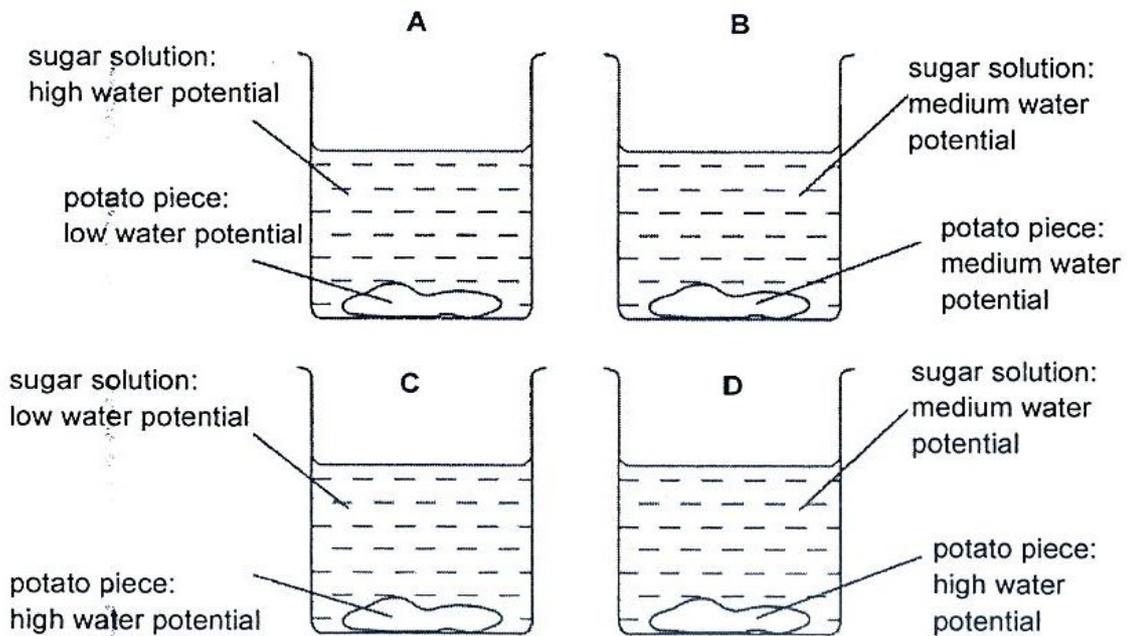


21 Which feature of a root hair cell indicates that it is from a plant and not from an animal?

- A cell membrane
- B cell wall
- C chloroplast
- D cytoplasm

22 The diagrams show some pieces of potato in four sugar solutions of different water potential.

In which solution will the potato piece take up water from the solution and swell?



23 Which of these processes require energy from respiration?

	diffusion	osmosis
A	✓	✓
B	✓	×
C	×	✓
D	×	×

✓ energy required

× energy not required

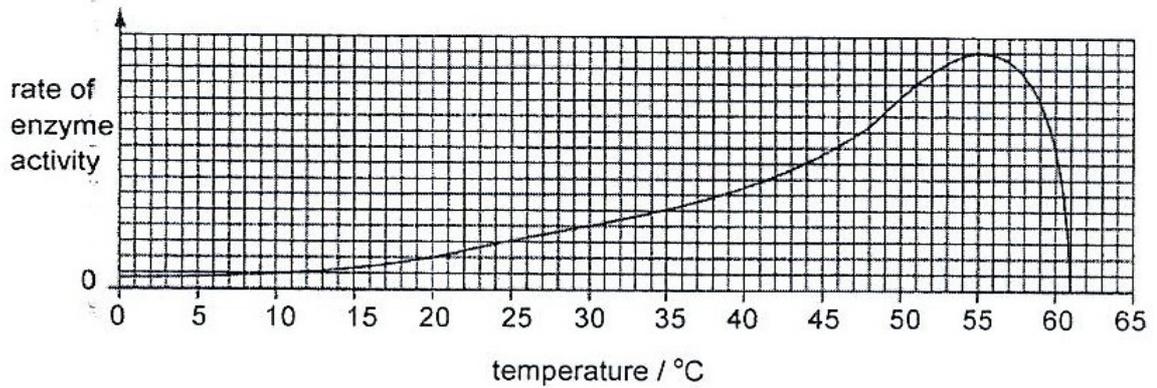
- 24 Two samples of food are tested. The results are shown in the table.

	test used		
	iodine solution	Benedict's test	biuret test
sample 1	brown	orange	blue
sample 2	blue/ black	blue	violet

What do these results show?

