

Centre No.	Subject No.	Level	Paper No.	Group No.	Marker's No.
	0300				

Total

[C007/SQP042]

Intermediate 2
Biology
Specimen Question Paper

Time: 2 hours

NATIONAL
QUALIFICATIONS

Fill in these boxes and read what is printed below.

Full name of centre

Town

First name and initials

Surname

Date of birth

Day Month Year

Candidate number

Number of seat

SECTION A (25 marks)

Instructions for completion of Section A are given on page two.

SECTIONS B AND C (75 marks)

- 1 (a) All questions should be attempted.
- (b) It should be noted that in **Section C** questions 1 and 2 each contain a choice.
- 2 The questions may be answered in any order but all answers are to be written in the spaces provided in this answer book, and must be written clearly and legibly in ink.
- 3 Additional space for answers and rough work will be found at the end of the book. If further space is required, supplementary sheets may be obtained from the invigilator and should be inserted inside the front cover of this book.
- 4 The numbers of questions must be clearly inserted with any answers written in the additional space.
- 5 Rough work, if any should be necessary, should be written in this book and then scored through when the fair copy has been written.
- 6 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.



Read carefully

- 1 Check that the answer sheet provided is for Intermediate 2 Biology (Section A).
- 2 Fill in the details required on the answer sheet.
- 3 In this paper a question is answered by indicating the choice A, B, C or D by a stroke made in **ink** in the appropriate place in the answer sheet—see the sample question below.
- 4 For each question there is only **one** correct answer.
- 5 Rough working, if required, should be done only on this question paper—or on the rough working sheet provided—**not** on the answer sheet.
- 6 At the end of the examination the answer sheet for Section A **must not** be placed inside the answer book, but should be handed separately to the invigilator.

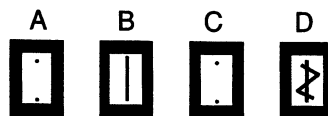
Sample Question

Which of the following are the raw materials for photosynthesis?

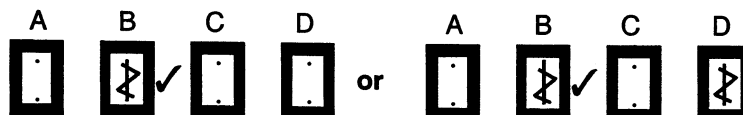
- A Carbon dioxide and glucose
- B Carbon dioxide and water
- C Oxygen and water
- D Oxygen and glucose

The correct answer is **B**—carbon dioxide and water. A **heavy** vertical line should be drawn joining the two dots in the appropriate box in the column headed **B** as shown in the example on the answer sheet.

If, after you have recorded your answer, you decide that you have made an error and wish to make a change, you should cancel the original answer and put a vertical stroke in the box you now consider to be correct. Thus, if you want to change an answer D to an answer B, your answer sheet would look like this:



If you want to change back to an answer which has already been scored out, you should enter a tick (✓) to the **right** of the box of your choice, thus:



SECTION A

All questions in this section should be attempted.

Answers should be given on the separate answer sheet provided.

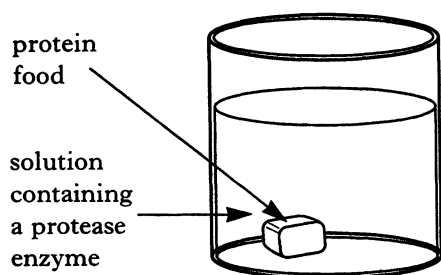
1. Which of the following can be used to describe yeast?

A Animal
B Bacterium
C Macrophage
D Fungus

2. Which of the following is only found in plant cells?

A Cell membrane
B Nucleus
C Cytoplasm
D Cell wall

3. In an investigation into the digestion of a protein food, the time taken for a cube of protein to be digested was recorded. Four samples were used.



