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Name

Reg. No

Class



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4EX

SCIENCE (CHEMISTRY, BIOLOGY)

5088/01

Paper 1 Multiple Choice [20 Marks]

PRELIMINARY EXAMINATION
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 Candidates

There are **twenty** 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.

Any rough working should be done in this booklet.

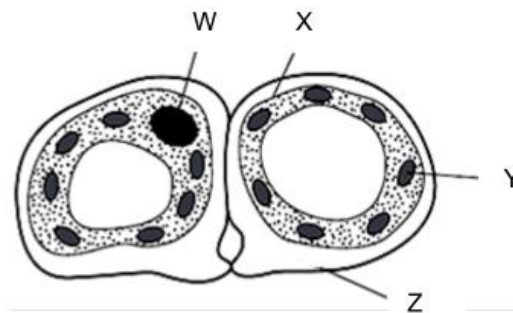
The use of an approved scientific calculator is expected, where appropriate.

This question paper consists of **10** printed pages.

Paper 1 (25 marks)

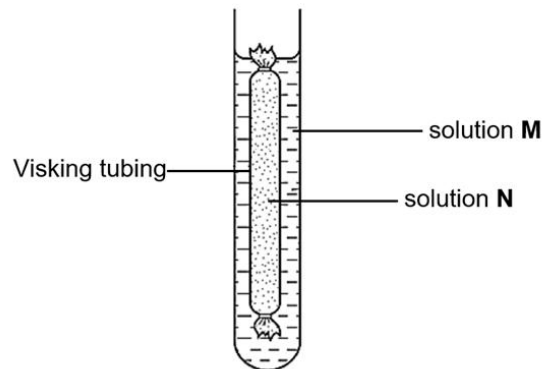
Answer all questions in the OTAS provided.

- 1 The diagram shows a cross section through two guard cells of a leaf.



Which labelled structures would also be found in an animal cell?

- A** W and X **B** W and Z **C** X and Y **D** Y and Z
- 2 The diagram shows an experiment to investigate the process of osmosis.



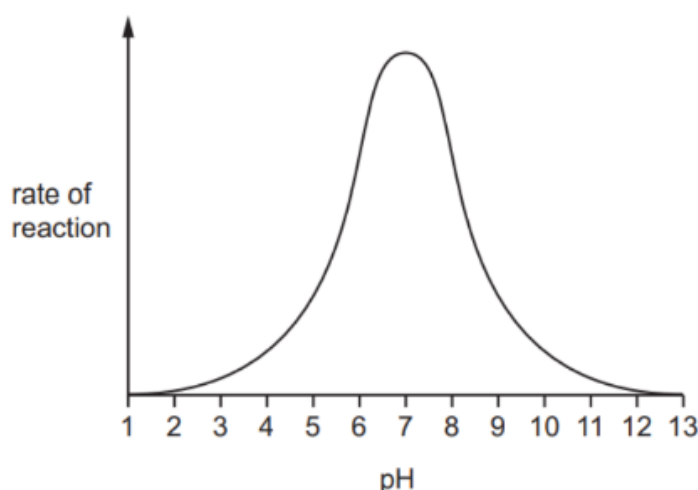
The results are shown in the table.

	mass of Visking tubing and contents/g
before experiment	10.0
after experiment	12.8

Which statement best describes solutions **M** and **N**?

- A** Solution M is 4% salt solution and solution N is water.
B Solution M is 4% salt solution and solution N is 4% salt solution.
C Solution M is 4% salt solution and solution N is 10% salt solution.
D Solution M is 10% salt solution and solution N is 4% salt solution.
- 3 Which of the four substances listed below will give a violet colour when tested with biuret solution?
- A** cellulose
B fats
C glycogen
D protein

- 4 The graph shows the effect of pH on a particular enzyme-controlled reaction.

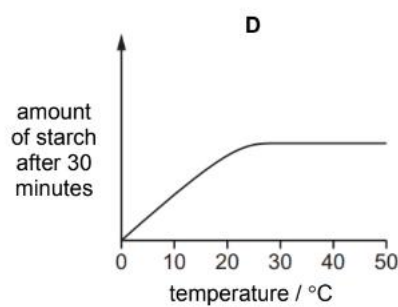
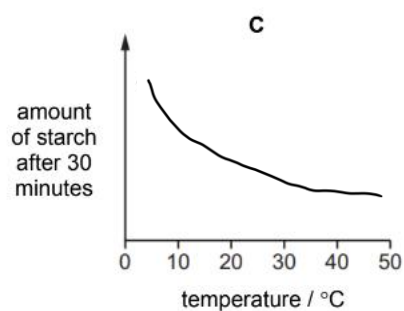
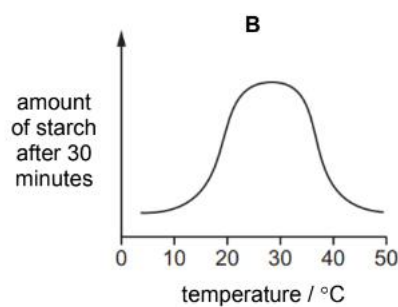
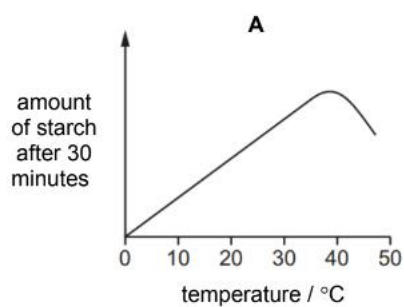


When is the enzyme **fully** denatured?

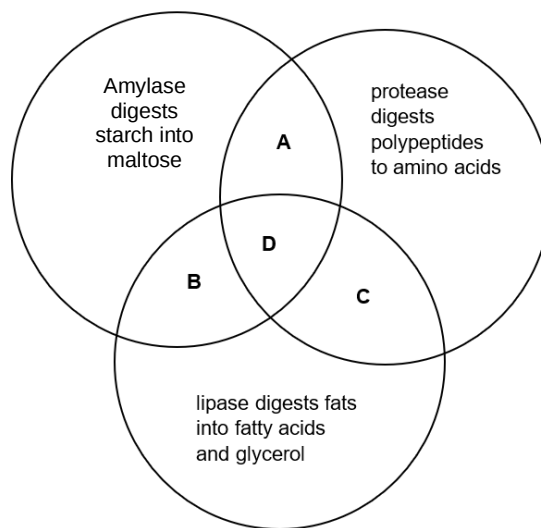
- A pH 1 and pH 13
 - B pH 3 and pH 11
 - C pH 5 and pH 9
 - D pH 7
- 5 Amylase is an enzyme that breaks down starch to maltose. A student set up an experiment to investigate the effect of different temperatures on the action of amylase on starch solution.

He measured the amount of starch remaining after 30 minutes at different temperatures.

Which graph would you expect the student to draw from his result?

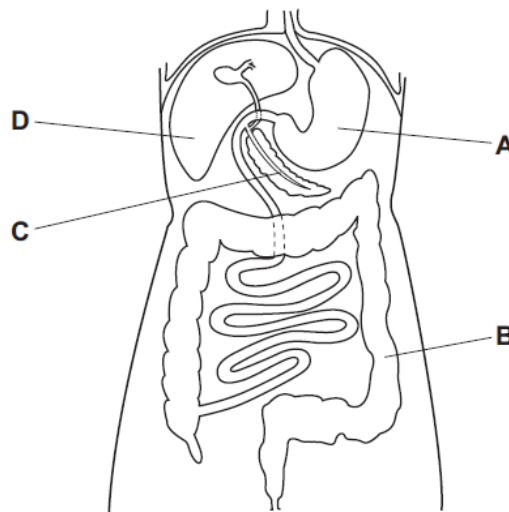


- 6 Which section of the diagram represents the functions carried out by the small intestine?

