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Paya Lebar Methodist Girls' School (Secondary)
Preliminary Examination 2024
Secondary 4 Express / G3

CANDIDATE NAME		CLASS		CLASS INDEX NUMBER	
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CENTRE NUMBER				
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INDEX NUMBER				
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SCIENCE (BIOLOGY)

5088 / 01

Paper 1 Multiple Choice

1 August 2024

Additional Materials: Multiple Choice Answer Sheet

30 minutes

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

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

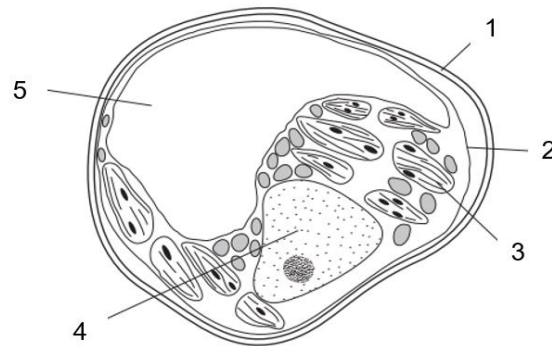
There are **twenty** multiple choice questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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.

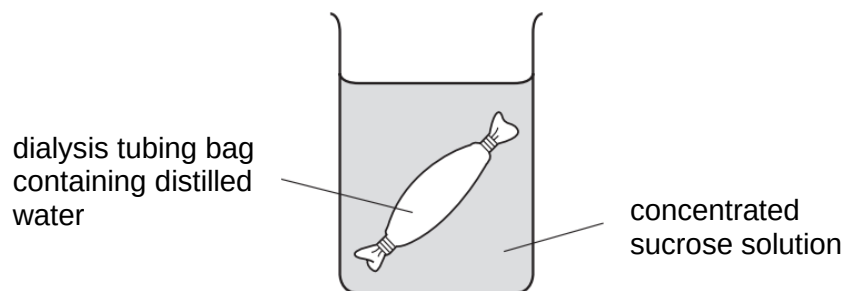
1 The diagram shows a mesophyll cell.



Which structure(s) are not found in animal cells?

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

2 The diagram shows some of the apparatus used in an osmosis investigation.



In this investigation a dialysis tubing bag was filled with distilled water, sealed and weighed.

The dialysis tubing bag was then immersed in concentrated sucrose solution for one hour.

After one hour the dialysis tubing bag was removed from the beaker, the surface was dried and the bag was reweighed.

Which row explains what will happen during the investigation?

	mass of the dialysis tubing bag at the end	net movement of sucrose molecules	net movement of water molecules
A	decreases	none	out of the bag
B	decreases	none	into the bag
C	increases	into the bag	into the bag
D	increases	into the bag	out of the bag

3 Which of the statements about the movement of substances involve diffusion?

- 1 movement of carbon dioxide from body cells into the bloodstream
- 2 movement of glucose from the ileum into the bloodstream
- 3 movement of mineral ions into root hair cells in plants

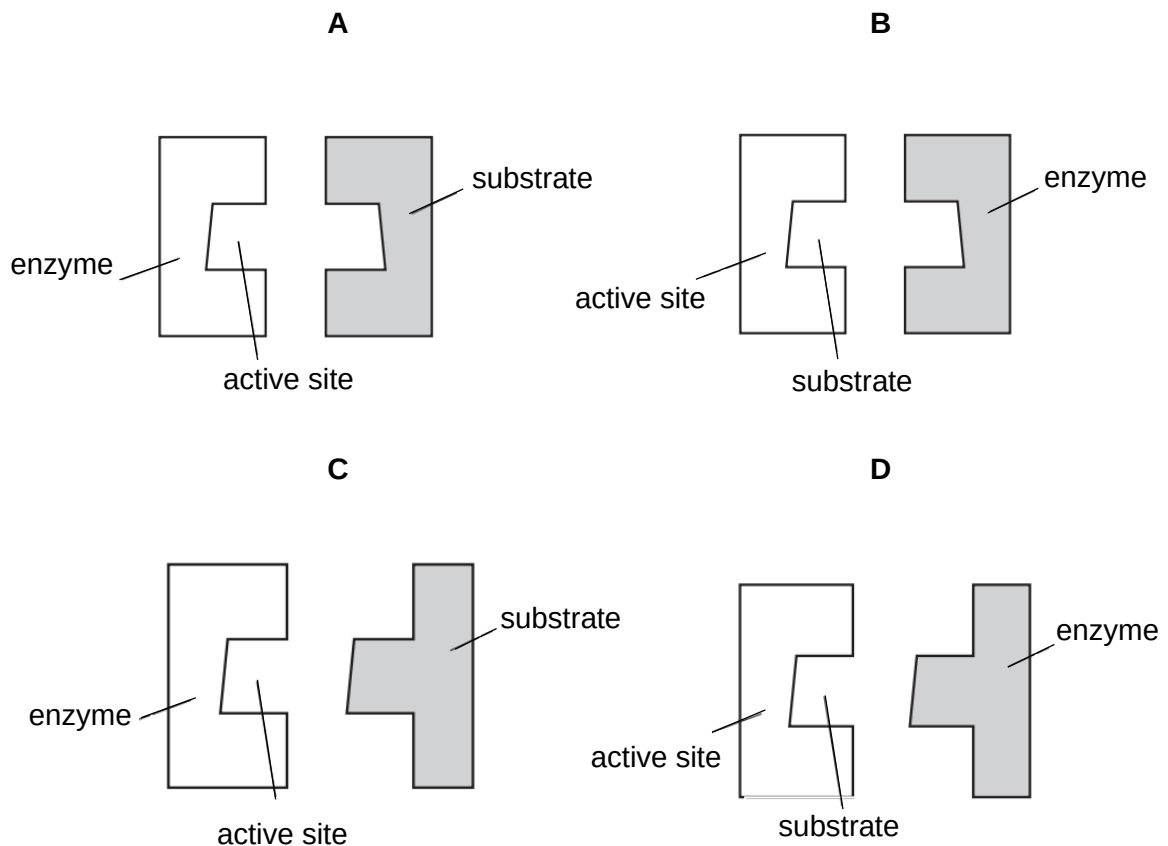
- A 1 and 2 only
 B 1 and 3 only
 C 2 and 3 only
 D 1, 2 and 3

4 Large molecules are synthesised from smaller basic units.

What is the basic unit of maltose?

- A amino acid
 B glycerol
 C glucose
 D starch

5 Which diagram of an enzyme, active site and substrate is correct?



6 What is the function of bile?

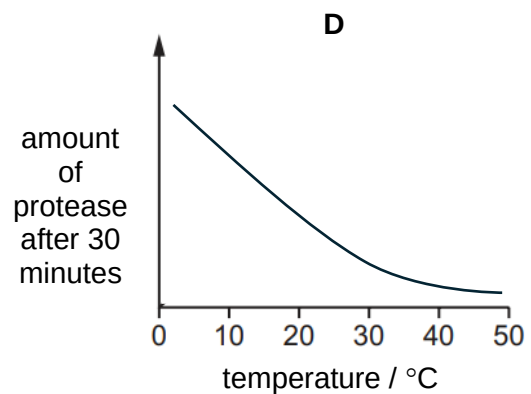
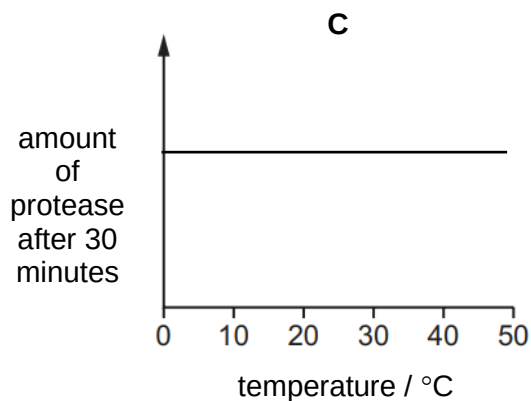
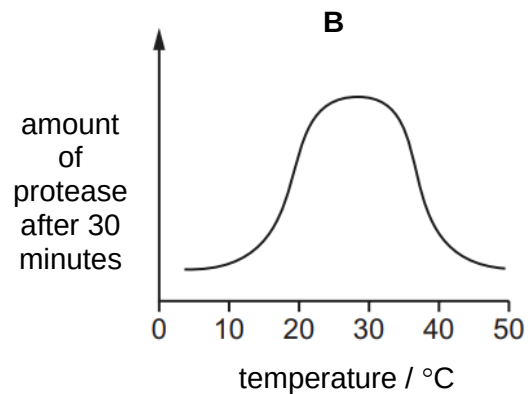
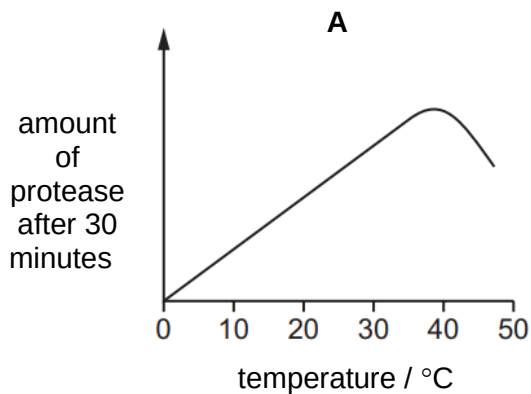
- A to acidify the food entering the duodenum
- B to break up fats into smaller droplets
- C to activate enzymes digesting glycerol
- D to produce fat-digesting enzymes