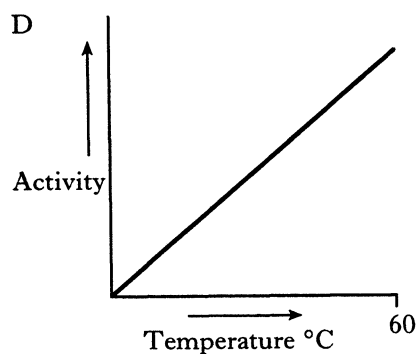
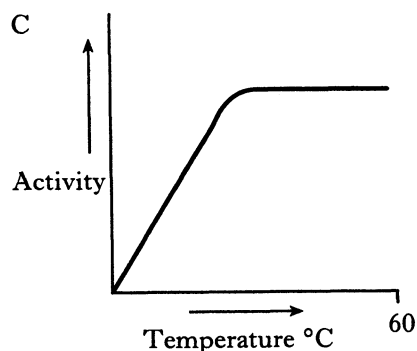
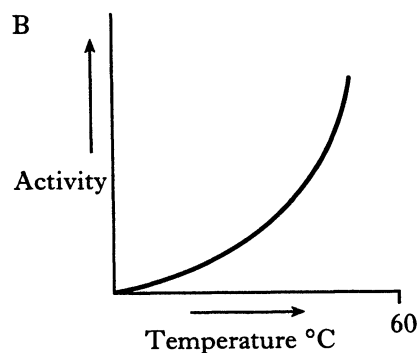
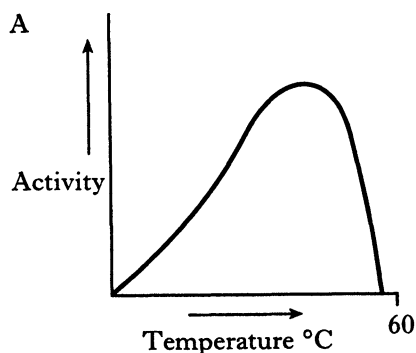
The results are recorded in the table below.

<i>Protein food</i>	<i>Time taken for complete digestion</i>
sample 1	6 hours 50 minutes
sample 2	6 hours 40 minutes
sample 3	7 hours
sample 4	7 hours 10 minutes

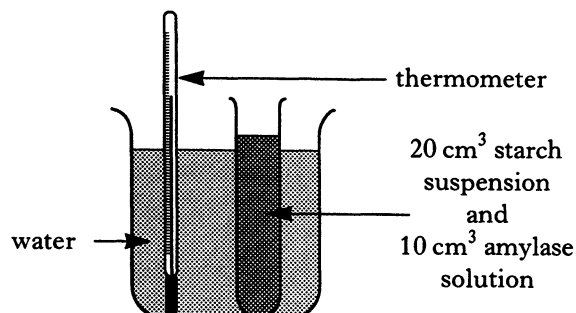
The average time taken to digest the protein was

A 7 hours 25 minutes
B 6 hours 55 minutes
C 6.55 hours
D 6.85 minutes.