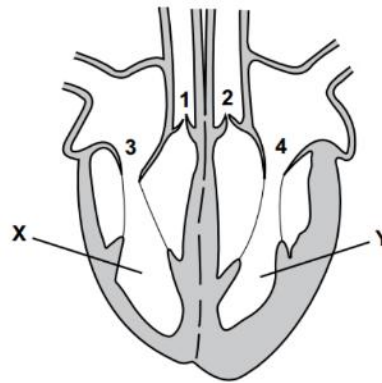


- 7 The diagram shows some organs in the human body.

In which part are amino acids broken down to form urea?



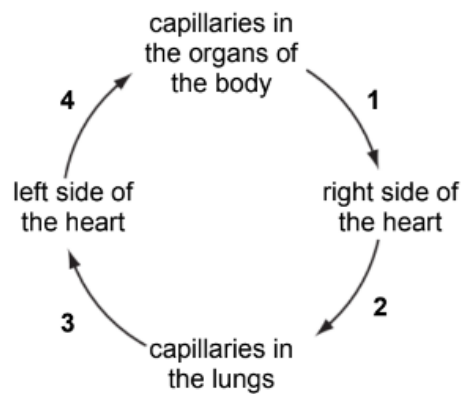
- 8 The diagram shows a section through the heart.



While the muscles of chambers **X** and **Y** are contracting, which valves are open and which are closed?

	valves 1 and 2	valves 3 and 4
A	closed	closed
B	closed	open
C	open	closed
D	open	open

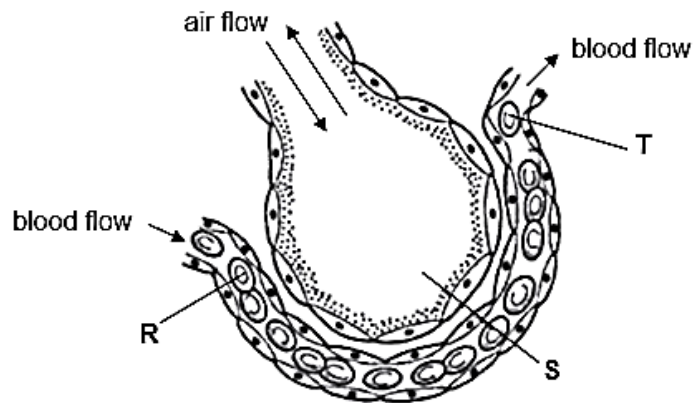
- 9 The diagram shows blood flow through the human body.



At which stages does the blood contain the least oxygen?

- A** 1
- B** 2
- C** 3
- D** 4

- 10** The diagram shows a section of an alveolus in the lung of a mammal.

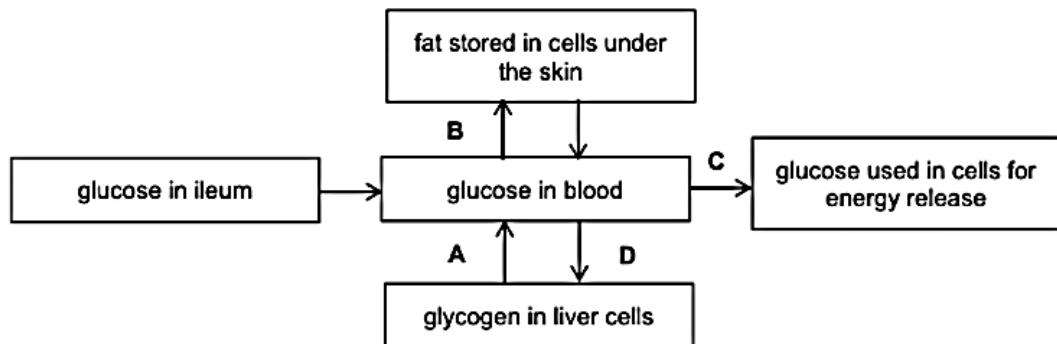


What are the oxygen concentrations in the three parts labelled R, S and T?

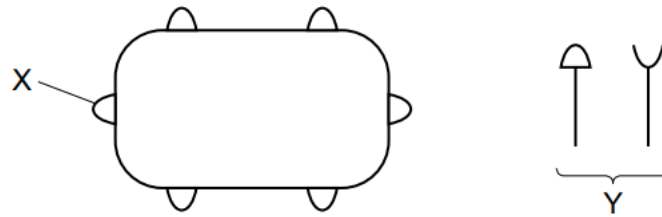
	R	S	T
A	low	high	low
B	low	high	high
C	high	high	low
D	high	lo	low

- 11** The diagram shows what happens to glucose in the human body.

Which change (**A – D**) is controlled by insulin in liver?



- 12** The diagram with the structure labelled **X** shows a bacterium with proteins on its surface. The diagram labelled **Y** shows proteins made by the human body.



Which row shows the correct combination for destroying the bacterium?

	name of X	name of Y	correct shape of Y
A	antigen	antibody	
B	antibody	antigen	
C	antigen	antibody	
D	antibody	antigen	

- 13** The table shows the energy in four trophic levels, **W**, **X**, **Y**, and **Z**, in a grassland community.

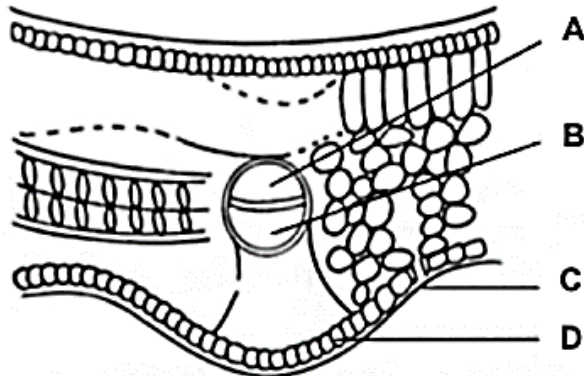
trophic level	energy in trophic level (kJ/ha)
W	10
X	70
Y	580
Z	6400

Which statement of this grassland community is correct?

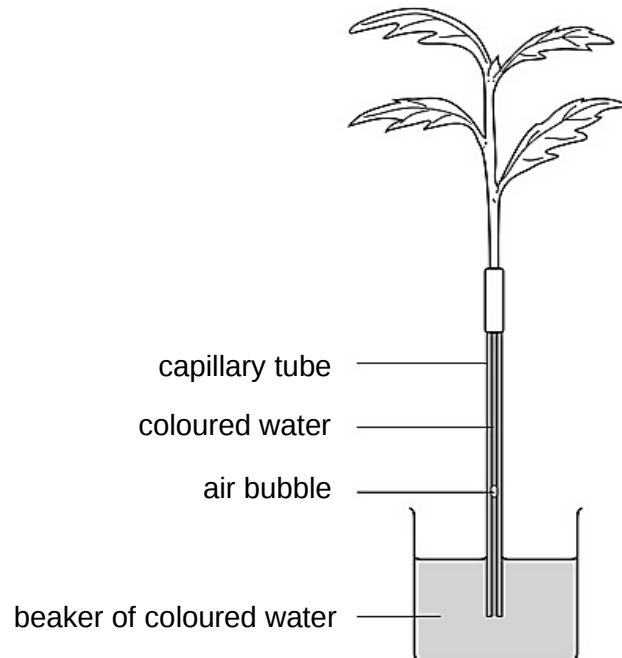
- A** Energy accumulates as it flows from organism W to organism Z.
- B** Light energy is converted to chemical energy by organism W.
- C** Most of the energy that flows from Z to Y is lost as heat energy.
- D** Organism Z represents decomposers.

- 14** The diagram shows a transverse section of a dicotyledonous leaf.

Which part of the plant carries water for photosynthesis?