7 Proteases are enzymes that break down proteins into amino acids.

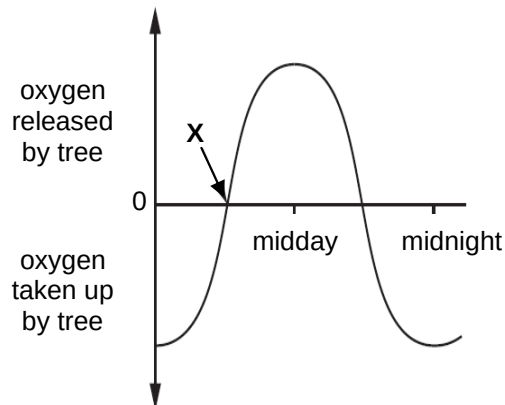
A student sets up an experiment to investigate the effect of different temperatures on the action of protease on egg albumin.

He measured the amount of protease in the solution after 30 minutes at different temperatures.

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



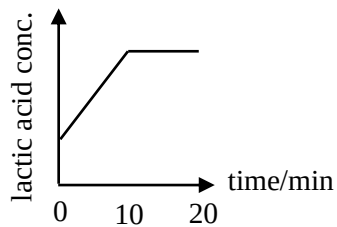
- 8 The graph shows the oxygen released and taken up by a tree during a 24 hour period.



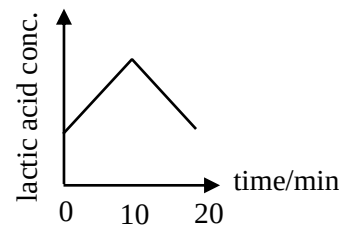
Which statement best describes the situation at point X?

- A Photosynthesis begins.
 - B Respiration stops.
 - C The rate of respiration equals that of the rate of photosynthesis.
 - D The rate of respiration is greater than the rate of photosynthesis.
- 9 Which graph shows the change of lactic acid concentration in a thigh muscle of a boy who jumps vigorously for 10 minutes and then sits down for another 10 minutes?

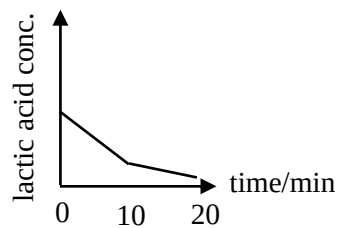
A



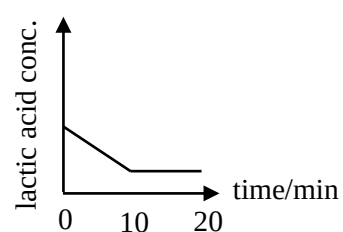
B



C

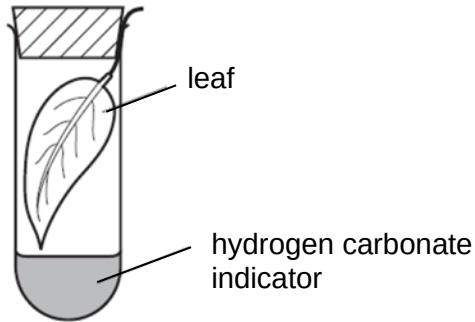


D



- 10** A green leaf is picked at time 0700h and immediately placed in a sealed test tube containing hydrogen carbonate indicator solution.

The test tube is kept near a window for 24 hours. The table below shows how the indicator changes in colour.

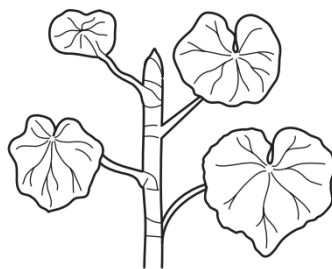


colour	amount of carbon dioxide compared to average atmospheric concentration
purple	less than normal
red	normal
yellow	more than normal

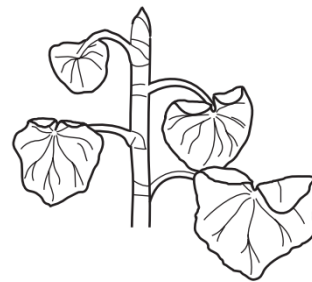
Which colour will the hydrogen carbonate indicator be at 1200h in the afternoon and 2300h at night?

	1200 h	2300 h
A	purple	yellow
B	red	purple
C	yellow	purple
D	yellow	red

- 11** The diagram shows a plant shoot and the same shoot six hours later.



plant shoot



same shoot six hours later

Which change in environmental conditions would **not** cause this change in the shoot?

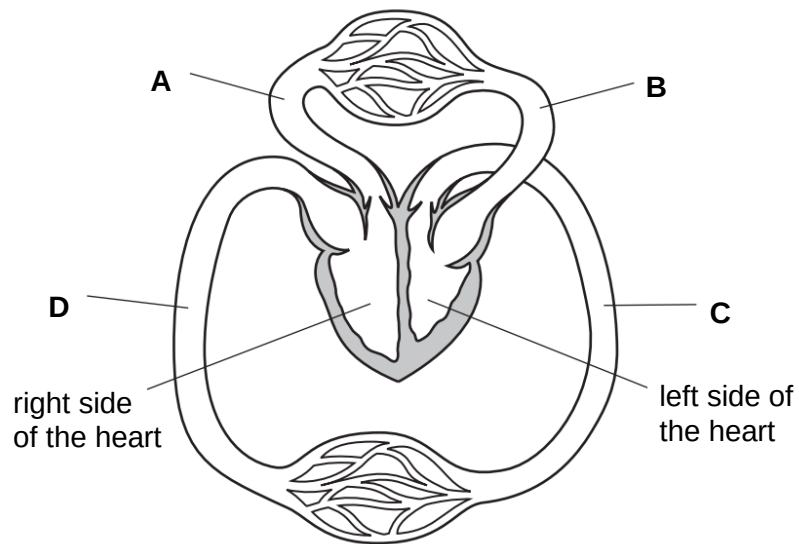
- A** an increase in temperature
- B** an increase in humidity
- C** an increase in wind speed
- D** an increase in light intensity

12 Which processes take place in the liver?

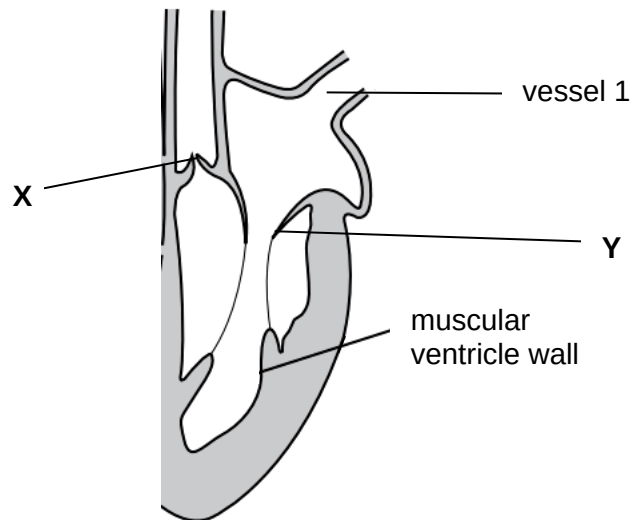
- 1 conversion of glucose to glycogen
- 2 conversion of glycogen to glucose
- 3 production of amino acids from urea
- 4 conversion of harmful substances to harmless ones

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

13 The diagram represents part of the human circulatory system.
Where is the blood pressure highest?



- 14** The diagram shows the left-hand side of the human heart when the ventricle is relaxed.



What happens when the ventricle contracts?

