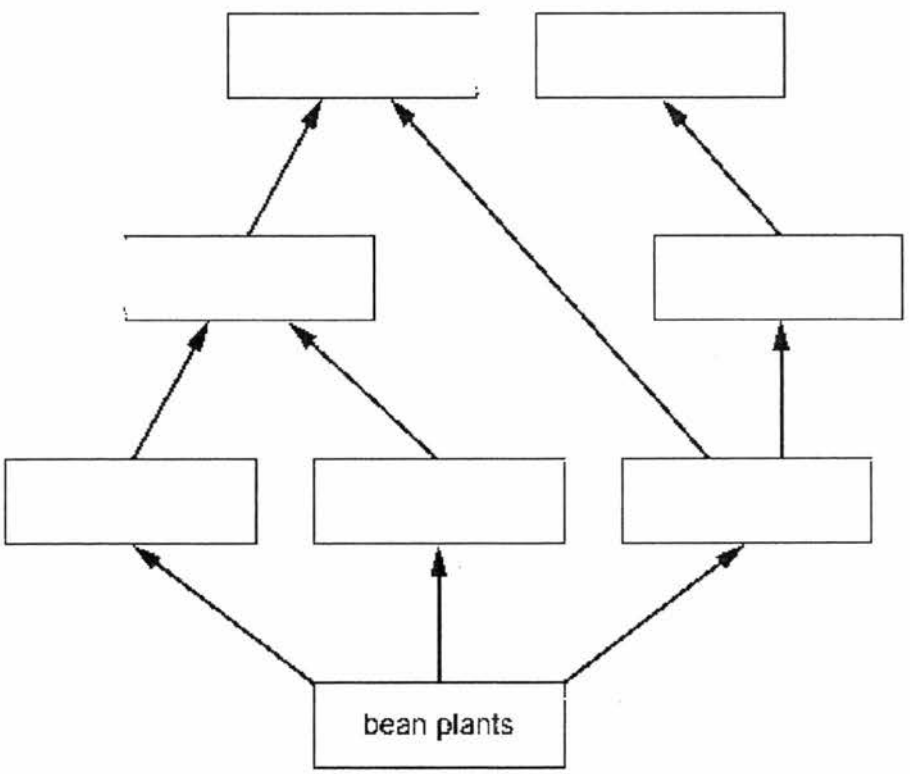

Fig. 4.2 [3]

4 (b) In each space below,

(i) draw and label a pyramid of biomass for the hawks, mice and bean plants in this habitat,

[1]

(ii) draw and label a pyramid of numbers for a bean plant, small birds and aphids.

[1]

(c) Explain how energy is lost along a food chain.

.....

.....

..... [2]

[Total:7]

5 Animal cells can be cultured outside the organism, i.e. *in vitro*, under controlled conditions.

A scientist performed an *in vitro* cell culture experiment by adding some animal cells to a flask containing growth medium with radioactive glucose, $^{14}C_6H_{12}O_6$. No oxygen was supplied until 3 hours into the experiment. Samples of gas produced by the cells were tested for radioactivity at regular intervals. The results are shown in Fig. 5.1.

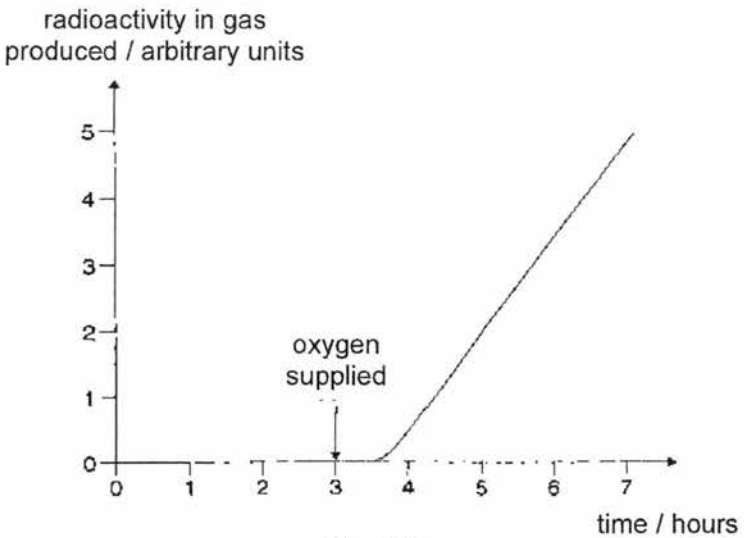

Fig. 5.1

(a) State the chemical equation for the process taken place from the third hour onwards.