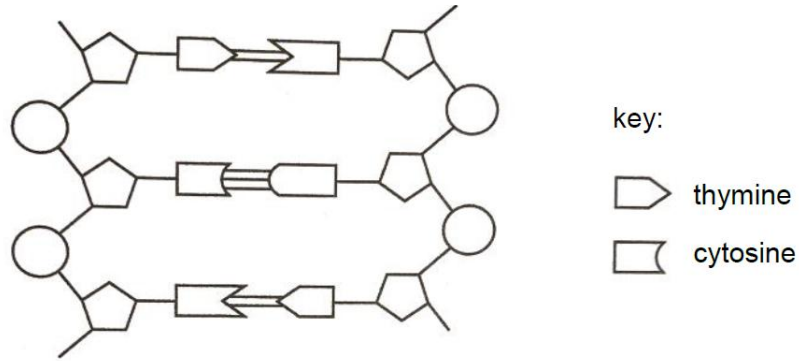
- 15** The diagram shows a potometer used to measure water uptake by a leafy twig.



Which of the following will cause the greatest increase in the rate at which the air bubble is drawn up the capillary tube?

- A** increase in humidity of the surroundings only
- B** increase in temperature of the surroundings only
- C** increase in temperature and humidity of the surroundings
- D** increase in temperature and decrease in humidity of the surroundings

16 The diagram shows a short section of a molecule of DNA.



Which row correctly identifies the shapes used in the diagram?

				
A	phosphate group	sugar	adenine	guanine
B	phosphate group	sugar	guanine	adenine
C	sugar	phosphate group	adenine	guanine
D	sugar	phosphate group	guanine	adenine

17 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** Genes are divided into sections called chromosomes.
- D** Genes include long DNA molecules called chromosomes.

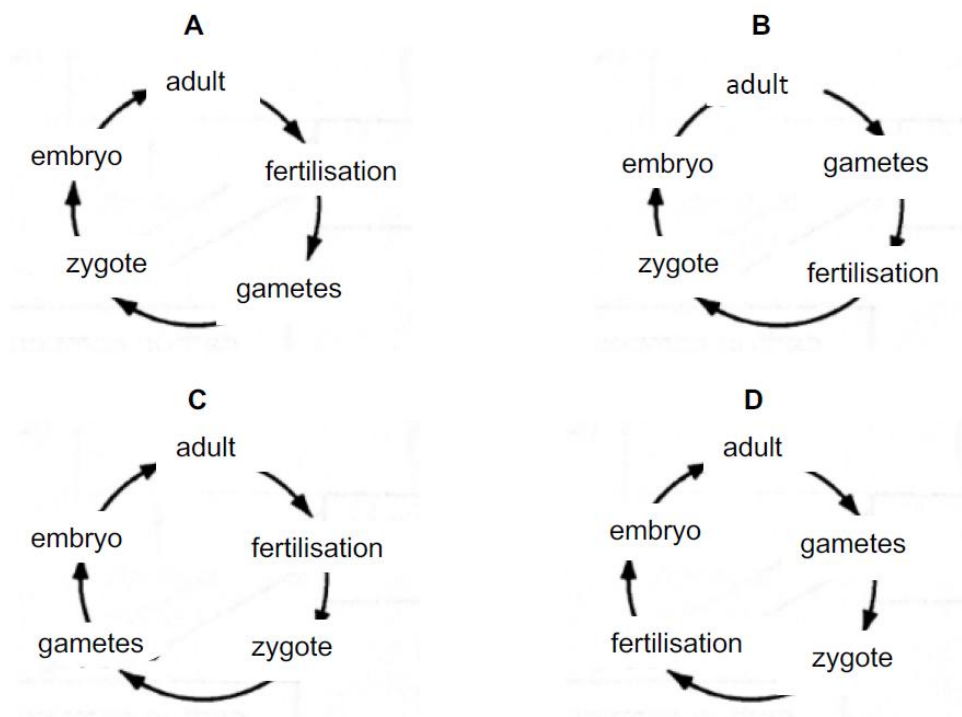
- 18 Two persons have mutations in their cells.

One has sickle cell anaemia and the other has Down's syndrome.

What is the type of mutation and how many chromosomes do they have in their body cells?

	sickle cell anaemia		Down's syndrome	
	type of mutation	number of chromosomes in body cells	type of mutation	number of chromosomes in body cells
A	chromosome	24	gene	47
B	chromosome	23	gene	46
C	gene	46	chromosome	47
D	gene	47	chromosome	23

- 19 Which diagram shows the order of the main stages of the human reproductive cycle?



- 20 In sexual reproduction in humans, why are sperm cells produced in much greater numbers than egg cells?

- A** More than one sperm cell fertilises an egg.
- B** Sperm cells are small.
- C** Sperm cells live for only a short time.
- D** The chance of one sperm cell reaching an egg is very small.

---End of Paper ---

MAYFLOWER SECONDARY SCHOOL

2024 SECONDARY 4 EXPRESS SCIENCE BIOLOGY 5088 PRELIM P1

ANSWER SCHEME

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

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

Name

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Class



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4EX

SCIENCE (CHEMISTRY, BIOLOGY)

5088/04

Biology Component

Paper 4 [65 Marks]

PRELIMINARY EXAMINATION

Aug 2024

1 hour 15 minutes

Additional Materials:

Approved calculator

Instruction to Candidates

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 staples, paper clips, highlighters, glue or correction fluid.

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

This paper consists of two sections.

Section A will carry 55 marks and will contain a number of compulsory structured questions. The last question will carry 10 marks.

Section B will carry 10 marks and will contain two questions.

Candidates must answer only one out of these two questions.

FOR EXAMINER'S USE		
Paper		Marks
Paper 1 (MCQ)		/ 20
Paper 3		
A		/ 55
B	8 / 9	/ 10
Paper 5		/ 15
Total		/ 100

At the end of the examination, fasten all your work securely together.

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

This question paper consists of 16 printed pages.

Setter: Mrs Marie Huang

Vetter: Mrs Vija

Section A (55 marks)

Answer **all** the questions in the spaces provided.

- 1** Some students investigated the effect of immersing red blood cells in different concentrations of salt solutions.

They measured the diameters of samples of red blood cells and calculated the mean.

They then immersed the red blood cell samples in different concentrations of salt solutions.

After two minutes they measured and calculated the mean of the samples again.

Table 1.1 shows the results.

Table 1.1		
percentage concentration of the salt solution / %	mean initial diameter of the red blood cells / μm	mean diameter of the red blood cells after two minutes / μm
0.4	7.5	Cells burst
0.8	7.5	8.2
0.9	7.5	7.5
1.8	7.5	6.0

- (a)** Calculate the percentage increase in the mean diameter of red blood cells that were immersed in the 0.8% salt solution.

Give your answer to three significant figures.

Answer..... % [2]

- (b) (i)** Explain the results for the red blood cells that were immersed in 1.8% salt solution.

.....

 [2]

- (ii)** State why there was no change in the mean diameter of the red blood cells immersed in 0.9% salt solution.

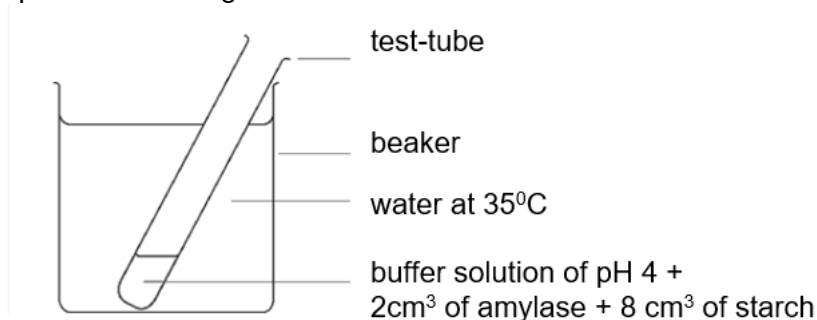
.....
 [1]

[Total = 5]

- 2 An experiment was conducted to investigate the action of enzyme amylase in solutions of different pH.