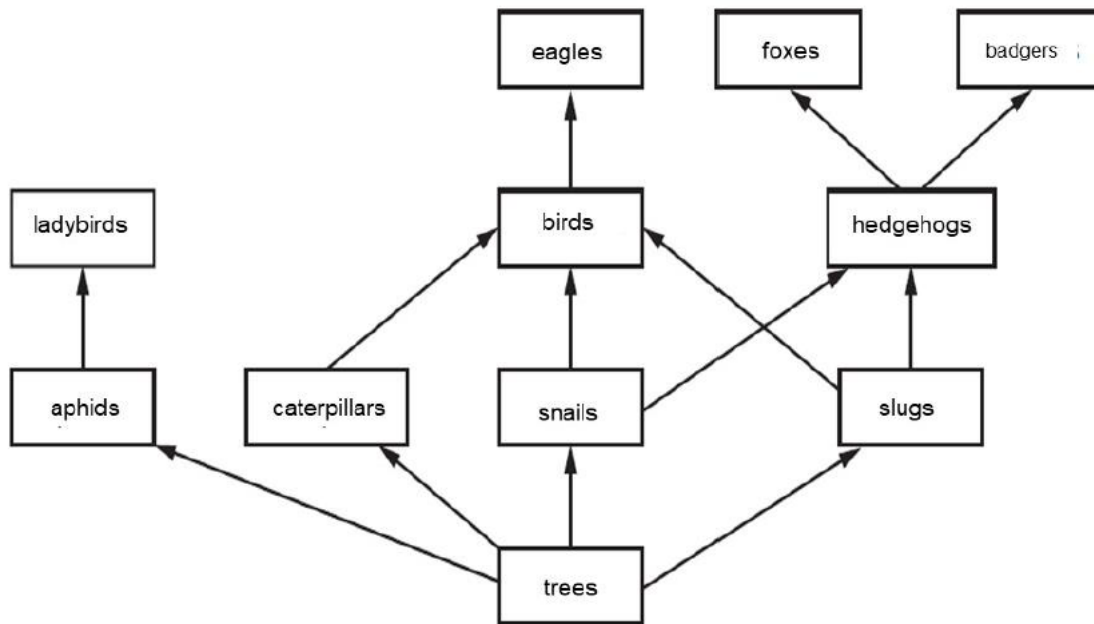
	valve at X	valve at Y	type of blood in vessel 1
A	closed	open	oxygenated
B	closed	open	deoxygenated
C	open	closed	oxygenated
D	open	closed	deoxygenated

- 15** Human Immunodeficiency Virus (HIV) and influenza are examples of infectious diseases. What are the similarities between them?

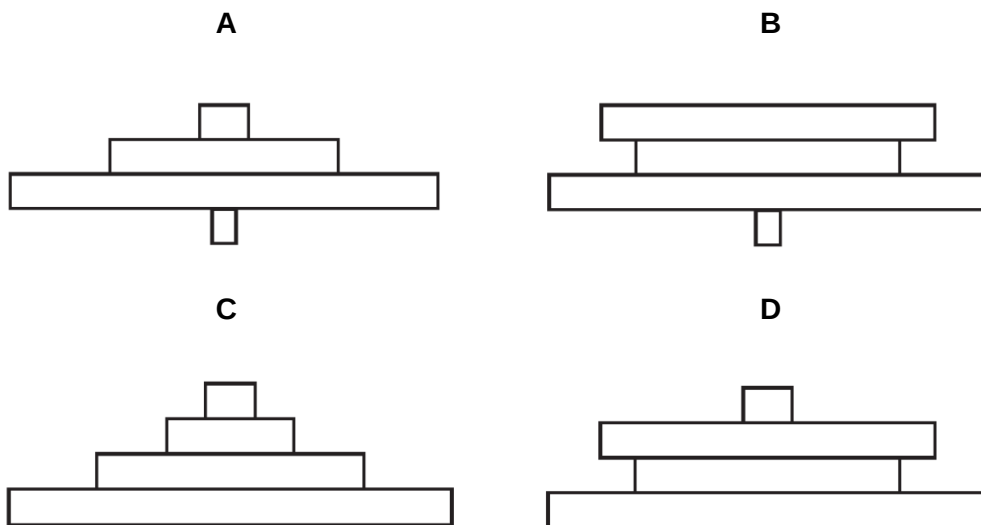
- 1 Both can be treated by antibiotics.
- 2 Both can be spread through respiratory droplets.
- 3 Both can spread from one person to another.
- 4 Both can be spread through contaminated food.

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

16 The diagram shows part of a food web.



Which pyramid of numbers is based on this food web?



17 Which statement **incorrectly** describes the function or structure of a gene?

- A A change in gene sequence is known as a mutation.
- B A gene codes for the production of more than one type of nucleotide.
- C A gene consists of a sequence of nucleotides.
- D A gene is a unit of inheritance.

- 18** A woman's menstrual period started on the 5th of December.

December						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

key:

 : menstruation

 : ovulation

On which date will the progesterone levels most likely be the highest?

- A** 4 December
B 17 December
C 25 December
D 31 December
- 19** Two persons have mutations in their cells. One has albinism and the other has Down's syndrome.

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

	albinism		Down's syndrome	
	type of mutation	number of body chromosomes	type of mutation	number of body chromosomes
A	gene	47	chromosome	23
B	gene	46	chromosome	47
C	chromosome	23	gene	46
D	chromosome	24	gene	47

- 20** In a species of mice, grey fur colour is dominant and brown fur colour is recessive.

Two parents with grey fur produce offspring which all have grey fur. Later that year, the same parents produced more offspring. One of these offspring has brown fur.

Which statement about fur colour is correct?

- A** Both parents are homozygous.
- B** Only one of the parents is homozygous.
- C** Both parents are heterozygous.
- D** Only one of the parents is heterozygous.

END OF PAPER

Preliminary Examination 2024 (Term 3)
Secondary 4 Express & 5 Normal Academic
Science Biology 5088
Paper 1

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



Paya Lebar Methodist Girls' School (Secondary)
Preliminary Examination 2024
Secondary 4 Express (G3)

CANDIDATE NAME		CLASS		CLASS INDEX NUMBER	
		TG			

CENTRE
NUMBER

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INDEX NUMBER

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SCIENCE (BIOLOGY)

5088/4

Paper 4 Biology

16 August 2024

No additional materials are required.

1 hour 15 minutes

READ THESE INSTRUCTIONS FIRST

Write your name, class and class index number on the front cover.

Write in dark blue or black pen.

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

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

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

Section A (55 marks)

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

Section B (10 marks)

There are two questions in this section. Answer only **one** question.

Write your answers in the spaces provided on the question paper.

At the end of the test, fasten all your work securely together, if applicable. The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
Section A	55
Section B	10
7	
8	
Total	65

Section A (55 marks)

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

1 Digestive enzymes catalyse the breakdown of large insoluble molecules.

(a) Explain why it is important that large insoluble molecules are broken down by chemical digestion.

.....

..... [1]

(b) Fig. 1.1 shows the action of an enzyme.

(i) On Fig. 1.1, use label lines and labels to identify the enzyme, product and substrate that can be found in the stomach.



Fig. 1.1.

[1]

(ii) Define *enzyme*.

.....

.....

.....

..... [2]

[Turn over]

- (c) An enzyme **X** in biological washing powders speed up the removal of stains from clothing.

Some of these stains may contain fats.

A student investigated the effect of a bile-like substance to increase the effectiveness of the washing powder. He tested the effect of bile on the digestion of fats in milk.

She used an indicator that is pink in alkaline solutions and colourless in acidic solutions. She added the same volume of indicator to each test tube.

The student observed and recorded the colour of the contents of each test-tube at 0 minutes, 20 minutes and 40 minutes.

Table 1.1. shows the results of the investigation.

Table 1.1

set-up		indicator colour observed		
test tube	content	0 minutes	20 minutes	40 minutes
A	milk and bile	pink	pink	pink
B	milk and enzyme X	pink	pink	colourless
C	milk, enzyme X and bile	pink	colourless	colourless

- (i) Name the enzyme **X** that will remove fat stains.

..... [1]

- (ii) Explain why removing fat stains and protein stains from clothing requires a washing powder that contains more than one type of enzyme.

.....

.....

.....

..... [2]

- (iii) Describe and explain the difference in results between the test-tubes A, B and C.

.....

.....

.....

.....

.....

..... [3]

[Total: 10 marks]

- 2 A student investigated osmosis in potato plant cells. He immersed cubes of potato tissue in water and different concentrations of sucrose solutions for 30 minutes.