- A Sample 1 contains starch and sugars.
 - B Sample 1 contains starch only.
 - C Sample 2 contains starch and protein.
 - D Sample 2 contains protein only.
- 25 When an enzyme molecule has catalysed a chemical reaction in a cell, what happens to it?
- A It acts as a catalyst again.
 - B It is denatured.
 - C It is digested.
 - D It is used up by the reaction.

- 26 The graph shows how temperature affects the rate at which an enzyme works.



What does the graph show about this enzyme?

- A The enzyme is denatured by temperatures above 65 °C.
 B The enzyme is denatured by temperatures below 8 °C.
 C The enzyme works fastest at 48 °C.
 D The rate of enzyme activity doubles when the temperature is raised from 10 °C to 20 °C.
- 27 Which processes are functions of the liver?

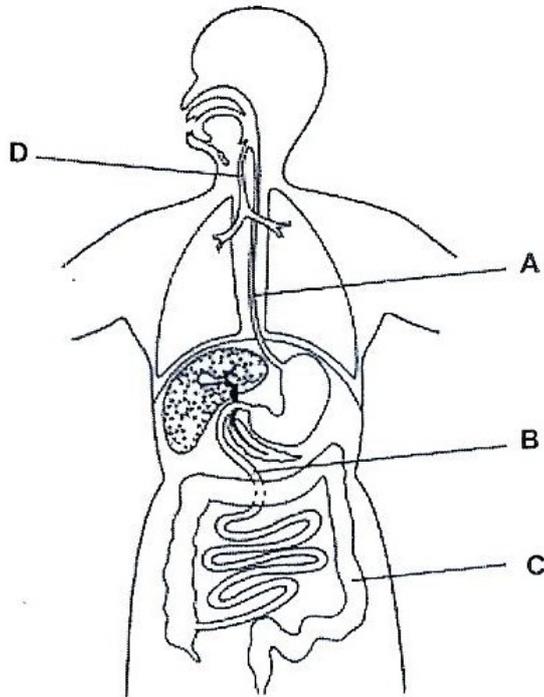
	absorbing food	assimilating food	helping with digestion of food
A	✓	✓	✓
B	✓	✓	×
C	✓	×	✓
D	×	✓	✓

key

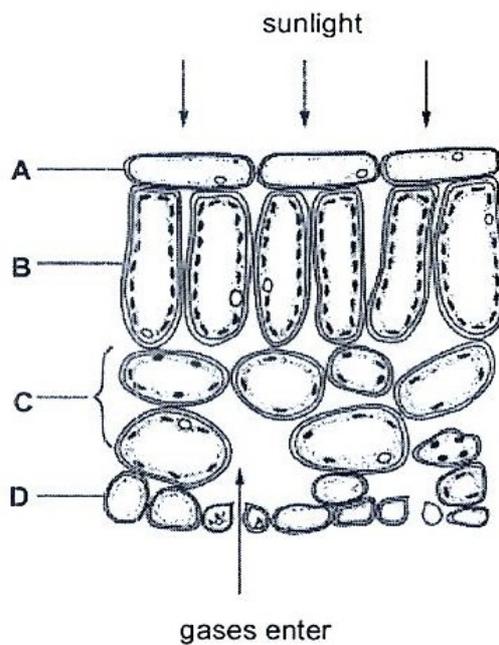
✓ = is a function

× = is not a function

- 28 The diagram shows some organs of the human body.
Which structure does **not** move its contents by peristalsis?



- 29 The diagram shows some cells in a leaf of a green plant.
In which layer of cells does most photosynthesis occur?



- 30 A plant stem was dissected into a number of different tissues. Each tissue was tested for the presence of starch, protein and reducing sugar. The results are shown in the table.

Which tissue is xylem?

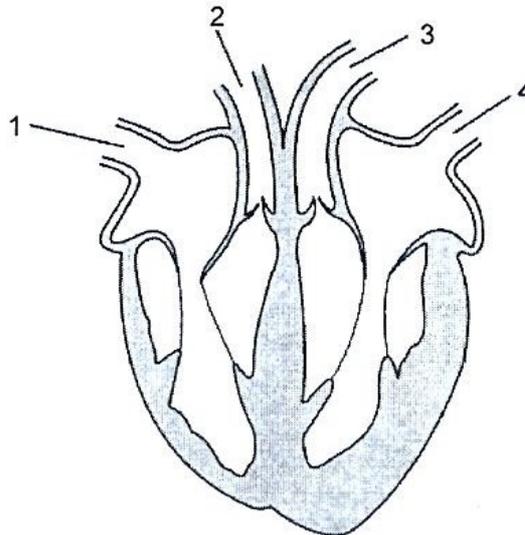
	starch	protein	sugar
A	✓	×	✓
B	✓	×	×
C	×	✓	✓
D	×	×	×

key

✓ = substance present

× = substance absent

- 31 The diagram shows a vertical section through the heart.