..... [1]

(b) Explain why no radioactivity was detected until oxygen was supplied.

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.....

..... [2]

[Total:3]

6 Fig. 6.1 shows the effect of increasing light intensity on photosynthesis in two different species of plants, species C and species D.

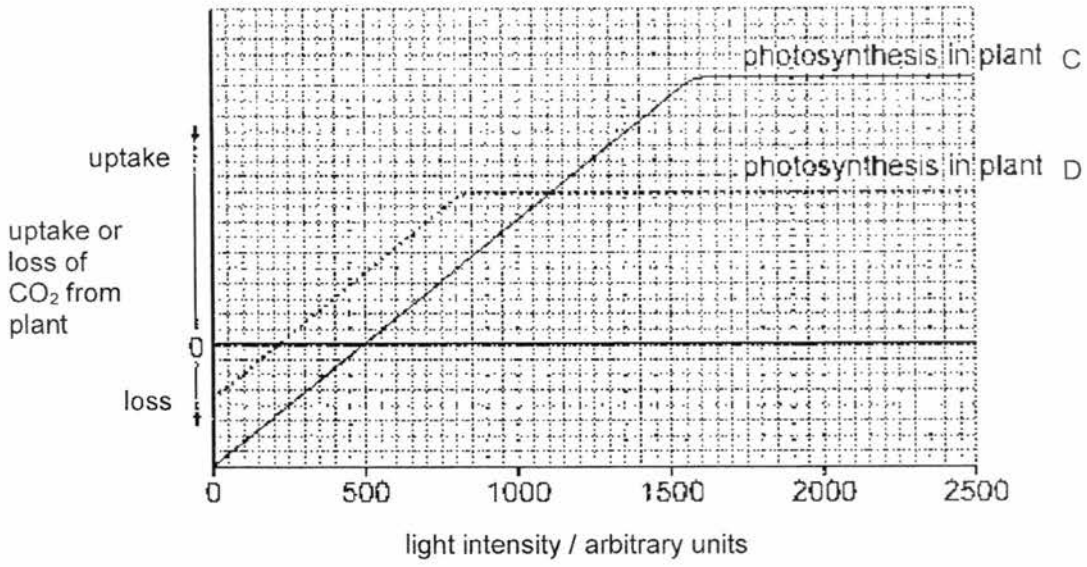

Fig. 6.1

(a) **(i)** Using Fig. 6.1, state the light intensity at which the rate of respiration is equal to the rate of photosynthesis in plant C.

..... [1]

(ii) Explain why carbon dioxide is lost from plant C at a light intensity below the value stated in **(a)(i)**.

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..... [3]

6 **(b)** Using Fig. 6.1, suggest why plant species D is more likely than species C to grow on the ground in a wooded area such as a tropical rain forest.

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.....[3]

(c) When leaves fall from plants, they are decomposed to return nutrients to the soil.

Suggest a reason why the rate of decomposition will be particularly high in a tropical rain forest.

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.....[2]

[Total:9]

7 Cystic fibrosis is a genetic condition in humans that results from a failure to inherit a particular dominant allele of a gene.

(a) Define the term *gene*.

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.....[2]

(b) **(i)** Use a fully labelled genetic diagram to show how cystic fibrosis is inherited by the children of two heterozygous parents.
Use the letter **D** to represent the dominant allele and **d** to represent the recessive allele.

[4]

(b) **(ii)** State the expected ratio of children with no cystic fibrosis to children with cystic fibrosis.