The masses of potato cubes were measured before and after immersion.

The percentage changes in mass were calculated.

Table 2.1 shows the results.

Table 2.1

concentration of sucrose solution / mol dm^{-3}	mass of potato cube before immersion /g	mass of potato cube after immersion/ g	percentage change in mass /%
0.00	1.32	1.42	7.6
0.20	1.32	1.38	4.6
0.40	1.35	1.36	0.7
0.60	1.33	1.29	-3.0
0.80	1.30	1.24	-4.8
1.00	1.32	1.25	.....

- (a) Using the information in Table 2.1, calculate the percentage change in mass at $1.00 \text{ mol / dm}^{-3}$ and complete Table 2.1.

Give your answer to **one** decimal place.

[1]

[Turn over]

- (b) (i)** Using the information in Table 2.1, plot a graph to show the percentage change in mass of potato at different sucrose solutions in Fig. 2.1 below.

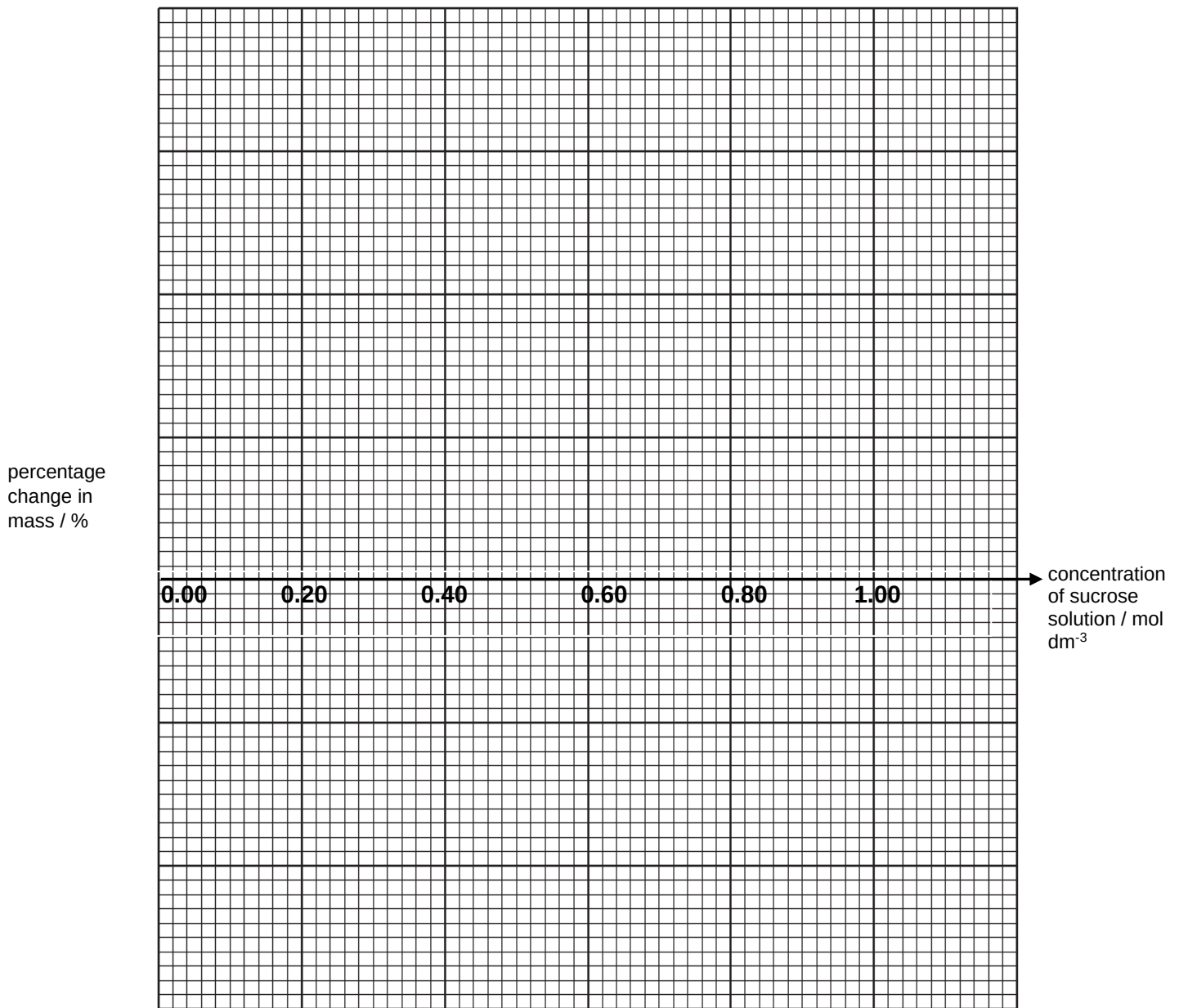


Fig. 2.1

[3]

- (ii)** Based on your graph in **(b)(i)**, state the water potential of the potato cells.

.....

[1]

[Turn over]

- (c) Using the information in Table 2.1 and Fig. 2.1, explain the results observed at the 0.4 mol dm⁻³ and 0.8 mol dm⁻³.

.....

.....

.....

.....

.....

..... [3]

- (d) Suggest and explain the expected appearance of a cell from a potato cube and a red blood cell that has been immersed in distilled water for 30 minutes.

.....

.....

.....

..... [2]

[Total: 10 marks]

[Turn over]

3 Mammals have a double circulation.

- (a)** Fig. 3.1 is a diagram of a section through the heart of a mammal. The arrows show the direction of blood flow through the heart and blood vessels.

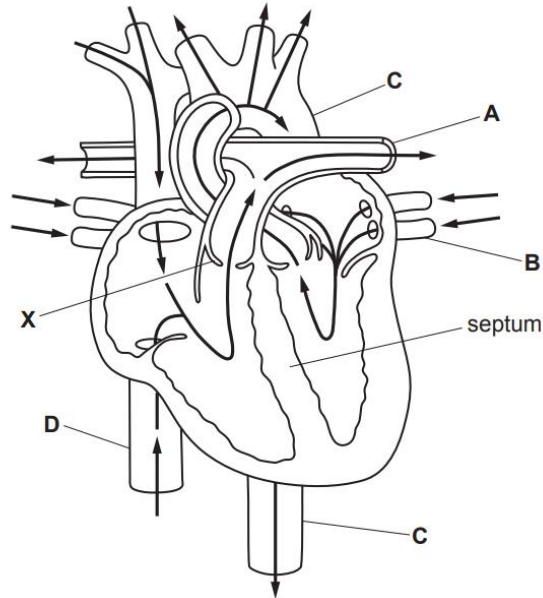


Fig. 3.1

- (i)** Identify the structures labelled **A** and **D**.

A

D

[2]

- (ii)** State the name of the chamber of the heart with the thickest wall.

.....

[1]

- (iii)** Explain why the chamber in **(a)(ii)** has the thickest wall.

.....

.....

.....

.....

[2]

[Turn over]

(iv) Identify the structure labelled **X** in Fig 3.1 **and** state its role in the heart.

.....

.....

.....

..... [2]

(b) A scientist monitored the changes in the pH in muscles before, during and after two minutes of vigorous exercise.

The changes in pH are caused by the production of lactic acid.

Fig. 3.2 below shows the changes in pH during and after vigorous exercise.