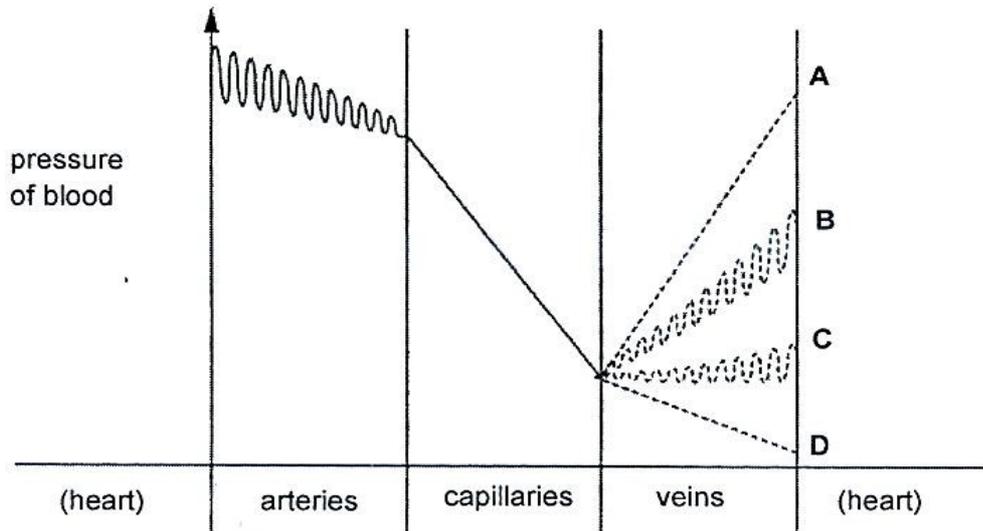


Which blood vessels contain oxygenated blood?

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

- 32 The diagram shows the pressure of blood after it leaves the heart and passes through arteries and then capillaries.

Which dotted line shows the pressure of blood as it flows through veins before returning to the heart?



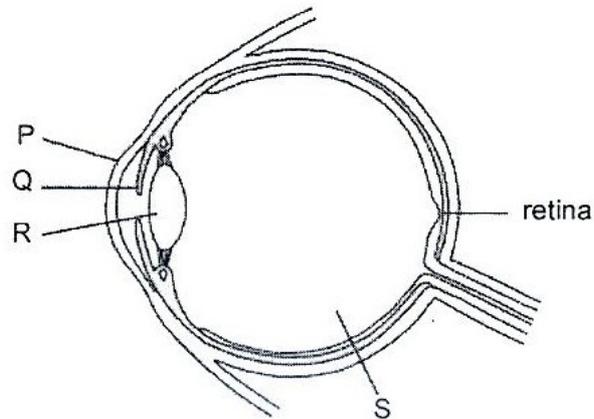
- 33 Which equation represents anaerobic respiration?

- A glucose \rightarrow lactic acid
 B glucose \rightarrow lactic acid + carbon dioxide
 C glucose \rightarrow lactic acid + water
 D glucose + oxygen \rightarrow carbon dioxide + water

- 34 After a meal containing carbohydrates, which row shows the changes in concentration of glucose and urea in the blood as it passes through the liver?

	glucose	urea
A	less	less
B	less	more
C	more	less
D	more	more

35 The diagram shows a section through the eye.



Which pair of structures focus light rays onto the retina?

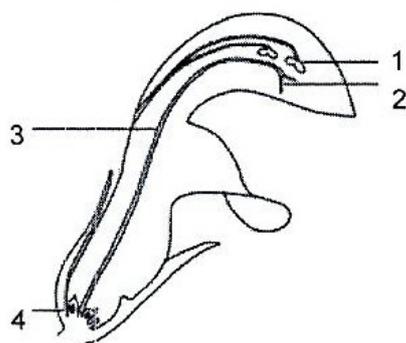
- A P and Q
- B P and R
- C Q and R
- D Q and S

36 A woman ovulates on the 7th of March.

In which week will her next menstrual period begin?

week	March						
	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
	-	-	-	1	2	3	4
A	5	6	7	8	9	10	11
B	12	13	14	15	16	17	18
C	19	20	21	22	23	24	25
D	26	27	28	29	30	31	

37 The diagram shows a section through a flower.



Where do the following occur?