Six test-tubes were set up where each test-tube was filled with buffer solutions of pH 4, 5, 6, 7, 8 and 9. 2 cm^3 of amylase and 8 cm^3 of starch were added into each test-tube in sequence.

The first set-up is shown in Fig 2.1.



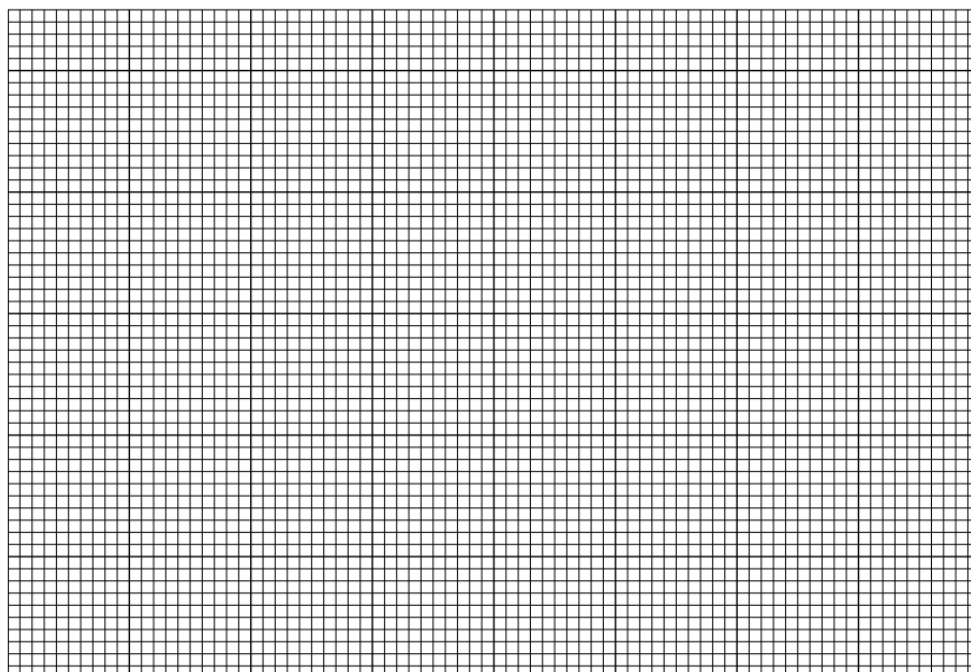
0.5 cm^3 of the mixture in the test-tube was taken out every 30 seconds and tested for starch, until it gave a negative test. The time taken for all the starch to be digested was recorded in Table 2.2.

Table 2.2

pH	time taken for starch to be digested / minutes
4	10.0
5	7.5
6	5.0
7	6.0
8	10.5
9	16.5

- (a) Plot these results on the grid.

Time taken to
digest starch/
minutes



pH

[3]

[Turn over]

(b) Describe the test for starch and the expected results.

.....

.....

.....

..... [2]

(c) From your graph, state the optimum pH for amylase action.

optimum pH = [1]

(d) Describe briefly how starch is digested in the alimentary canal.

.....

.....

.....

..... [2]

[Total = 8]

- 3 A pulse oximeter is a device that fits on the end of a finger. It measures the heart rate (pulse rate) in beats per minute and the percentage of oxygen in the blood (%SpO₂)

Fig 3.1 shows a photograph of a pulse oximeter.



Fig 3.1

John, a non-smoker, used a pulse oximeter to investigate the effect of exercise on heart rate and the percentage of oxygen in the blood. He recorded readings from the pulse oximeter before exercise (0, 1, 2 minutes). He then exercised for 5 minutes. At the end of 5 minutes, he recorded four more readings at 7, 8, 9 and 10 minutes.

The results are shown in Table 3.1

Table 3.1

time / minutes	heart rate / beats per minute	percentage blood oxygen
0	66	98
1	65	99
2	66	99
7	110	96
8	96	97
9	85	98
10	68	98

- (a) (i) Using the above data in Table 3.1, describe and explain any changes in John's heart rate during the investigation.

.....

 [2]

- (ii) Using the above data in Table 3.1, describe and explain any changes in the percentage of oxygen in his blood during the investigation.

.....

 [2]

- (iii) John thought the way he was breathing could have affected the percentage of oxygen in his blood during exercise.

What could he do to increase his percentage of oxygen in his blood?

..... [1]

- (b) A man is a heavy smoker and is suffering from emphysema.

Suggest how this person's normal pulse rate and percentage of oxygen in his blood may vary from those of John in (a).

.....

 [2]

[Total=7 marks]

[Turn over]

4 Fig 4.1 shows the internal structure of the leaf.

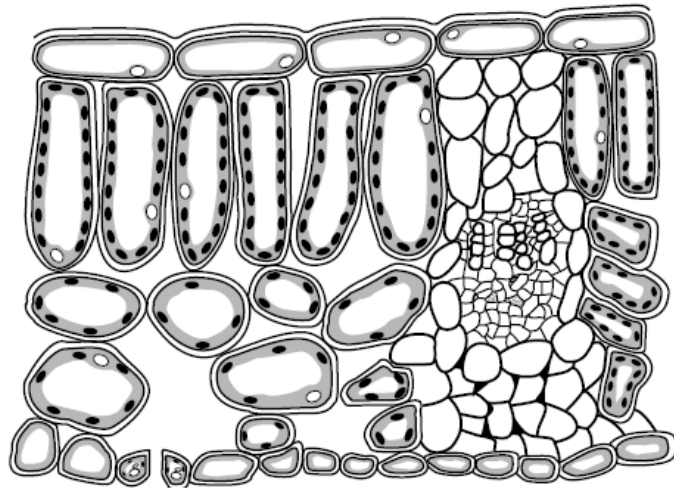


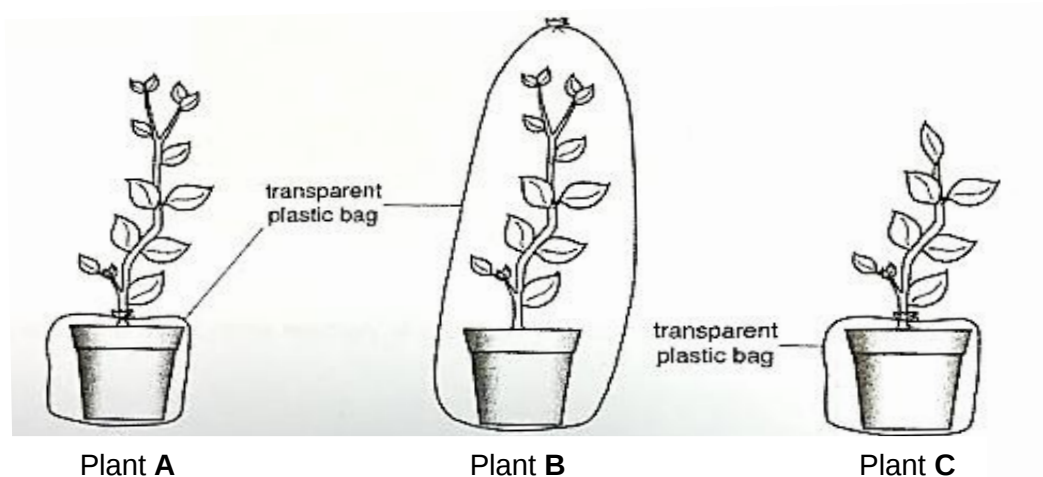
Fig 4.1

- (a) (i) Label **X** and name the cell(s) where maximum photosynthesis takes place. [1]
- (ii) Label **Y** and name the cell(s) which transport water to the cells. [1]

The figure shows three plants **A**, **B** and **C**, growing in pots.

Each plant was treated in the following ways:

- An equal volume of water was given to each plant at start of experiment.
- Plastic bags were placed around the pots of plants A and C.
- The whole of plant B was enclosed within a plastic bag.
- The plants were placed in a sunny position by a window.