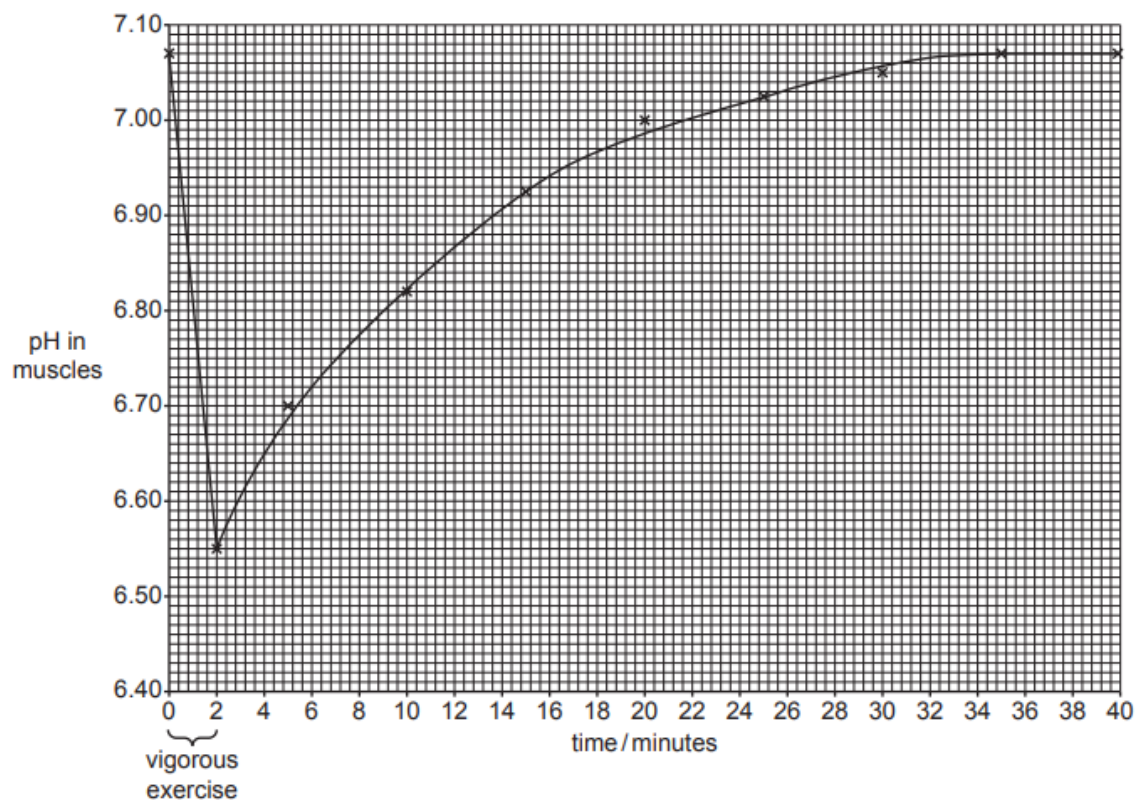


Fig. 3.2

[Turn over]

- (i) Describe and explain the results in Fig. 3.2.

0 to 2 min

.....

.....

2 to 40 min

.....

..... [2]

- (ii) A patient had a condition where the structure **X** does not close fully. Suggest and explain how that would affect the results in Fig 3.2.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 12 marks]

[Turn over]

- 4 The water lily has adaptive features that are found in many different hydrophytes which are plants that grows in water.

Fig. 4.1 is a photograph of some leaves of a water lily and Fig. 4.2 is a photomicrograph of a cross-section of a part of a water lily leaf.

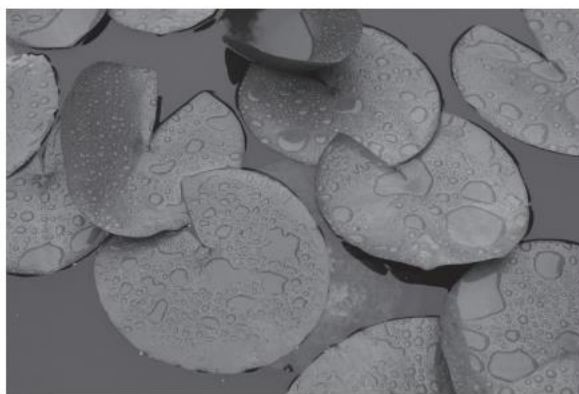


Fig. 4.1

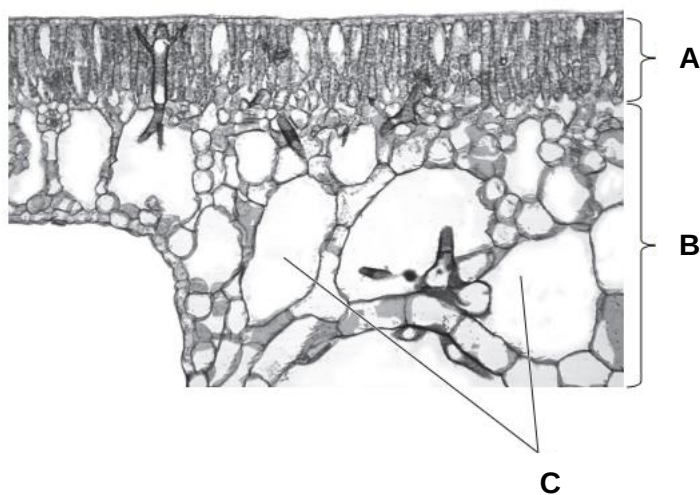


Fig. 4.2

- (a) State the names of the parts labelled **A**, **B** and **C** in Fig. 4.2.

A

B

C [3]

[Turn over]

- (b) Explain how part **C** in Fig. 4.2 adapts the water lily for its environment.

.....

.....

.....

..... [2]

- (c) A scientist calculated the mean number of stomata per mm² in the upper and lower epidermis in tomato plants and water lily plants. Tomato plants are a type of land plant.

Table 4.1 shows the results.

Table 4.1

plant	mean number of stomata per mm ²	
	in upper epidermis	in lower epidermis
tomato	10	129
water lily	475	0

- (i) State the name of the cells that control the opening and closing of the stomata.

..... [1]

- (ii) Compare and explain the differences in the mean number of stomata in a tomato plant and in a water lily plant.

.....

.....

.....

..... [2]

[Total: 8 marks]

[Turn over]

- 5 A student investigated a seashore ecosystem.

The food web for this seashore is shown in Fig. 5.1

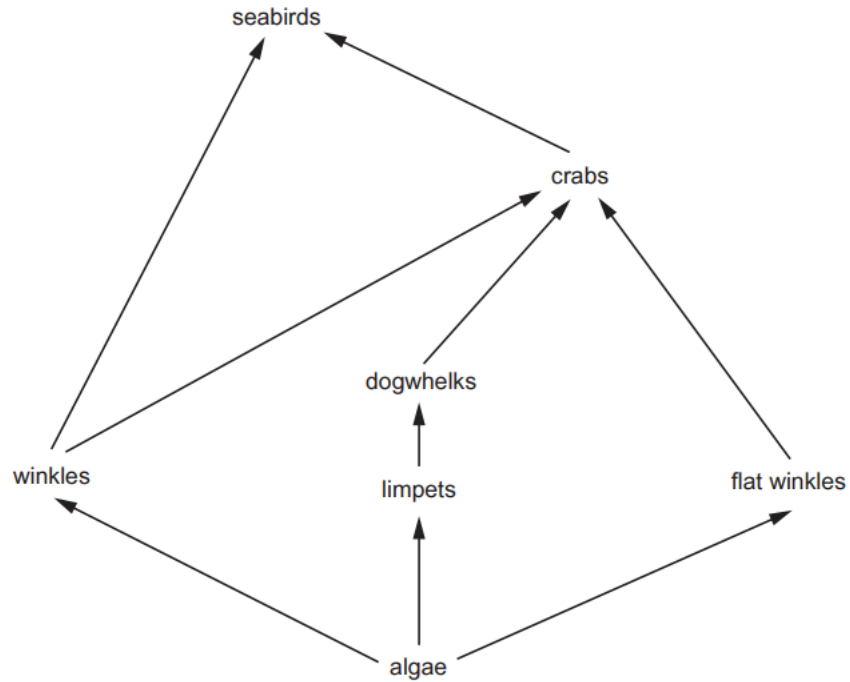


Fig. 5.1

- (a) Complete Table 5.1 by counting the number of each type of organism in the food web.

Table 5.1

description	number of each type of organism in the food web
carnivore	
consumer	
herbivore	
producer	

[2]

[Turn over]

- (b)** A new species of starfish was introduced in the seashore food web in Fig. 5.1.

The starfish species eats limpets.

Predict and explain what would happen to the number of dogwhelks and algae in this area after the starfish were introduced.

dogwhelks

.....

algae

..... [2]

- (c)** Some bacteria that live on the seashore feed on dead material.

State the term used to describe organisms that get energy from dead or waste organic material.

..... [1]

[Total: 5 marks]

[Turn over]

- 6 (a) Huntington's disease is a genetic disease caused by a mutation in a single gene.

The allele for Huntington's disease is dominant and represented by the letter **H**.

The allele for no Huntington's disease is recessive and represented by the letter **h**.

Fig. 6.1 is a pedigree diagram showing the inheritance of Huntington's disease in one family.