4. Which of the following graphs best shows the effect of temperature on the activity of an enzyme?

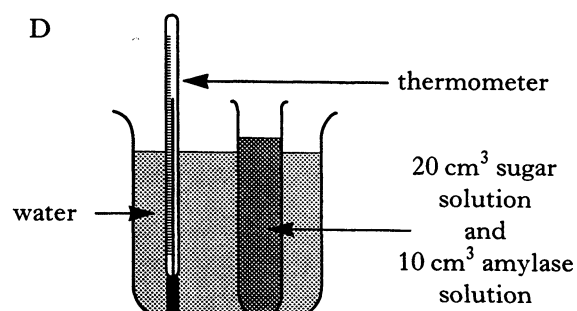
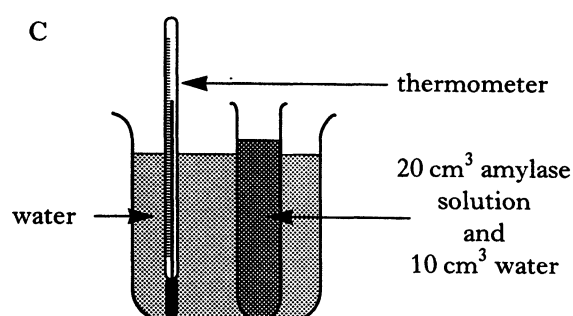
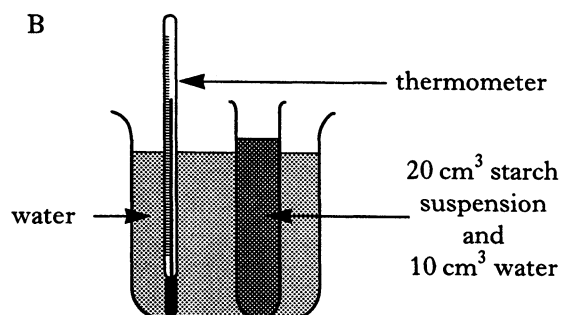
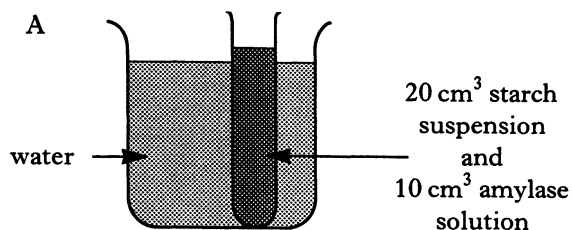


5. The diagram below shows part of an investigation, carried out by a student, into the action of the enzyme amylase.

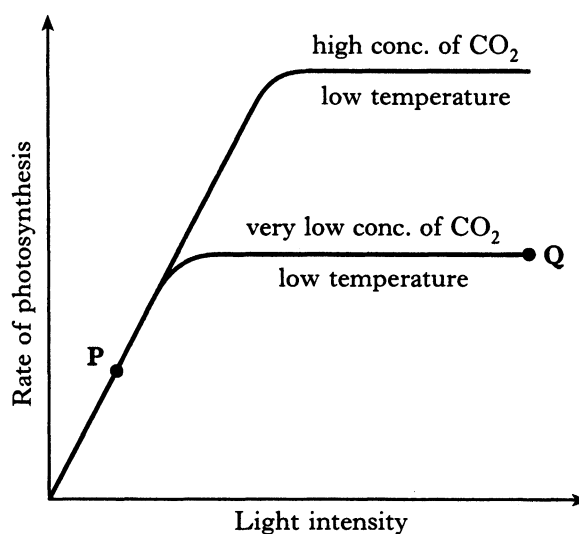


At the end of the investigation, the student concluded that the amylase had broken down the starch into sugar.

Which of the following would be a suitable control for this investigation?



6. The graph shows the effect of light intensity, concentration of carbon dioxide and temperature on the rate of photosynthesis.



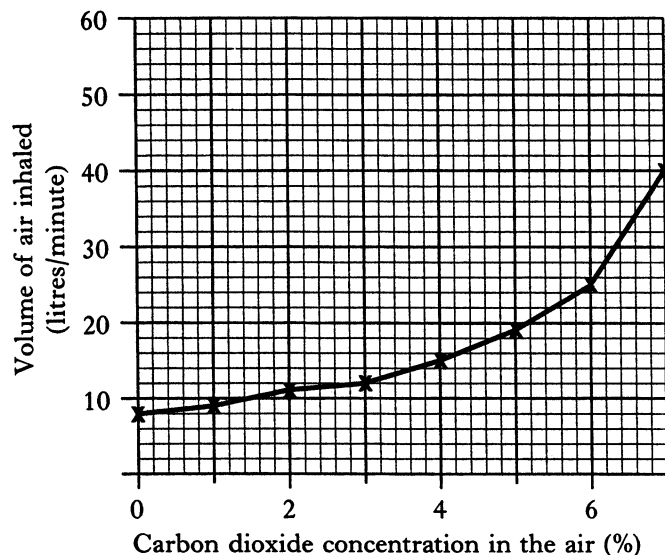
Which factors are limiting the rate of photosynthesis at points P and Q on the graph?

	P	Q
A	light	carbon dioxide
B	light	temperature
C	carbon dioxide	temperature
D	temperature	light

Questions 7 and 8 refer to the graph below.