The change in mass of each plant was calculated each day for a period of 5 days, and the percentage loss over the 5 days was then calculated.

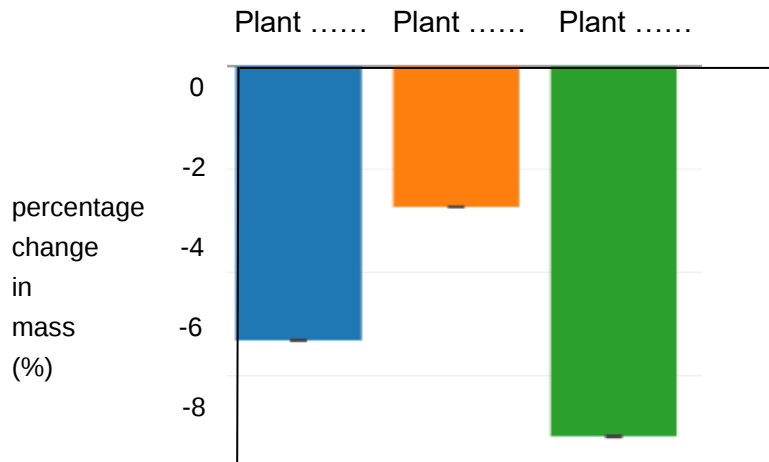
- (b) (i) Name the process responsible for any loss of mass by the plants.

..... [1]

- (ii) Suggest why the pots of plants **A** and **C** were enclosed in plastic bags.

.....
 [1]

- (iii) The bar chart below shows the percentage mass loss by the three plants over the 5 days.



Identify the three plants (**A**, **B** and **C**) in the above bar chart. [1]

- (iv) State which of the plants wilted the most and explain why.

Plant

.....

 [3]

[Total = 8]

5 Fig 5.1 represents the liver and its blood supply.

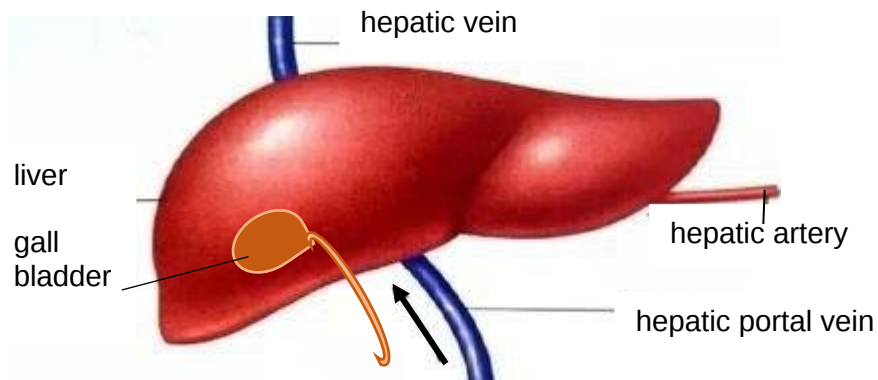


Fig 5.1

- (a) (i) On Fig 5.1, draw an arrow next to the blood vessels to show the direction in which blood flows (one has been drawn for you). [1]
- (ii) State which blood vessel shown in Fig 5.1 contains the highest concentration of urea. [1]

.....

- (iii) State the function of the gall bladder. [1]

.....

.....

- (b) Long term alcohol consumption can lead to serious liver disease.

Fig 5.2 shows alcohol consumption and liver cirrhosis mortality in men in Country X from 1970 to 2004.

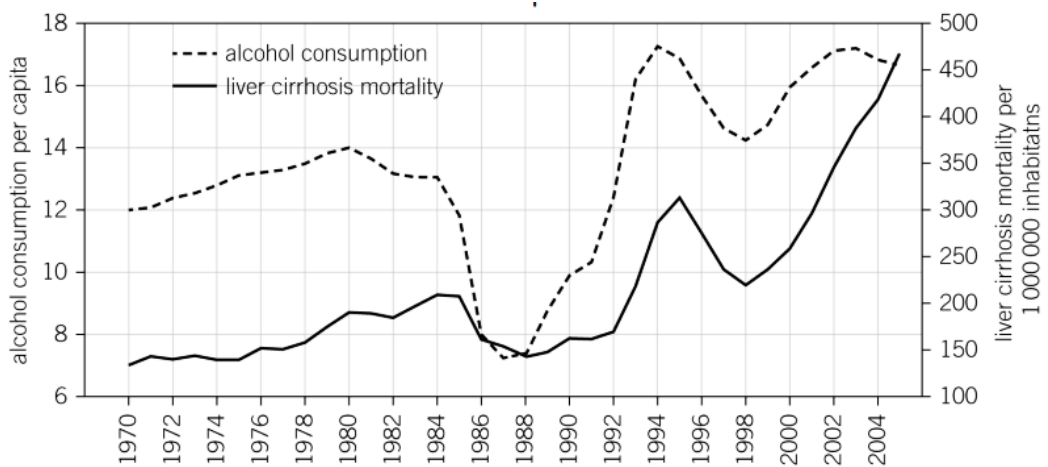


Fig 5.2

- (i) Describe the relationship between alcohol consumption and deaths from liver cirrhosis in the years 1970 to 1984.

.....

..... [1]

- (ii) Alcohol consumption fell sharply in 1984. Describe the trend in deaths from liver cirrhosis in this year.

.....

..... [1]

- (iii) Does the data show any correlation between alcohol as a main risk factor and deaths from liver cirrhosis? Explain your answer.

.....

.....

..... [1]

[Total = 6]

- 6 (a) Sickle-cell anaemia is a condition caused by gene mutation.

- (i) Define the term mutation.

.....

..... [1]

- (ii) Describe the relationship between gene and chromosome.

.....

.....

.....

..... [2]

- (iii) State one factor that can cause mutation.

.....

[1]

- (b) Sickle-cell anaemia is an inherited disease. Individuals who are homozygous recessive suffer from the disease.

Fig 6.1 show how sickle-cell anaemia is inherited in one family.

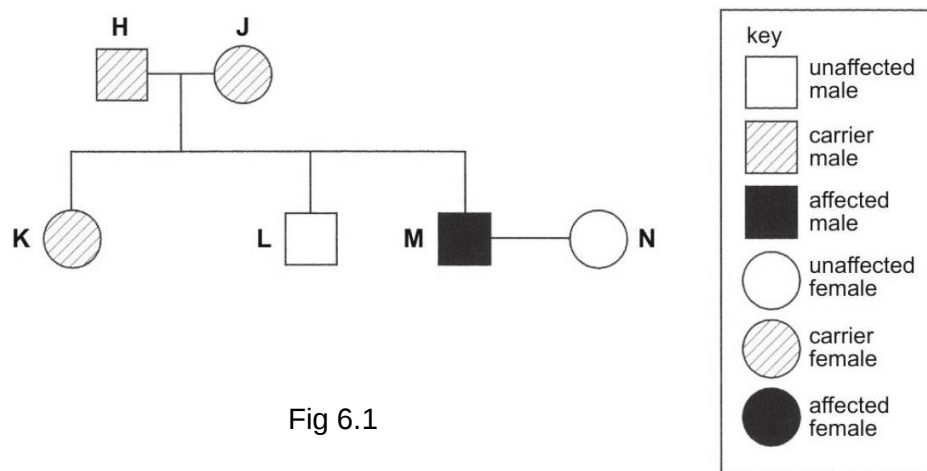


Fig 6.1

- (i) Using the letters, **A** and **a**, state the genotype of parent **H**.
 [1]
- (ii) State which of the individuals in Fig 6.1 is/are homozygous.
 [1]
- (iii) Use letters **A** and **a**, to draw a genetic diagram to show the possible genotypes of any children produced by parents **M** and **N**.
 [4]
- (iv) State the chances of a child born to parents **M** and **N** suffering from sickle-cell anaemia.
 [1]

[Total = 11]

7 White blood cells protect the body against pathogens such as bacteria and viruses.

(a) Describe how white blood cells protect us against pathogens.