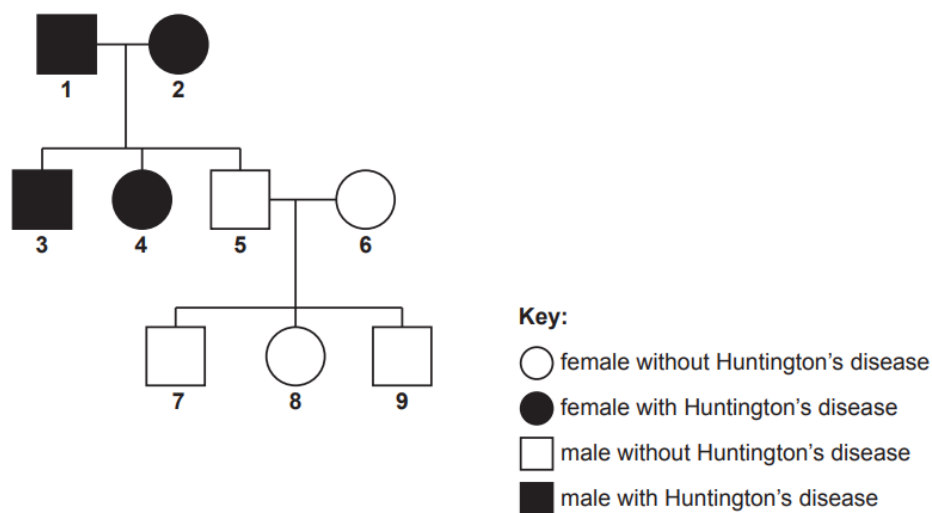


Fig. 6.1

- (i) State the number of males with Huntington's disease in Fig. 6.1.

..... [1]

- (ii) Explain using Fig. 6.1 why the allele for Huntington's disease is dominant.

.....

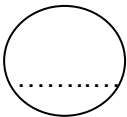
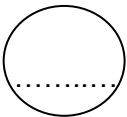
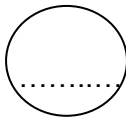
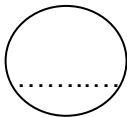
.....

.....

..... [2]

- (iii) A person that is heterozygous for Huntington's disease has a child with a person that is homozygous recessive.

Complete the genetic diagram and calculate the ratio of the child inheriting Huntington's disease.

phenotype of parents	.....	.....	.....	.....
genotype of parents	.....	.....	.....	.....
gametes				
genotype of offspring	.....	.....	.....	.....
phenotype of offspring	.....	.....	.....	.....
ratio of offspring phenotype				

[5]

- (b) Chromosomes contain genetic information in the form of gene.

- (i) Define the term *gene*.

.....

..... [1]

- (i) State the chromosomes involved in the inheritance of sex in humans.

..... [1]

[Total: 10 marks]

End of Section A

[Turn over]

Section B (10 marks)

Answer **only ONE** questions from this section.
Write your answers in the spaces provided.

- 7 Antibiotic resistance is an increasing problem worldwide.

Erythromycin is an antibiotic.

Fig. 7.1 shows the daily doses of erythromycin per 1000 people over a 13-year period.

The number of bacterial infections resistant to erythromycin per 1000 people is also shown.

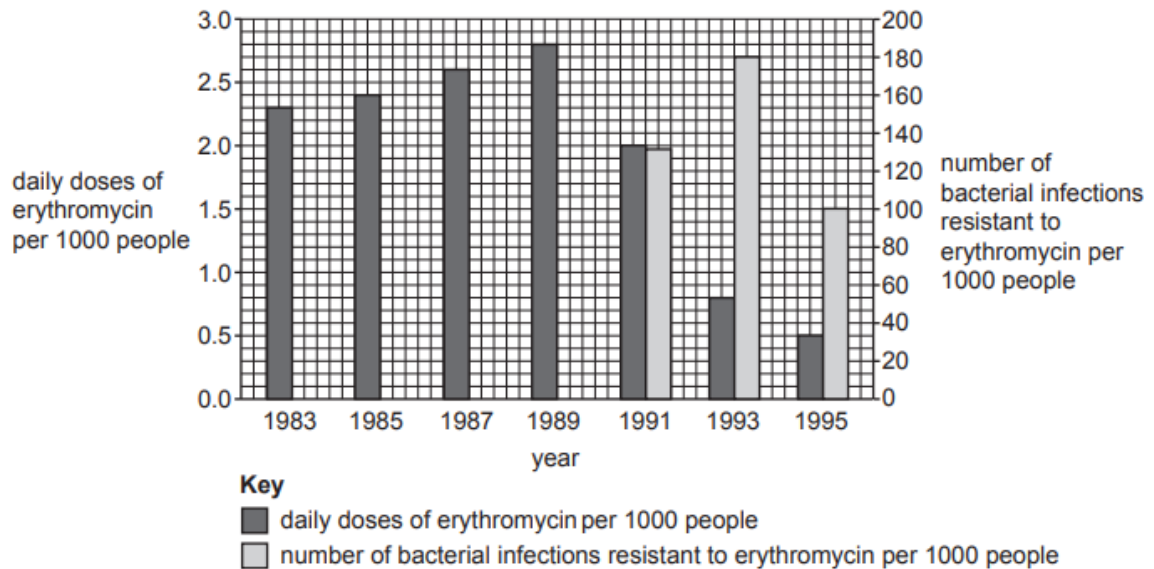


Fig. 7.1

- (a) Describe the data shown in Fig. 7.1.

.....

.....

.....

.....

.....

.....

.....

- (b) Suggest reasons for the change in the number of bacterial infections resistant to erythromycin from 1993 to 1995 shown in Fig. 7.1.

.....

.....

.....

..... [2]

- (c) Explain how bacteria become resistant to antibiotics.

.....

.....

.....

.....

.....

..... [3]

- (d) *Salmonella* bacteria is resistant to erythromycin. *Salmonella* bacteria can cause food poisoning and are able to reproduce when the temperature is between 5.2°C and 46.0°C. *Salmonella* bacteria are killed after 10 minutes at 75.0°C. The bacteria is usually transmitted to humans by eating foods contaminated with animal faeces.

Suggest and explain the ways of preventing the spread of food poisoning caused by *Salmonella* bacteria.

.....

.....

.....

..... [2]

[Total: 10 marks]

[Turn over]

8 Hormones regulate different process in the body.

- (a)** Fig. 8.1 shows the changes that happen to the thickness of the uterus lining during the menstrual cycle.

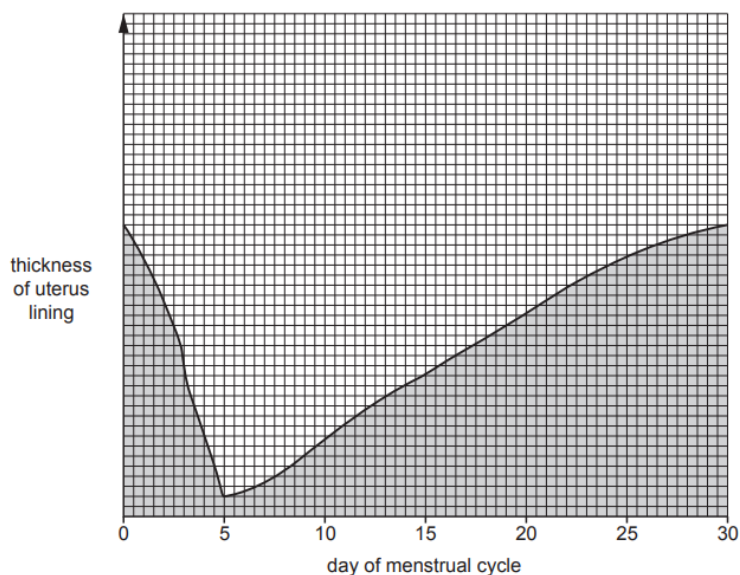


Fig. 8.1

- (i)** Define *hormone*.

.....
 [1]

- (ii)** Using Fig. 8.1, name and describe the actions of two hormones that regulate the changes to the uterine lining.

.....

 [3]

[Turn over]

- (b)** Pancreas releases two important hormones to regulate the blood sugar level.

Describe and explain how these hormones regulates blood glucose level.

Insulin

.....

.....

.....

.....

Glucagon

.....

.....

.....

..... [4]

- (c)** Describe and explain how the DNA of the person determines the different types of hormones that are produced.