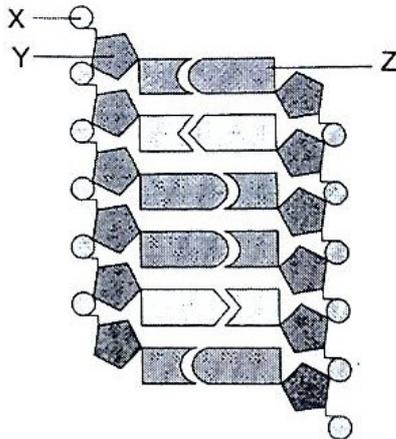
	pollination	fertilisation
A	1	2
B	2	4
C	3	1
D	4	3

38 In mice, the allele for brown fur is dominant to the allele for grey fur.

What would be the phenotypes of a cross between a mouse heterozygous for brown fur and a mouse with grey fur?

- A** 100% with brown fur
- B** 100% with grey fur
- C** 25% with brown fur and 75% with grey fur
- D** 50% with brown fur and 50% with grey fur

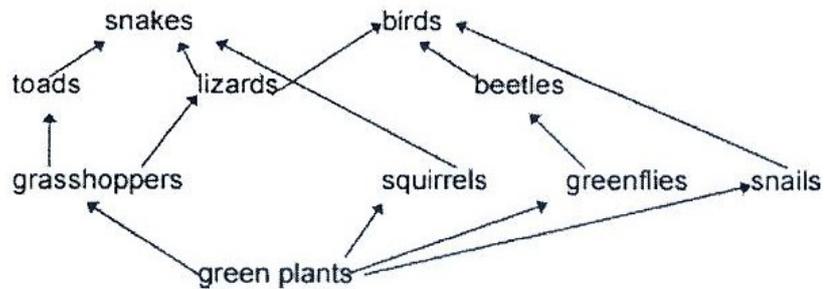
39 The following diagram shows part of a DNA molecule.



Identify X, Y and Z.

	X	Y	Z
A	deoxyribose sugar	nitrogenous base	phosphate group
B	nitrogenous base	deoxyribose sugar	phosphate group
C	phosphate group	deoxyribose sugar	nitrogenous base
D	phosphate group	nitrogenous base	deoxyribose sugar

40 The diagram shows a food web in woodland.



In this food web, a beetle is

- A a carnivore.
- B a decomposer.
- C a herbivore.
- D a producer.

*****End of Paper*****

Section A

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

For
Examiner's
Use

- 1 Fig. 1.1 shows some food just before it enters the stomach and the same food as it leaves the stomach four hours later.

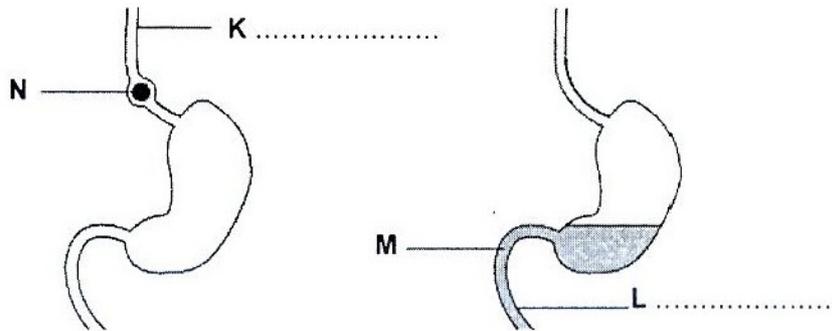


Fig. 1.1

- (a) On Fig. 1.1, label structures K and L. [2]
- (b) The food consisted solely of meat and potatoes. By placing ticks (✓) in the appropriate boxes in Table 1.2, show how the major components of the food compare at positions M and N.

Table 1.2

	more at M than at N	less at M than at N	almost the same at M and N
starch			
protein			
fibre			

[3]

Fig. 1.3 shows the same food at O, and 24 hours later, at P.

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Use

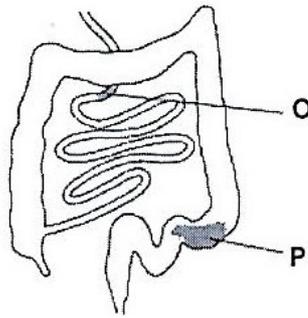


Fig. 1.3

(c) (i) Explain what has happened to the protein between O and P.

.....

.....

.....

.....

[3]

(ii) Name the region of the alimentary canal which will contain fibre in the highest proportion and give reasons for your answer.

region of alimentary canal

reasons

.....

.....

[3]

[Total: 11]

- 2 A plant growing in a pot was covered with a transparent polythene bag. The plant was placed in a sunny window and left there for 24 hours.