.....[1]

(c) One effect of cystic fibrosis is that the bile and pancreatic duct becomes blocked with mucus. Suggest why a person whose bile and pancreatic duct is blocked may find it difficult to gain weight despite eating a balanced diet.

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.....[4]

[Total:11]

Section B

Answer **three** questions.

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

8 Enzymes are used commercially to extract juice from apples.

Fig. 8.1 shows two containers of apple juice. One contains juice extracted using an enzyme and the other without an enzyme.

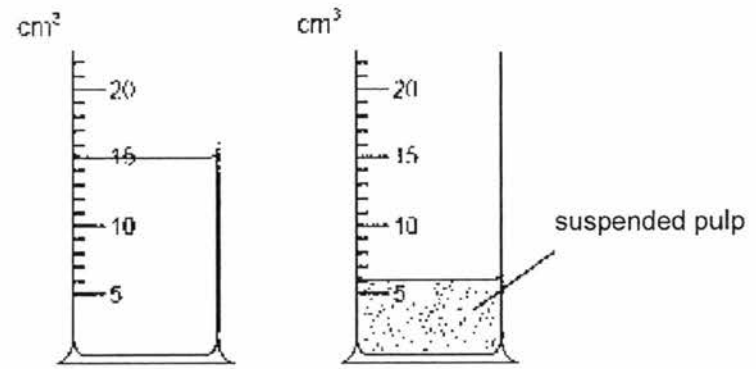

Fig. 8.1

(a) With reference to Fig. 8.1, compare the volume and appearance of the two juices extracted.

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.....[2]

(b) Some students investigated the effect of pH on the production of apple juice using the same enzyme.

- The apples were chopped up and formed into a smooth pulp.
- The pulp was divided into samples. Each sample was adjusted to a different pH.
- Enzyme was stirred into each sample of pulp and left to stand for 10 minutes for the enzyme to react.
- The mixtures of pulp and enzyme were then filtered for 20 minutes to collect the juice. The volumes of apple juice collected, are shown in Table 8.1.

Table 8.1

pH	volume of apple juice collected / cm^3
3	40
4	56
5	95
6	60
7	30

8 (b) (i) Plot a graph to show the effect of pH on the production of apple juice using this enzyme.

[4]

8 (b) (ii) Describe and explain the effect of pH on the production of apple juice, using this enzyme.

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..... [4]

[Total:10]

9 (a) Explain what is meant by the term *double circulation*.

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..... [4]

9 (b) Explain how the heart is adapted to keep blood flowing in a double circulation.

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..... [6]

[Total: 10]

10 Either

(a) Describe the significance of each of the following features of a dicotyledonous leaf in terms of the process named:

(i) the distribution of chloroplasts in the process of photosynthesis

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..... [4]

(ii) stomata and mesophyll cells in the process of gas exchange.

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..... [3]

10 (b) Transverse sections were taken from the root and stem of a dicotyledonous plant.

Describe differences in how two named tissues involved in transport are arranged in each of these sections.

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..... [3]

[Total: 10]

10 Or

(a) Outline factors, other than alcohol, that may increase a person's risk of developing coronary heart disease.

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..... [4]

(b) Describe the effects of excessive consumption of alcohol on the individual and society as a whole.

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..... [6]

[Total: 10]

ANSWERS

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

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

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

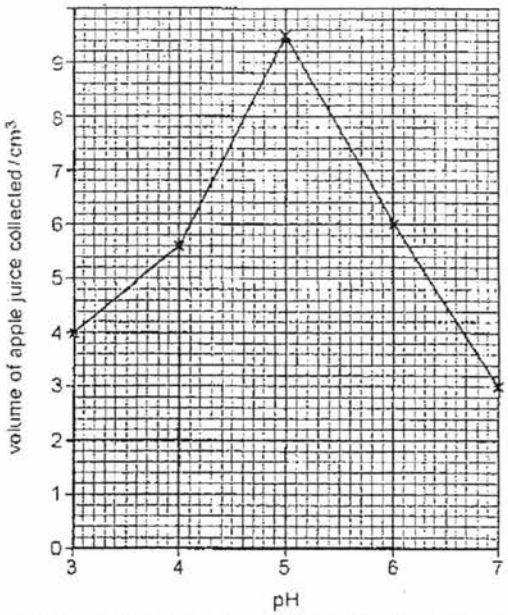
31	32	33	34	35	36	37	38	39	40
A	B	A	A	B	A	C	C	A	D