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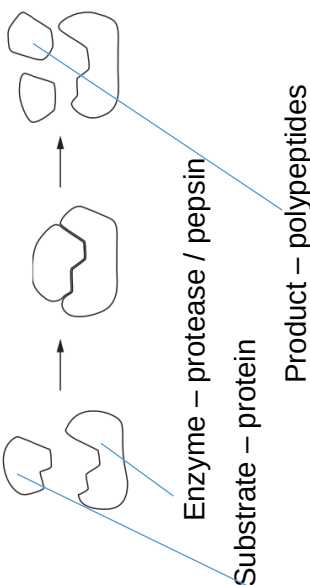
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[Total: 10 marks]

End of Paper 4

Ans: 2024 Secondary 4 Science Bio 5088 Prelim Paper 4

Qn	Ans	Marks	Remarks	LO
1a	for absorption + (become soluble) + small enough, for diffusion / active transport ;	1		4 (a) describe the functions of the various parts of the digestive system: mouth, salivary glands, oesophagus, stomach, duodenum, pancreas, gall bladder, liver, ileum, colon, rectum, anus, in relation to ingestion, digestion, absorption, assimilation and egestion of food, as appropriate
1bi		1	R product as amino acids R substrate as polypeptide	4 (b) describe the functions of enzymes (e.g. amylase, maltase, protease, lipase) in digestion, listing the substrates and end-products
1bii	1 Biological catalyst + speed up rate of reaction; 2 without being chemically unchanged; 3 can be reused; 4 Provide alternative pathway with lower activation energy;	2	1 must be in answer	3 (d) explain the mode of action of enzymes in terms of an active site, enzyme-substrate complex and enzyme specificity using the 'lock and key' hypothesis

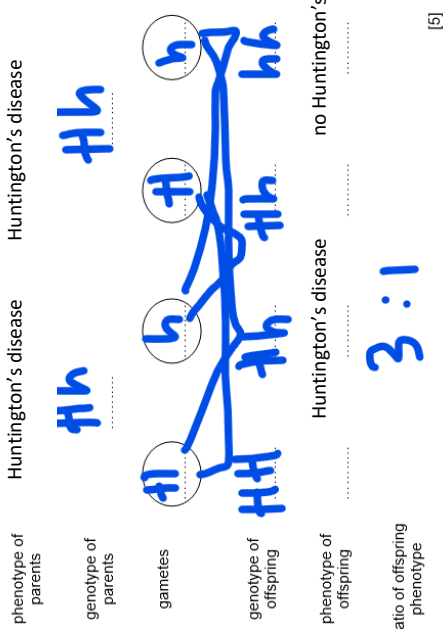
1ci	Lipase	1		4 (b) describe the functions of enzymes (e.g. amylase, maltase, protease, lipase) in digestion, listing the substrates and end-products
1cii	any two from: enzymes are specific OR idea of, one type removes protein and one removes fats / AW ; protein (stains/substrate) will not fit into the active site of lipase / AW ora ; enzyme and substrate have complementary shapes ;	2		3 (d) explain the mode of action of enzymes in terms of an active site, enzyme-substrate complex and enzyme specificity using the 'lock and key' hypothesis
1ciii	compare with tubes A, B and C to assess effect of lipase and / or bile + quote time taken to turn colourless bile, does not (chemically) digest fats / does not make solution acidic ; lipase / enzyme, is required (for breakdown of fats in milk) ; bile help speed up digestion of fats + emulsify fats;	3		4(b) describe the functions of enzymes (e.g. amylase, maltase, protease, lipase) in digestion, listing the substrates and end-products 4 (d) state the role of the liver in: • fat digestion
	Total	10m		

2a	1.25 – 1.32 / 1.32 *100% = -5.3	1	R if not in one DP Ig if no working shown but warn students	3. manipulate numerical and other data; Calculate is used when a numerical answer is required. In general, working should be shown, especially where two or more steps are involved.
2bi	1m scale 1m plot 1m best fit	3	See last page	(in words or by using symbolic, graphical and numerical forms of presentation) to translate information from one form to another.
2bii	0.44 / mol dm ⁻³ ; where graph intersects X-axis	1		
2c	potato (cube) in 0.8 (mol dm ⁻³ solution) loses (percentage) mass / ora + potato in 0.4 mol dm ⁻³ solution gain mass/ora + quote data; water molecules moves from an area of high water potential to an area of low water potential / AW + osmosis ; water potential of 0.8 (mol dm ⁻³ solution) is lower than potato cell + the water potential of the 0.4 (mol dm ⁻³ solution) is higher than potato cell; movement of water molecules out / loss of water / into cell/gain water + cause of mass loss/gain;	3		2 (b) define osmosis, investigate and describe the effects of osmosis on plant and animal tissues
2d	The cell from a potato cube will be turgid + red blood cell burst;	2		2(b) define osmosis, investigate and describe the effects of osmosis on plant and animal tissues

	Red blood cell no cell wall to maintain shape of cell + rigid structure + prevent cell from bursting				
	Total	10m			
3ai	A Pulmonary arteries D (Inferior) Vena cava	2			5 (a) identify the main blood vessels to and from the heart, lungs, liver and kidney
3aii	Left ventricle	1			5 (d) describe the structure and function of the heart in terms of muscular contraction and the working of valves (histology of the heart muscle, names of nerves and transmitter substances are not required)
3aiii	Pump blood to all parts of body through the (aorta); Generate force for blood + greatest distance	2			
3aiv	Semi-lunar valve; Prevent backflow of blood + ensure blood flows from right ventricle to pulmonary arteries	2		Allow ecf for wrong vessel	
3bi	1 0 to 2 minutes pH decreases from 7.07 to 6.55 during vigorous exercise 2 anaerobic respiration + lactic acid production +extra energy required for vigorous exercise 3 After vigorous exercise + pH increases from 6.55 to 7.07 from 2 to 40 min 4 oxygen debt + time taken for lactic acid to be transported to liver	2		Students to quote figures 1 and 2 to get 1m 3 and 4 to get 1m	6 (f) explain why cells respire anaerobically during vigorous exercise resulting in an oxygen debt that is removed by rapid, deep breathing after exercise
3bii	Longer time taken for pH to increase back to 7.07/ ora; Lower pH reached during the 2 minutes; AVP	3			6 (f) explain why cells respire anaerobically during vigorous exercise resulting in an oxygen debt that is

	Less blood is sent to the lungs to be oxygenated; Less oxygenated blood sent to all parts of body for vigorous exercise; More anaerobic respiration + more lactic acid produced; Longer time required to repay oxygen debt			removed by rapid, deep breathing after exercise
	Total	12m		
4a	A Palisade mesophyll B Spongy mesophyll C Intercellular air space	3		8 (a) identify the cellular and tissue structure of a dicotyledonous leaf, as seen in transverse section using the light microscope and describe the significance of these features in terms of their functions, such as the • distribution of chloroplasts for photosynthesis • stomata and mesophyll cells for gaseous exchange • vascular bundles for transport
4b	any 2 from: many (air spaces) / large (air spaces) ; reduces density (of the leaf) ; allowing it to float / be on water / be near surface of water ; (so) accessible, to light / carbon dioxide / gas exchange / AW, for photosynthesis ;)	2		
4ci	Guard cells	1		
4cii	comparison - max 1 from: 1 water lily has more stomata on upper epidermis than tomato ; ORA 2 water lily has more stomata (per mm ²) than tomato ; ORA	2		

	any use of comparative manipulated figures from table including unit (at least once in the answer) ; explanation: 3 idea that tomato needs to reduce, water loss / transpiration / evaporation ; 4 water lily (floats on water so) only upper surface is exposed to air ; 5 (water lily has large number of stomata) as water does not need to be conserved ;			
	Total	8m		
5a	Carnivore – 3 Consumer – 6 Herbivore – 3 Producer -1	2m	2 correct 1 m	9 (b) describe the roles of producers, consumers and decomposers in food chains and food webs
5b	Dogwhelks will decrease as there would be more competition for limpets as food; Algae – increase as less limpet will consume the algae	2m		9 (b) describe the roles of producers, consumers and decomposers in food chains and food webs
5c	Decomposers	1		9 (b) describe the roles of producers, consumers and decomposers in food chains and food webs
	Total	5m		

6ai	2		1		
6aii	Individual 1 and 2 give birth to offspring 5 who do not have the disease; This means that Individual 1 and 2 are heterozygous; They display the trait though they are heterozygous;		2		12 (c) explain the terms dominant, recessive, homozygous, heterozygous, phenotype and genotype
6aiii		phenotype of parents Huntington's disease Huntington's disease genotype of parents Hh Hh gametes H h H h genotype of offspring HH Hh Hh hh phenotype of offspring Huntington's disease no Huntington's disease ratio of offspring phenotype $3:1$ [5]	5	1m phenotype + genotype of parents 1m gametes 1m correct cross 1m genotype of offspring + phenotype of offspring 1m ratio	12 (f) use genetic diagrams to solve problems involving monohybrid inheritance
6bi	Gene is a unit of inheritance made up a sequence of nucleotide that codes for polypeptides		1		10 (d) state that each gene: • is a sequence of nucleotides, as part of a DNA molecule