Samples of air were taken from the bag at hourly intervals. The concentration of oxygen and carbon dioxide in the air inside the bag was then measured. The results for oxygen are shown in Fig. 2.1.

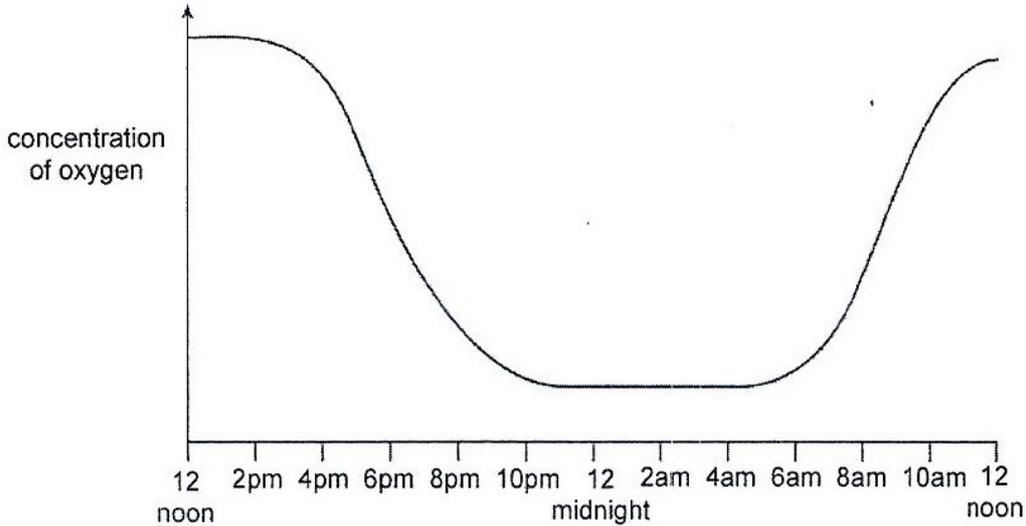


Fig. 2.1

- (a) Explain why the bag covering the plant needed to be transparent.

.....
 [2]

- (b) With reference to photosynthesis and respiration, explain the shape of the curve in Fig. 2.1.

.....

 [3]

- (c) On Fig. 2.1, sketch a curve to show how the concentration of carbon dioxide inside the bag would vary during this 24 hour period.

[1]

(d) Plants are the producers in a food chain.

(i) Explain what is meant by the term *producer*.

.....
.....

{1}

(ii) Briefly describe the non-cyclical nature of energy flow.

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

{2}

[Total: 9]

For
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3 A baby girl was born with a heart condition. Fig. 3.1 shows the structure of her heart.

For
Examiner's
Use

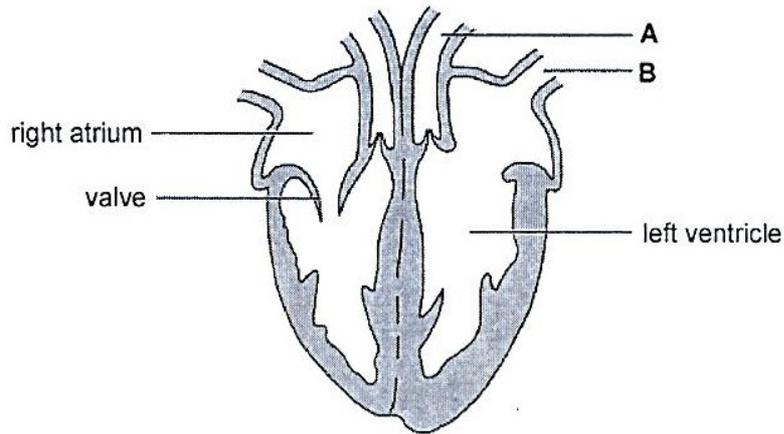


Fig. 3.1

(a) Name the parts labelled A and B.

A

B

[2]

(b) When the ventricles of the heart contract, they push on the blood so that it flows into the arteries.

Explain why this will not happen properly in the left hand side of the baby's heart.

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

[2]

(c) The heart condition means that less oxygenated blood is carried to the body tissues.

(i) Describe how the structure of the red blood cells allows it to carry out its function effectively.

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

[2]

(ii) Describe where and how the blood becomes oxygenated.

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

[2]

[Total: 8]

7
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*For
Examiner's
Use*

4 Humans carry out aerobic and anaerobic respiration.

(a) Use word equations to help you explain the differences between aerobic and anaerobic respiration in humans.

.....

[4]

(b) Athletes compete in races of different distances.