.....

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.....

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.....

.....

[3]

(b) The transmission of the measles virus is like the influenza virus. Describe 2 methods of transmission of the measles virus to cause a measles infection.

.....

.....

.....

.....

[2]

A doctor injects a child with a measles vaccine. A few weeks after the vaccination, the child becomes infected with measles from another person.

Figure 7.1 shows the number of measles antibodies in the child's blood from before the vaccination until after the infection.

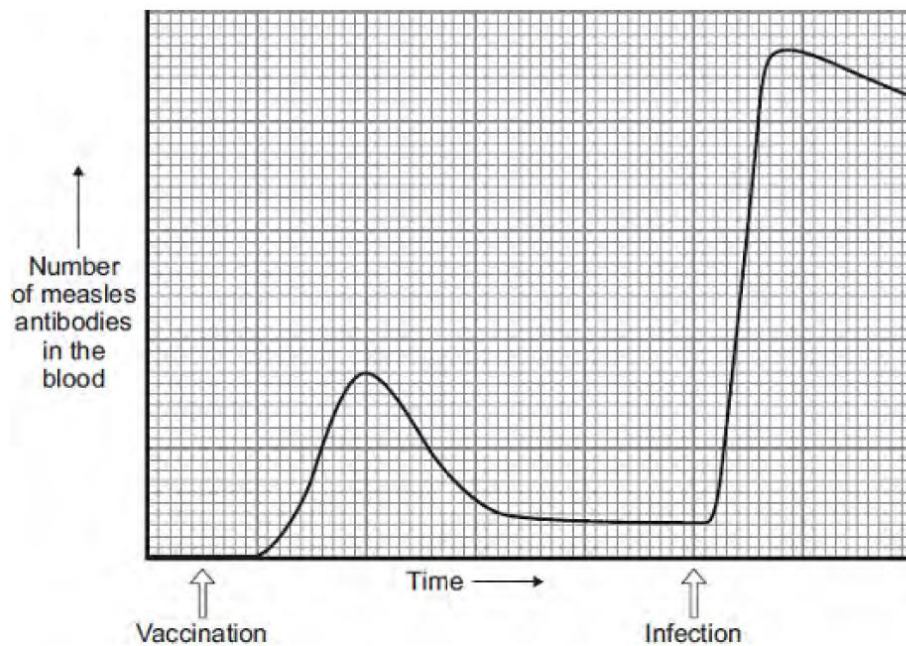


Fig 7.1

[Turn over]

- (c) Using Fig 7.1, explain why the child experienced a milder form of measles and took a shorter time to recover from measles.

.....

.....

.....

..... [2]

- (d) (i) The use of antibiotics is ineffective against measles. Explain why this is so.

.....

.....

.....

..... [2]

- (ii) What is the advantage of vaccinating a large proportion of the population against measles?

.....

..... [1]

[Total = 10]

---End of Section A---

Section B (10 marks)

Answer any **1** questions in this section. Write your answers in the spaces provided.

- 8 (a)** Fig 8.1 shows a pyramid of numbers and biomass for a sycamore tree.

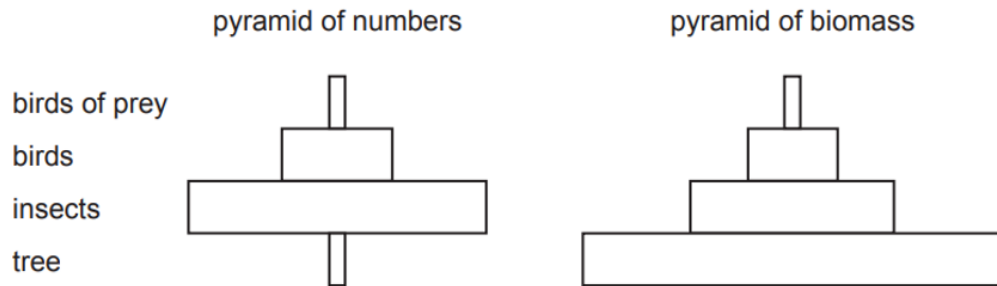


Fig 8.1

Using Fig 8.1, describe and explain the different shapes of the two pyramids.

.....

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.....

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.....

.....

[4]

- (b)** The concentration of atmospheric carbon dioxide has increased considerably in recent years.

Describe the possible causes of increased atmospheric carbon dioxide.

.....

.....

.....

.....

.....

[2]

(c) Soybean plants, *Glycine max*, were grown in two separate plots.

Each plot used a carbon dioxide enrichment system to control the atmospheric carbon dioxide concentration.

The atmospheric carbon dioxide concentrations in the two plots were kept at:

- 370ppm, which is similar to the current atmospheric carbon dioxide concentration.
- 550ppm, which is a possible future atmospheric carbon dioxide concentration.

When the soybean plants were fully grown, scientists calculated the average rates of photosynthesis at regular intervals from 04:00 to 22:00 for both plots.

The results are shown in Fig. 8.2.

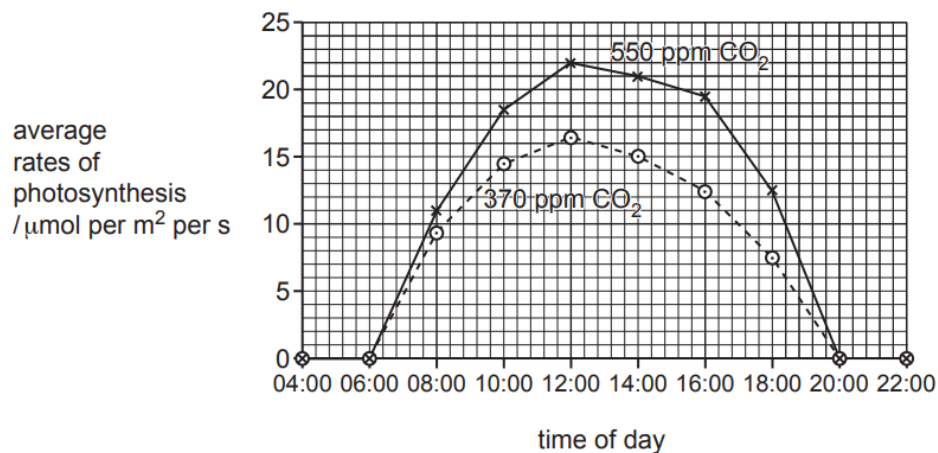


Fig. 8.2

Describe and explain the effect of carbon dioxide concentration on the average rates of photosynthesis of the soybean plants from 06:00 to 20:00.

Predict how the projected atmospheric carbon dioxide concentrations will affect plant growth.

Use the data from Fig. 8.2 in your answer.

.....

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[4]

[Total = 10]

- 9 (a) Fig 9.1 shows the thickness of the uterine lining of a woman for the first 8 days of a 40-day assessment period.