An investigation was carried out into the effect of increasing the concentration of carbon dioxide in the air on a person's breathing.

The graph below shows how increasing the percentage of carbon dioxide in the air affects the volume of air inhaled each minute.



7. The volume of **carbon dioxide** entering the lungs each minute when the concentration of carbon dioxide in the air is 7%, is

A 2.8 litres
B 17.5 litres
C 28.0 litres
D 40.0 litres.

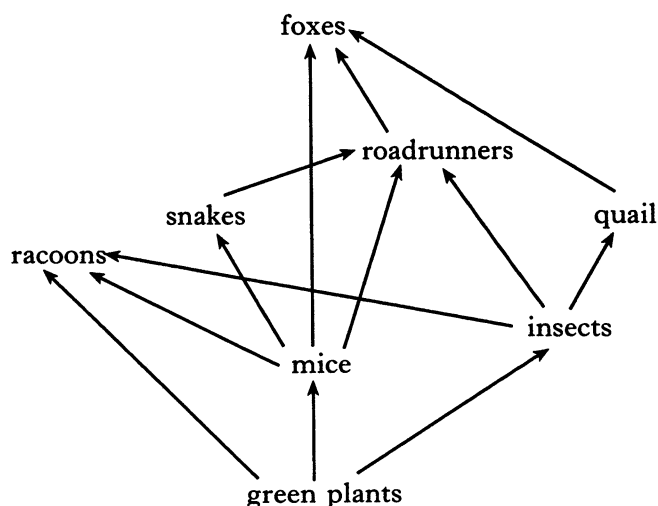
8. When the carbon dioxide concentration of the air is increased from 2% to 5%, the volume of air inhaled increases by

A 6 litres/minute
B 8 litres/minute
C 10 litres/minute
D 19 litres/minute.

9. Which of the following describes a community within an ecosystem?

A All the animals
B All the plants
C All the plants and animals
D The total number of one species

10. The diagram shows part of a food web in Californian scrubland.



Which of the following organisms are in competition for mice?

A Raccoons and insects
B Quail and raccoons
C Roadrunners and insects
D Snakes and roadrunners

Questions 11 and 12 refer to the information below.

Organism	Pairs of wings	Appearance of wings	Type of mouthparts
Dog flea	0	–	sucking
Ladybird	2	hardened	biting
Aphid	2	transparent	sucking
Bird louse	0	–	biting
Butterfly	2	coloured	sucking

Key

- no wings go to 2
two pairs of wings go to 3
- Dog flea
..... Bird louse
- wings transparent Aphid
wings not transparent go to 4
- Ladybird
..... Butterfly

In the key above, two of the numbered pairs of statements have been omitted.

Answer the following **two** questions by selecting the correct pair of statements.

Pairs of statements

- no wings
two pairs of wings
- sucking mouthparts
biting mouthparts
- wings hardened
wings coloured
- one pair of wings
two pairs of wings

11. Which pair of statements fits into 2?

12. Which pair of statements fits into 4?

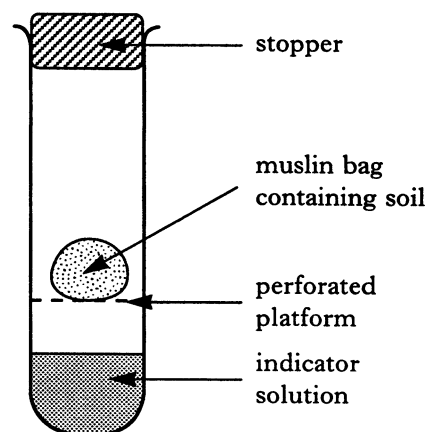
13. The process by which organisms that are better adapted to their environment survive and breed, while those less well adapted fail to do so, is called

- biodiversity
- environmental impact
- natural selection
- genetic engineering.

14. Different forms of a gene are called

- phenotypes
- alleles
- gametes
- genotypes.

15. The apparatus below was used to show that bacteria in soil respire and release carbon dioxide.



Which of the following would provide the most suitable control?