Fig. 4.1 shows the percentage of energy released by aerobic and anaerobic respiration during these races.

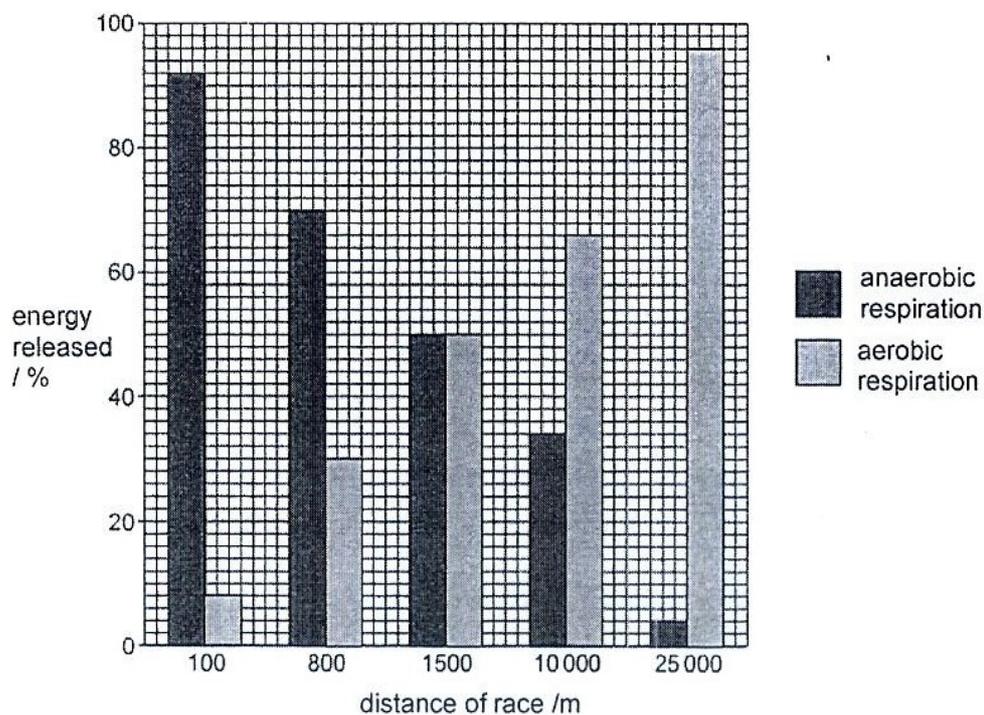


Fig. 4.1

(i) State the percentage of energy that is provided by anaerobic respiration in a 100m race

..... % [2]

(ii) State the length of race where the total energy released by each type of respiration is equal.

..... m [1]

(c) State two conclusions that can be made from the data shown in Fig. 4.1.

1

.....

2

.....

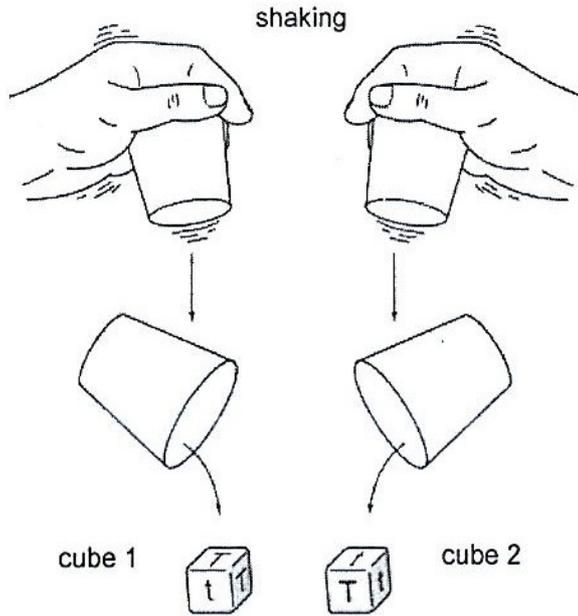
[2]

[Total: 9]

*For
Examiner's
Use*

- 5 Fig. 5.1 shows a method used by a student to understand how characteristics are inherited when two plants of species X are crossed. Both cubes had three of their faces marked with the letter T and three with the letter t.

For
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Use



In this example, the letters appearing on the upper faces are Tt.

Fig. 5.1

The student shook each container and then tipped both cubes out at the same time and recorded the letters appearing on the upper faces of the cubes.

The student tipped both cubes out a total of 405 times.

- (a) (i) Complete Table 5.2 to show the results obtained.

Table 5.2

letters appearing on the upper faces of the cubes	tt	TT	Tt
number of times each pair of letters appeared	98	202

[1]

- (ii) State what the letters on the faces of the cubes represent.