Thickness of uterine lining (arbitrary units)

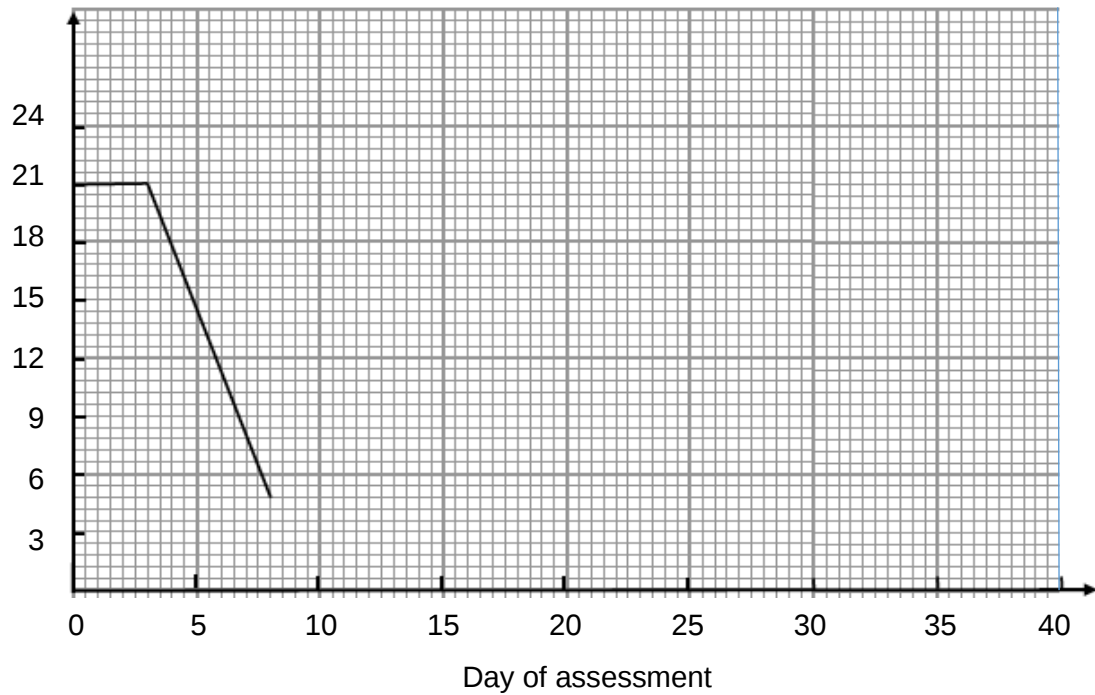


Fig 9.1

- (i) Using the information from Table 9.2, complete Fig 9.1 of the thickness of the remaining period of the assessment.

Table 9.2

Time (day of assessment)	Thickness of uterine lining (arbitrary units)
10	3
16	9
20	21
24	21
28	21
32	24
36	24
40	24

[2]

- (ii) The woman's menstrual cycle lasts an average of 28 days.

With reference to the graph, outline the key events that would have taken place in the female reproductive system and the hormones responsible, for the following periods of time.

Day 8 to Day 16 of assessment

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[3]

Day 17 to Day 40 of assessment

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[3]

- (b) If the woman was to get pregnant, describe the events that will take place from the moment of fertilisation till implantation.

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.....

[2]

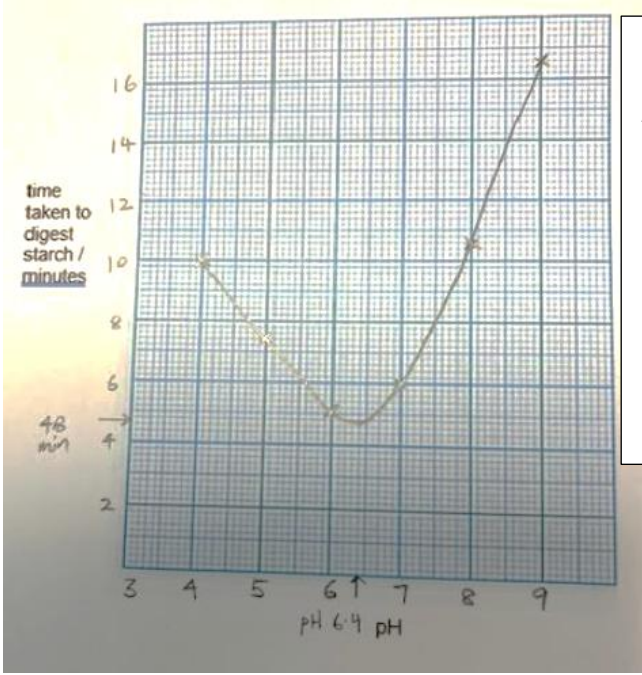
[10 marks]

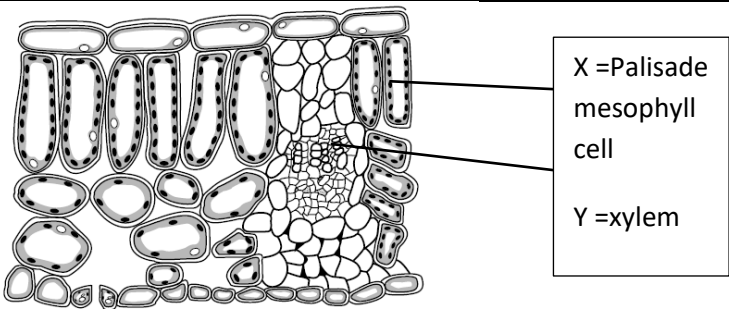
End of Section B

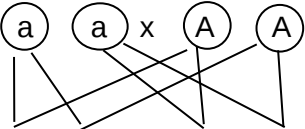
End of Paper

2024 4E SC-Bio 5088 P4 Prelim Exam Marking Scheme

Section A

Qn	Expected Ans	marks	Remarks
1a)	% increase in 0.8%: Working : $(8.2-7.5)/7.5$ Answer: 0.09333 0.0933 % (3 sign fig)	1 1	
(b)(i)	rbc in 1.8%: reduced in diameter from 7.5 to 6.0µm 1.8% salt solution has <u>lower water pot</u> than rbc = so water moved out of rbc by <u>osmosis</u> and thus the cell shrunk	1 1	Poorly done. Data not cited
(ii)	No change in size in 0.9%: water potential of rbc sap is the same as the water potential of 0.9% salt solution.	1	Also accept same salt concentration Water concentration rejected
		5m	
2a	 Coord=1m Accurate pts = 1m Best fit curve =1m		Scale for many students penalised; should not include pH 1-2.
b	Test for starch : add a few drops of iodine solution to starch Result: if starch present, solution turns blue-black. If starch is absent, solution remains yellow/brown.	1 1	
c	Opt pH = read from graph 6.4 (betw pH 6 & 7)	1	Many students did not read from the graph. Cited pH from the table directly not accepted.
d	Starch is digested in the mouth by amylase into maltose. Maltose is digested in small intestine by maltase into glucose	1 1	mention place, enzyme & product
		8m	
3a i)	Heart rate = at rest was 65-66 beats per min but after exercise went up to 110 beats but slowly went back to 68 after few min.	1	Data cited with no units not given credit.

	No. of beats went up bec heart beats faster to send oxygen and glucose quickly to the muscles / muscles need oxygen and glucose for respiration /to provide energy to muscles	1	Common mistake: blood provides energy to the body; blood circulated to the rest of the body (with no mention of the muscles receiving more blood for muscular contractions)
ii)	Percentage of oxygen: slight decrease from 98-99% at rest to about 96% Muscles require oxygen for respiration but lungs not able to get enough oxygen into the bloodstream.	1 1	Almost no student was able to cite the limited capacity of the lungs to obtain sufficient energy to support aerobic respiration. Many students mistakenly wrote that anaerobic respiration kicks in instead of aerobic respiration.
iii)	Faster breathing (increase in breathing rate) OR deeper breathing (depth of breathing)	1	Many cited breathing through nose or mouth (not accepted) without considering how the measure must increase the amount of oxygen supplied.
b	Any 2 of the following: <i>Emphysema – alveolar wall breaks down = so surface area for gaseous exchange is less.</i> 1. Pulse rate is usu higher in smokers. They need to pump blood harder to get blood to all parts of body. 2. % oxygen in blood – usu lower than non-smoker. As they are not able to take in maximum oxygen at each breath, oxygen saturation is usu lower.	1 1 1	
		7m	
4a i)	 X =Palisade mesophyll cell Y =xylem	1 1	Many labelled X/Y without the name of the structure or vice versa. They were also some who labelled the chloroplast instead of the palisade mesophyll cell.
ii)	Transpiration	1	
iii)	To prevent any water from evaporating from the soil into the air	1	
b)i)	Least loss: B most loss: A (C B A)	1	
ii)	Plant that lost most water = Plant A The leaves of plant A had more leaves than C and hence, had more stomata for water loss via transpiration. The leaves of plant B were enclosed in a bag that increased the humidity of air. This reduced the water vapour loss of the leaves in B compared to A.	1 1 1	Poorly done question. Candidates cannot see how the answer in 4aii relates to this question part. Many students focused on p/s and respiration instead of the role of transpiration to lose