Apparatus as above, but

- no stopper
- no soil
- an equal mass of baked and cooled soil
- no indicator solution.

16. A salt water bony fish maintains the osmotic concentration of its body fluids by
- A drinking water and eliminating salt from the gills
 - B drinking water and absorbing salts through the gills
 - C eliminating excess water as dilute urine
 - D absorbing water through the gills.
17. Some air-breathing mammals, such as certain species of seals, whales, and dolphins, have adaptations which enable them to make long underwater dives in search of food.

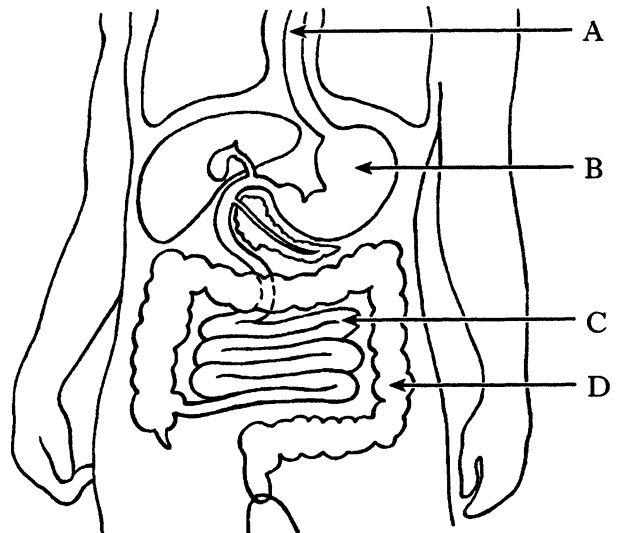
The table below shows the distribution of stored oxygen in a Weddell seal compared with a human.

	<i>Total oxygen stored (%)</i>		
	<i>In the lung capillaries</i>	<i>In muscles</i>	<i>In the rest of body</i>
Weddell seal	5	26	69
Human	35	13	52

The ratio of oxygen stored in the lung capillaries of humans to that stored in the lung capillaries of Weddell seals is

- A 7 : 1
- B 2 : 1
- C 1 : 7
- D 1 : 2.

Questions 18, 19 and 20 refer to the diagram of the human digestive system shown below.



18. In which part are carbohydrates mainly absorbed?
19. In which part is water mainly absorbed?
20. Which labelled arrow is pointing to the stomach?
21. Solid food is passed along the gut by
- A osmosis
 - B peristalsis
 - C digestion
 - D excretion.
22. Which part of the brain is involved in the control of heart rate?
- A Cerebellum
 - B Cerebrum
 - C Medulla
 - D Hypothalamus

23. Which of the following pairs of corrective mechanisms would occur in response to an increase in body temperature?

- A Dilation of blood capillaries in the skin
and
Increased activity of sweat glands
- B Dilation of blood capillaries in the skin
and
Decreased activity of sweat glands
- C Constriction of blood capillaries in the skin
and
Increased activity of sweat glands
- D Constriction of blood capillaries in the skin
and
Decreased activity of sweat glands

Questions 24 and 25 refer to the information below.

The table below shows the changes in the volume of blood circulating in a number of parts of the body before and during exercise.

<i>Part of body</i>	<i>Volume of blood circulating (cm³/minute)</i>	
	<i>Before exercise</i>	<i>During exercise</i>
Heart muscle	300	900
Muscles attached to the skeleton	1200	12 000
Skin	600	1900
Muscles of the gut	1500	600

24. For heart muscles the blood flow during exercise increases by

- A 3 times
B 4 times
C 10 times
D 30 times.