..... [1]

- (iii) State the reason for shaking the containers.

..... [1]

13

Describe and explain the rate of water conduction in the tree, during this 24 hour period.

*For
Examiner's
Use*

.....

.....

.....

.....

.....

.....

.....

.....

.....

[4]

- 7 The brown plant hopper is a serious insect pest of rice. Spraying with pesticides is a common way to control it. However, brown plant hoppers have become resistant to pesticides.

Fig. 7.1 shows the effect of spraying pesticides against populations of this insect pest.

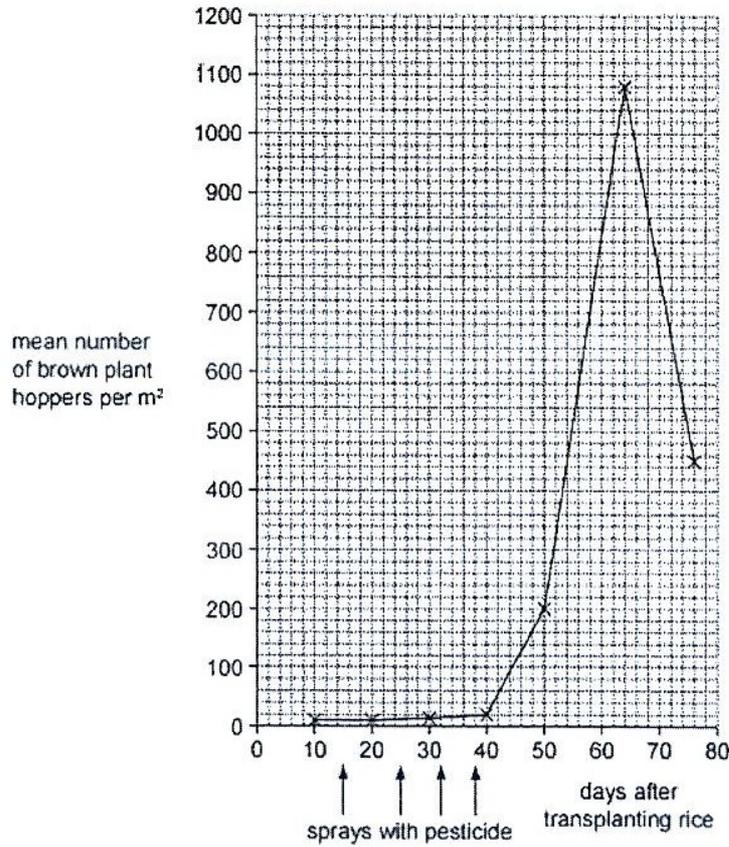


Fig. 7.1

- (a) Define the term *population*.

.....

[2]

- (b) Use Fig. 7.1 to describe the effect of pesticides on populations of the brown plant hopper.

.....

[4]

(c) Rice growing has involved the destruction of forests.

Describe the long-term effects of deforestation on the environment.

.....

.....

.....

.....

.....

.....

.....

.....

[4]

*For
Examiner's
Use*

Xinmin Secondary School
Preliminary Examination
Biology 5158
Mark Scheme

Paper 1

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

Symbols and abbreviations used in mark scheme

; – separates points for the award of a mark
 / – separates alternatives for a marking point
 ref. – makes reference to
 () – points within brackets need not be in the answer for a mark to be awarded
 cf. – compared to
 e.c.f. – error carried forward
 wrt – with respect to
 R – reject
 I – ignore/irrelevant
 A – accept
 AW – alternative wording
 ORA – or reverse argument

Paper 2

No.	Marking point	Markers' remarks
1a	<ul style="list-style-type: none"> • K- oesophagus/ gullet; • L- duodenum/ small intestine; [2] 	
1b	<ul style="list-style-type: none"> • starch- almost the same; • protein- less; • fibre- almost the same; [3] 	(A any symbols, but R more than one per line)
ci	<ul style="list-style-type: none"> • digested/ changed/ broken down/ ref. named enzyme action; • to amino acids/ polypeptides; • absorption (available only with ref. amino acids) in small intestine; [3] 	R pepsin unless mention that it is from stomach.
cii	<ul style="list-style-type: none"> • colon / rectum / large intestine; • no suitable enzyme / not digested; • ref. cellulose / lignin; • therefore no absorption / egested as faeces / used in peristalsis (A all other things, or named substances are absorbed) ; [max 3] 	
2a	<ul style="list-style-type: none"> • so light could enter / light needed; • for photosynthesis; [2] 	