			water resulting in mass loss.
		8m	
5a i)	Hepatic artery – arrow towards liver; hepatic vein – arrow away from liver	1	Many missed out on this question.
ii)	Hepatic vein	1	
iii)	Gall bladder stores bile	1	Poorly done. Basic recall question.
bi)	1970-1984: Liver cirrhosis mortality increase (130 to 200 cases per million) as alcohol consumption increase (12 to 13) = nearly direct correlation	1	No need data
ii)	1984: alcohol consumption dropped but mortality was still high – took a few years to drop (1988)	1	Many immediately assumed the drop without noticing the high mortality rate.
iii)	Although alcohol is a main risk factor, there are other factors that also affect mortality as there are years when they are not directly correlated. But in gen, there is direct correlation in most years.	1	Any appropriate ans
		6m	
6a i)	Mutation is a random spontaneous change in the gene structure or the number of chromosomes.	1	Poorly done. Candidates clearly did not memorise this definition.
aii)	A gene is <u>a segment of nucleotides on the chromosome</u> [1] which <u>codes for the synthesis of a protein.</u> [1]	2	Most students got this wrong. The terms were highly confused and the lack of clarity in answer suggested a lack of preparation for this topic.
ii)	Mutation caused by: ultraviolet light Alpha, gamma, beta radiation (accept radiation) Chemicals like formaldehyde, tar, lysergic acid, etc	1	Any 1
bi)	H = Aa	1	
ii)	L, M, N	1	All 3
iii)	Parent Genotype aa x AA Gametes  Correct cross/ F1 Genotype All Aa F1 phenotype All carriers	1 1 1 1	Minus 1m if no circle for gametes Max 2m for Punnett Square Students' mistakes include: 1. Incorrect/incomplete genetic diagram 2. Wrong parental genotype 3. Ratio cited as 4: 0 (should be 1 -not penalised)
iv)	0 will suffer from sickle-cell anaemia	1	
		10m	
7a	White blood cells/lymphocytes are able to <u>produce antibodies when stimulated</u> in order to bind to the antigens	3	Students misconceptions include:

	of the pathogens. [1] The <u>pathogens are then clumped together</u> [1], which would be then ingested by the phagocytes through phagocytosis. [1] Also accept: Antibodies can also neutralise the toxins produced by the pathogens.		1. Malaria is a virus. 2. White blood cells contain antibodies. 3. The white blood cells know what to do when they see a pathogen. 4. Antibodies act on bacteria cells only. 5. Confusing antibiotics and antibodies.
b	Through <u>respiratory droplets when an infected person coughs or sneezes</u> and these droplets are inhaled into the respiratory system. [1] Through <u>contact of infected surfaces and subsequently touching of the face and/or eyes.</u> [1]	2	Rejected: Water droplets Many cited contaminated food and water
c	The number of antibodies in the child's blood increased after vaccination and upon infection, the number of antibodies more than doubled. [1] The high number of antibodies allowed the <u>increase in the speed in which the malaria virus is being destroyed</u> [1] hence experiencing milder symptoms.	2	BOD given to increase in number of antibodies. 0 candidates cited data from the diagram.
di	Use of antibiotics is only effective against bacteria and not virus [1], as the antibiotics weakens the cell wall of the bacteria/breaks up the cell membrane of the bacteria/prevents ribosomes from proteins synthesis [1], which the viruses do not have. OWTTE	2	
dii	Creating herd immunity to prevent the transmission to the individuals who are vulnerable and cannot go for vaccination. [1] OWTTE	1	only 1 student cited herd immunity correctly.

Section B

8a	- From the figure, the pyramid of biomass for the food chain follows the shape of a normal pyramid. - The biomass of the tree is the largest of all the organisms within the food chain, and hence is the main provider of energy for all the organisms at the higher trophic levels. - From the figure, the pyramid of numbers has an inversion in its base, as this is due to there being only one singular tree in which the insects feed on. - Following the predator-prey relationship, the number of birds are lesser than the insects and subsequently lesser birds of prey who feed on the birds.	4[1]	Poorly done. Many students simply describe the 2 pyramids with no analysis of relationships between the organisms in the food chain. Many assumed biomass = energy.
b i)	- Increased deforestation has resulted in less trees being able to absorb carbon dioxide from the environment/less able to serve as carbon sinks. - Increased carbon emissions from vehicles and industries due to combustion of fossil fuels has resulted in more carbon dioxide being released.	2[1]	

ii)	<u>At least 2 reference to data – 2[1]</u> - From 0600 to 2000, the photosynthesis rate at 370ppm is lower than that at 550ppm. - The highest rate of photosynthesis at 370ppm is 16umol per m² per s while the highest rate of photosynthesis at 550ppm is 22 umol per m² per s. - Photosynthesis rate increases from 0600 to 1200 as light intensity increases. Photosynthesis rate decreases from 1200 to 2000 as light intensity decreases. <u>Explanation – [1]</u> - The results show that an increase in carbon dioxide concentration brings about an increase in p/s rate, as carbon dioxide concentration is a limiting factor. [1] <u>Prediction – [1]</u> - With a heightened carbon dioxide concentration in the atmosphere, plants in general will be able to benefit from higher photosynthesis and growth rate. [1]	4	Data citing was lacking, a consistent problem in this paper.																						
		10m																							
9ai)	Thickness of uterine lining (arbitrary units) <table><caption>Data points for Uterine Lining Thickness</caption><thead><tr><th>Day of assessment</th><th>Thickness (arbitrary units)</th></tr></thead><tbody><tr><td>0</td><td>21</td></tr><tr><td>3</td><td>21</td></tr><tr><td>8</td><td>5</td></tr><tr><td>10</td><td>3</td></tr><tr><td>16</td><td>21</td></tr><tr><td>20</td><td>21</td></tr><tr><td>25</td><td>21</td></tr><tr><td>30</td><td>21</td></tr><tr><td>35</td><td>24</td></tr><tr><td>40</td><td>24</td></tr></tbody></table>	Day of assessment	Thickness (arbitrary units)	0	21	3	21	8	5	10	3	16	21	20	21	25	21	30	21	35	24	40	24		1m – plotting 1m – best fit shape of curve
Day of assessment	Thickness (arbitrary units)																								
0	21																								
3	21																								
8	5																								
10	3																								
16	21																								
20	21																								
25	21																								
30	21																								
35	24																								
40	24																								
(ii)	1.Day 10-16: Day 1-3: thickness = 21 units Day 3-8: thickness reduces from 21 to 5 units. Uterus lining breaking down = menstruation Day 8-10: uterus wall thickness is v low(3 units)= menstruation is on-going but goes a little thicker at day 10 (start of repair) By Day 16: there is increase in uterus lining thickness- uterus wall repaired and thicken = growing and thickening. Oestrogen is produced in ovary = cause the uterus wall to repair and thicken 2. Day 17-40: the uterus wall is thickened and remains thick until day 40. Hormone progesterone is produced in ovary – cause uterus wall to thicken & prepare for implantation. Progesterone also prevent ovulation and further devt of eggs.	1 1 1 1 1 1	Generally reasonably attempted.																						
b	Pregnant: - Fertilisation takes place in the oviduct (fallopian tube) when the sperm fuses with the ovum to form a zygote. - Embryo will move along the uterus and will embed itself in the uterus lining (called implantation)		Many thought it was the description of the uterine lining post-fertilisation.																						
		10m																							