25. The change in the blood flow to the gut during exercise is a decrease of

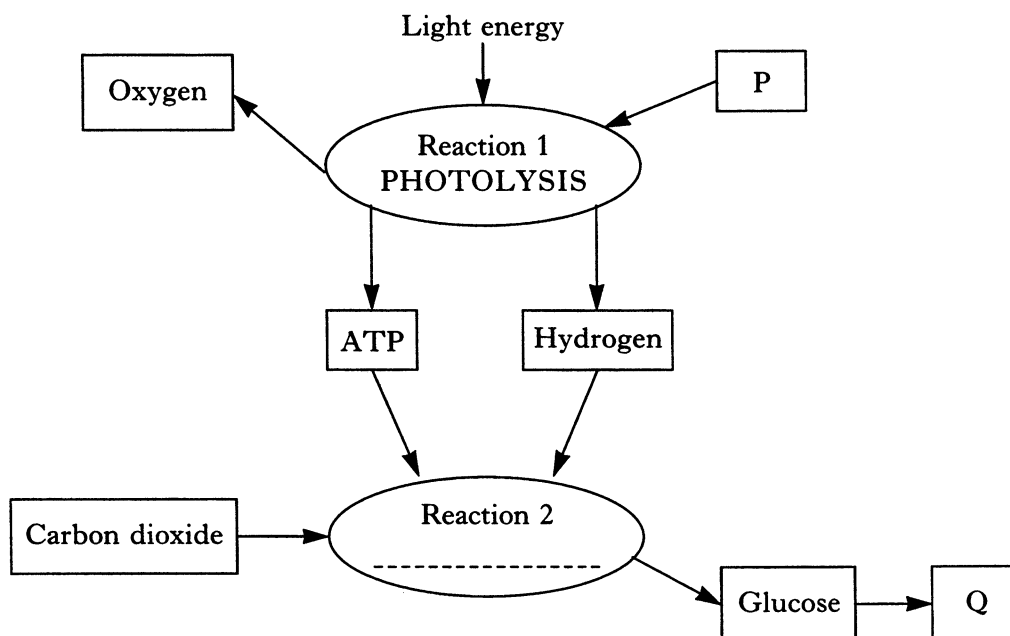
- A 40 %
B 50 %
C 60 %
D 67 %.

Candidates are reminded that the answer sheet MUST NOT be returned inside this answer book.

SECTION B

All questions in this section should be attempted.

1. (a) The diagram below summarises photosynthesis.



- (i) Name the molecule which absorbs light energy.

(1)

- (ii) Identify P, the source of the hydrogen produced by photolysis.

(1)

- (iii) The energy conversion taking place in Reaction 1 is

light energy $\longrightarrow$ _____ energy.

(1)

- (iv) Reaction 1 is called photolysis.
What name is given to Reaction 2?

(1)

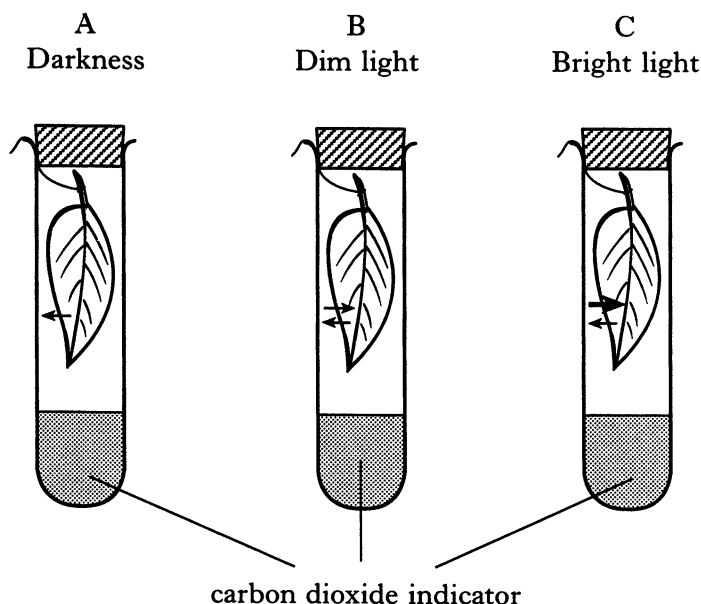
- (v) Compound Q is a component of plant cell walls.
Identify Q.