No.	Marking point	Markers' remarks
2b	<ul style="list-style-type: none"> values quote from graph; highest rate of photosynthesis in the presence of light; rate of photosynthesis decreases at night + only respiration; [3] 	
2c	<ul style="list-style-type: none"> curve with peak in centre; similar lower levels at either end; + label as part (c); [1] 	
2di	<ul style="list-style-type: none"> (organism which) produces food/ produces organic substances (from inorganic; ref. to energy from sun; [max 1] 	
2dii	<ul style="list-style-type: none"> energy lost after every trophic level; (through) heat energy / uneaten body parts/ AW ; [2] 	
3a	<ul style="list-style-type: none"> A- aorta; B- pulmonary vein; [2] 	
3b	<ul style="list-style-type: none"> absence of bicuspid valve; backflow of blood into left atrium; [2] 	
3ci	<ul style="list-style-type: none"> biconcave + increase surface area to vol ratio; no nucleus + increase space for haemoglobin; [2] 	
3cii	<ul style="list-style-type: none"> in the lungs / alveoli; oxygen diffuses (from air into blood) / oxygen combines with haemoglobin; [2] 	
4a	<ul style="list-style-type: none"> aerobic: oxygen + glucose → carbon dioxide + water + large amount of energy; anaerobic: glucose → lactic acid + small amount of energy; anaerobic respiration occurs in the presence of oxygen whereas anaerobic respiration occurs in the absence of oxygen; aerobic respiration releases large amount of energy whereas anaerobic respiration release small amount of energy; [4] 	Direct comparison must be made to achieve a point
4bi	<ul style="list-style-type: none"> 92; [2] 	
4bii	<ul style="list-style-type: none"> 1500; [1] 	
4c	<ul style="list-style-type: none"> racing requires energy + energy is supplied by aerobic and anaerobic respiration; the shorter the race, (100 & 800m/ up to 1500), the less aerobic respiration/ more anaerobic respiration/ the longer the race, (more than 1500 / 1000 – 2500) the more aerobic respiration/ less anaerobic respiration; [2] 	
5ai	<ul style="list-style-type: none"> 105; [1] 	
5aii	<ul style="list-style-type: none"> alleles; [1] 	R genotype
5aiii	<ul style="list-style-type: none"> to ensure a random result; /AW[1] 	
5b	<ul style="list-style-type: none"> red; [1] 	
5c	<ul style="list-style-type: none"> correct parental genotype; cross done during fertilisation; correct gametes (R: not circled) using lines/ punnet square; correct genotype of offspring; ratio; [max 5] 	
6a	<ul style="list-style-type: none"> water potential, water from soil moves into root hair cell by osmosis; 	

No.	Marking point	Markers' remarks
	<ul style="list-style-type: none"> • reaches xylem vessels; • transpirational pull; • water evaporates, into airspaces (in mesophyll); • water (vapour), diffuses/passes, out through stomata; 	
6b	<ul style="list-style-type: none"> • no water conduction before 4h; • rate of water absorption more than water loss; • slow/gradual, increase from 4h to 6h/7h; • maximum water conduction rate of 2.4dm³ per hour; • due to increase in temperature in the day+ more water loss/transpiration; • slight decrease at 12h due to higher water loss than water absorption/ wilting/stomata closes to reduce transpiration; max 4 	
7a	<ul style="list-style-type: none"> • group of organisms / individuals, of same species ; • can interbreed ; • live in same area / habitat (at same time) ; [max 2] 	
7b	<ul style="list-style-type: none"> • numbers of brown plant hoppers remain low, up to 40 days / day 40 ; • low numbers when spraying occurs (days 15 to 38) ; • rapid increase when spraying stopped / AW ; • then, crash / decrease ; • any population figure with unit ; e.g. to maximum of over 1000 per m² ; [4] 	
7c	<ul style="list-style-type: none"> • decreased rainfall ; flooding ; • erosion / loss of (top)soil ; • desertification ; • loss of (plant) nutrients / soil fertility ; • disruption to food chain ; loss of habitat ; • extinction / loss of biodiversity ; • effect on carbon dioxide in the atmosphere ; 	
8a	<ul style="list-style-type: none"> • light detected by photoreceptors; • nerve impulses transmitted from sensory neurone via optic nerve to; • the relay neurone within the brain; • to motor neurone which stimulates the; • circular muscles to contract and radial muscles to relax in bright light + pupil constrict; • circular muscles relax and radial muscles contract in dim light + pupil dilate; [max 7] 	
8b	<ul style="list-style-type: none"> • pupil will not be able to constrict fast enough; • too much light entering the retina; • unable to form a clear image for awhile; [3] 	