CHIJ Katong Convent Prelim Exams 2017 Answer scheme

Paper 2

Question		marks
1a	Homeostasis;	1
1b	C – receptor / sensor/ thermoreceptor/ temperature receptor/ nerve ending ; detecting changes (in temperature); D – sensory / afferent + neurone / nerve cell or fibre (R nerve) ; send impulses to CNS / brain / spinal cord /	4
1c	more blood to capillaries ; vasodilate/ dilation with ref. to capillaries or arterioles ; more heat lost ; lowers body temperature (still) further / hypothermia / AW ;	max 3
2ai	aorta	1
2aii	left ventricle	1
2b	(amino acids) 0.05 ; (mineral ions) 2.22 ; (proteins) 8.00 ; (urea) 2.03 ;	4
2c	There would be an increase / more / higher concentration of glucose in B, C and D; lack of insulin ; excess glucose would not be converted into glycogen ; kidney unable to/doesn't reabsorb all glucose ;	max 3
3a	aerobic respiration	1
3b	water is absorbed from ileum/ small intestine/ colon/ large intestine ; ref need to prevent water loss/ water important for use as solvent/ transport;	2
4a	one mark per trophic level in any order large bird / hawk + spider ; small / yellow bird + (black) flies ; greenflies / aphids + butterflies + mouse / mice ;	3
4bi	correct shape + all three levels correctly labelled;	1
4bii	correct shape + all three levels correctly labelled ; (inverted pyramid)	1
4c	some organisms / parts remain uneaten ; energy lost in faeces /undigested food ; urine / excretory products / excretion ; respiration - energy lost as heat ;	max 2
5a	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + large amount of energy	1
5b	absence of oxygen resulted in anaerobic respiration; carbon dioxide not a product of anaerobic respiration in animal cells;	2
6ai	500 arbitrary units; (award 1 mark even if student did not include units because y-axis has no values)	1

<table>
<tr><td>6aii</td><td>below 500 au, rate of respiration higher than rate of photosynthesis;
respiration produces CO_2 faster than;
CO_2 is used in photosynthesis;
light intensity below compensation point too low for photosynthesis;</td><td>max 3</td></tr>
<tr><td>6b</td><td>Forest has: shade / low light levels;
Plant D uptakes more carbon dioxide at lower light levels;
Plant D requires less energy to survive / has lower respiration rate;
Plant D "saturates" at a lower light level / levels / can't make use of high light levels/ correct use of figures e.g. After 850au increasing light level does not result in any increase in photosynthesis in plant D;</td><td>max 3</td></tr>
<tr><td>6c</td><td>large amount of detritus / leaf litter / organic material available;
for bacteria / fungi to act on;
OR
warm/ moist / damp (conditions) ;
for increased rate of enzyme action;</td><td>max 2</td></tr>
<tr><td>7a</td><td>small segment of DNA;
code for the production of protein / polypeptide
Accept: Gene is a unit of inheritance;
born on a particular locus of a chromosome
OR
A small segment of DNA in a chromosome;
that controls a particular characteristic or protein in an organism;</td><td>2</td></tr>
<tr><td>7bi</td><td>
<table>
<tr><td>Parental phenotype</td><td>heterozygous</td><td>heterozygous</td><td></td></tr>
<tr><td>Parental genotype</td><td>Dd</td><td>Dd</td><td>1</td></tr>
<tr><td>gametes</td><td>D d</td><td>D d</td><td>1</td></tr>
<tr><td>offspring genotype</td><td>DD Dd</td><td>DD dd</td><td>1</td></tr>
<tr><td>offspring phenotype</td><td>normal normal</td><td>normal cystic fibrosis</td><td>1</td></tr>
</table>
</td><td>4</td></tr>
<tr><td>7bii</td><td>3: 1</td><td>1</td></tr>
<tr><td>7c</td><td>reduction in enzymes / pancreatic juice <u>entering duodenum</u>;
less emulsification/ reduced bile action;
less nutrients digested ;
less fat digestion ; (lower rate of fat digestion)
fewer molecules to absorb / less absorption qualified;
and use for assimilation into larger molecules;
used in growth;
less fat stored /AW;</td><td>max 4</td></tr>
<tr><td>8a</td><td>more with enzyme (15 cm^3) / less without enzyme (6 cm^3) ;
(must quote values shown in diagram or accept calculated difference)
clear vs cloudy/ A with no pulp and B with pulp ;</td><td>2</td></tr>
<tr><td>8bi</td><td>labelled axes;
correct points plotted;</td><td>4</td></tr>
</table>