					• codes for one polypeptide • is a unit of inheritance
6bii	XX and XY	1			12 (g) describe the determination of sex in humans – XX and XY chromosomes
	Total	10m			
7a	any three from: daily doses / use (of erythromycin), peak, 1989 / at 2.8 doses per 1000 people ; (bacterial) infections (resistant to erythromycin) peak, in 1993 / at 180 bacterial infections per 1000 people ; no record of resistant infections, until 1991 / from 1983 to 1989 / first 6 years ; daily doses of erythromycin increases from 1983 to 1989 from 2.3 to 2.8 doses per 1000 people and decreases from 2.0 to 0.5 doses per 1000 people from 1991 to 1995; delay (of 4 years) between peak of doses and peak of (resistant) infections;	3			use information to identify patterns, report trends and draw inferences;
7b	any two from: 1 fewer doses of erythromycin used ;	2	MP3 examples: only giving		use information to identify patterns, report trends and draw inferences;

	2 development of new, antibiotics / treatments / vaccines ; 3 any example that would cause a reduced usage of antibiotics ; ; 4 more, awareness / education about, overuse of antibiotics / antibiotic resistance ; 5 improved, detection / screening (of pathogens to avoid spread) ; 6 ref to improved, cleanliness / hygiene or more people vaccinated / population has reached herd immunity ; 7 Isolating infected individuals ;		antibiotics when essential do not use antibiotics for viral infections	present reasoned explanations for phenomena, patterns and relationships; make predictions and propose hypotheses;
7c	ref to (random) mutations occur (in some of the bacteria) + (genetic) variation (in ability of bacteria to survive antibiotic treatment) ; bacteria with (antibiotic) resistance, survive / reproduce ; ora + pass on resistant, gene / allele (to offspring / other bacteria) ; increase in frequency of resistant, allele / gene (in the population) ;	3		7 (g) explain that the misuse and overuse of antibiotics may accelerate the emergence of antibiotic-resistant bacteria

	ref to natural selection / become (better) adapted (for the new environment) ; AVP ;			
7d	1 store food, in the fridge / freezer / at less than 5.2 °C 2 cook food at, high temperature / (least) 75 °C ; 3 cook food for, the recommended length of time / 10 minutes ; 4 do not keep food warm for a long time before eating it ; 5 wash hands (before preparing food) ; 6 use, filtered / boiled, water (for cooking) ; 7 washing cooking, utensils / surfaces ; 8 cover food / named method to prevent cross contamination ; 9 ref. to waste (food) disposal ;/ AVP Explain 11 ensure that bacteria cannot reproduce 12 ensure that bacteria are not transmitted via fecal material	2	Suggested ways must match explanation At least 2 ways and 2 explanation	7(b) explain that infectious diseases are caused by pathogens such as bacteria and viruses and can be spread from person to person through body fluids, food and water (knowledge of the structure of bacteria and viruses is not required)
	Total	10m		

8ai	hormone as a chemical substance + produced by a gland + carried by the blood + which alters the activity of one or more specific target organs	1		4(e) define a hormone as a chemical substance, produced by a gland, carried by the blood, which alters the activity of one or more specific target organs
8aii	QF – Day 0 to Day 5+ uterine lining decrease in thickness + menstruation+ oestrogen and progesterone level is low; From day 10 to Day 16+ oestrogen level increase + repair uterine lining; Day 16 to Day 30 + uterine lining thickens + progesterone level increases to repair and maintain the uterine lining	3	Student need to identify that it is a 30 day cycle and not 28 days both hormones must be identified correctly	11 (d) outline the menstrual cycle with reference to the alternation of menstruation and ovulation, the natural variation in its length, and the fertile and infertile phases of the cycle with reference to the effects of progesterone and oestrogen only
8b	Insulin + blood glucose level increase above normal + to decrease blood glucose level back to normal; Increase cell permeability to glucose + causes liver and muscle cells to convert more glucose to glycogen; Glucagon + blood glucose level decrease below normal + to increase blood glucose level back to normal;	4		4(f) outline how blood glucose concentration is regulated by insulin and glucagon

	Liver and muscle cells convert glycogen to glucose			
8c	Hormones are a type of protein; DNA carry genetic code + code for specific polypeptide + Polypeptide forms protein; Specific DNA sequence will code for specific polypeptide for different protein	2		10 (e) state that DNA is used to carry the genetic code, which is used to synthesise specific polypeptides (details of transcription and translation are not required)
	Total	10m		

- (b) (i) Using the information in Table 2.1, plot a graph to show the percentage change in mass of potato at different sucrose solutions in Fig. 2.1 below.

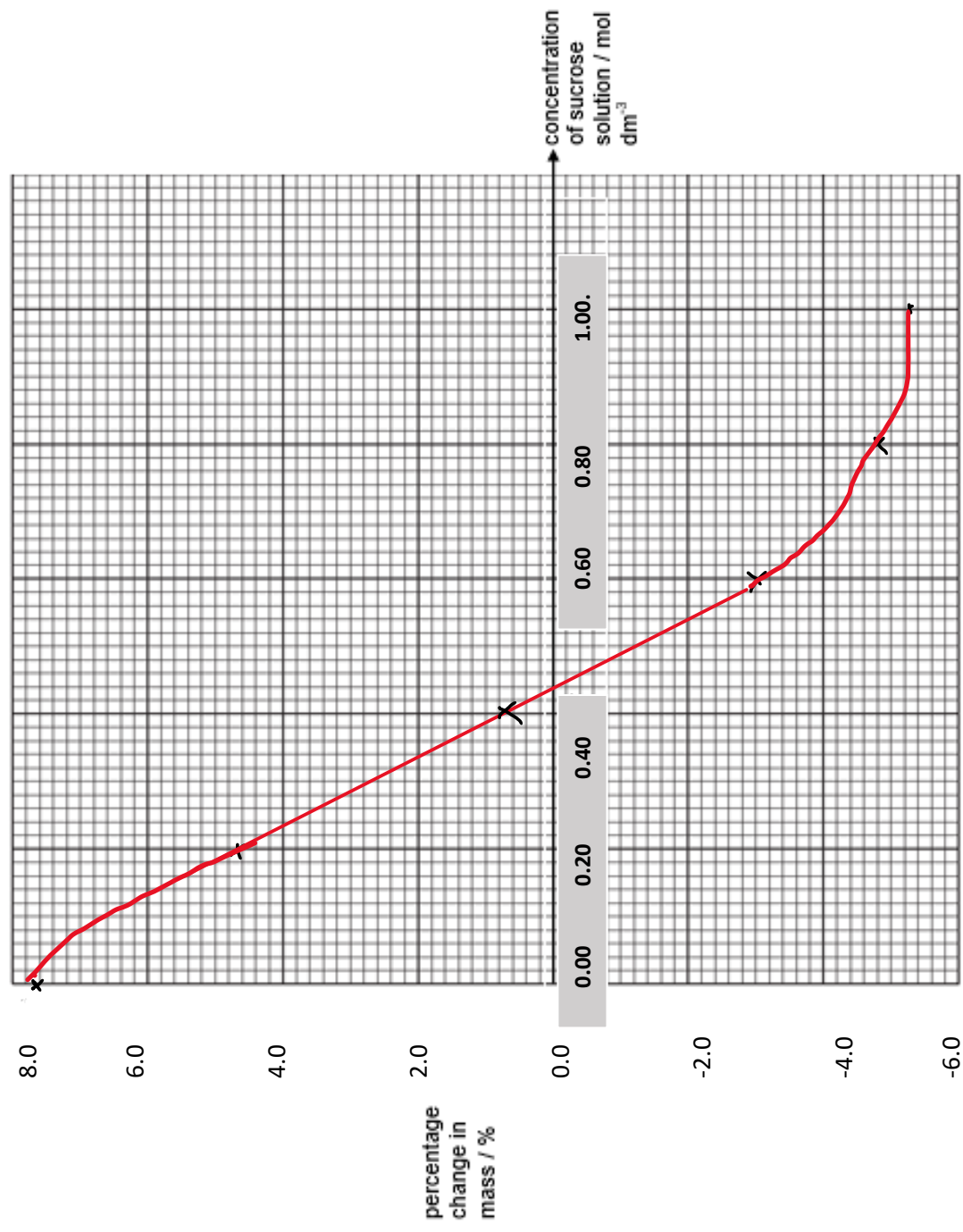


Fig. 2.1

[3]