	scale; line;  	
8bii	Rate of enzyme action is at its fastest/maximum/ optimum at pH 5 when volume of juice collected is highest; Rate of enzyme activity increases as the pH increases from 3 to 5 as shown by an increase in volume of juice collected; Further increase in pH from 5 to 7 results in a decrease in the rate of enzyme activity as the volume of juice collected decreases ; At optimum pH, most number of enzyme-substrate complex form/ most number of effective collisions between enzyme and substrate molecules; Enzymes start to <u>denature</u> **below and above their optimum pH**; When enzyme denatures : 3D configuration changes/ surface configuration changes, active site is lost and can no longer bind with substrate;	max 2 for describe max 2 for explain
9a	blood goes through heart twice (in one complete circuit of the body) ; circulation to/ from lungs / pulmonary ; circulation to/ from (rest of) body / systemic ; lungs + low pressure ; body + high pressure ;	max4
9b	two sides to the heart divided by median septum ; 4 chamber beats continuously ; right atrium + receives blood from body ; right ventricles + pumps blood to lungs ; left atrium receives blood from lungs ; left ventricle + pumps blood to (rest of) body ; left ventricle thicker-walled / more muscular + than right ventricle ; ventricles thicker-walled / more muscular + than atria ; further to pump blood / generate higher pressure ;	max 6

	atrioventricular valves + one-way flow / prevent backflow of blood from ventricles into atria ;	
10E ai	chloroplast found mainly spongy and palisade mesophyll cells; more chloroplast in palisade mesophyll ; none in epidermis / xylem / phloem / vein / transparent epidermis ; near leaf surface / (sun)light / to absorb more or most sunlight ; rapid rate of photosynthesis ; guard cells ; controlling stomata ;	max 4
10E aii	CO_2 ; O_2 ; correct ref. to photosynthesis or respiration ; diffusion ; (stomata): allow water vapour out/ transpiration ; (mesophyll cells): moist surface dissolve gases ;	max 3
10E b	xylem + phloem ; around edge of stem ; centre of root/ description of arrangement ; many xylem (stem) + one xylem (root) ; phloem and xylem paired in stem/ unpaired in root · A in vascular bundles in stem	max 3
10O a	ref to high fat diet; obesity / overweight ; high blood pressure; ref to cholesterol / saturated fatty acids / animal fats + in diet / blood; smoking; lack of exercise; genetic / inherited / family history (of heart disease); age / time factor; stress; diabetes;	max 4
10O b	Effect on individual: depressant / lowers blood pressure; reduced reaction times/ poor muscular co-ordination AW ; risk taking / delusions A/W; liver damage; tolerance to alcohol / increased dosage required; addiction / dependence; cost (to individual) financial / social; Effect on Society : anti social behaviour towards family A/W or example; anti social behaviour towards community A/W or example; financial cost to community; ref to drink driving; [max 6] Accept inability to take decisions AW A refs to smell / poor personal hygiene , low self esteem, lose friends etc. e.g. reduced income / physical harm e.g. stealing	max 4 for individual max 2 for society