(1)

Marks

1. (continued)

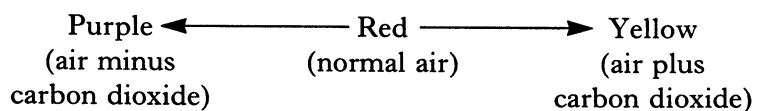
- (b) The diagrams below show the movement of carbon dioxide between green leaves of a certain plant and the atmosphere in different light conditions over a 24 hour period.



Each arrow represents the direction of carbon dioxide movement between the leaf and the atmosphere.

The thicker the arrow, the greater the volume of carbon dioxide moving.

The carbon dioxide indicator has the colour changes shown below.



- (i) Complete the table of results by writing the final colour of indicator in each container.

Container	Final colour of indicator
A	
B	
C	

(2)

Marks

1. (b) continued

- (ii) Describe the **control tubes** which would be needed before a valid conclusion could be drawn.

(1)

- (iii) Identify the containers in which (1) respiration and (2) photosynthesis was the dominant process.

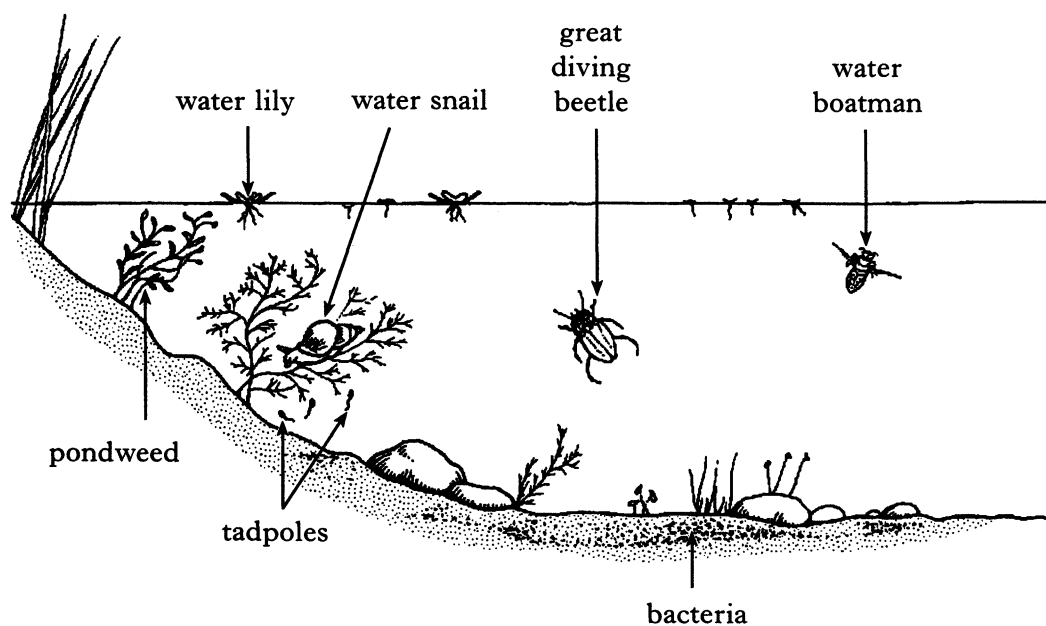
(1) Respiration: Container _____

(2) Photosynthesis: Container _____

(2)

Marks

2. The diagram below shows part of a freshwater pond.



(a) (i) The table below contains information about organisms in the pond.

<i>Organism(s)</i>	<i>Information</i>
Pondweed	Carries out photosynthesis
Water boatman	Attacks tadpoles and sucks their juices
Tadpole	Feeds on pondweed
Water snail	Feeds on pondweed
Great diving beetle	Kills and eats other insects
Bacteria	Feed on remains of other organisms

Use this information to select examples to complete the table below.

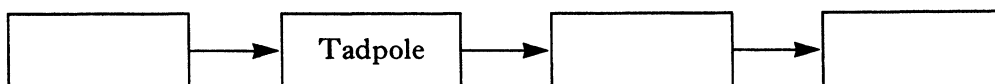
	<i>Example</i>
Primary consumer	
Predator	
Decomposer	

(3)

Marks

2. (a) (continued)

(ii) Complete the food chain below, using information from the table.



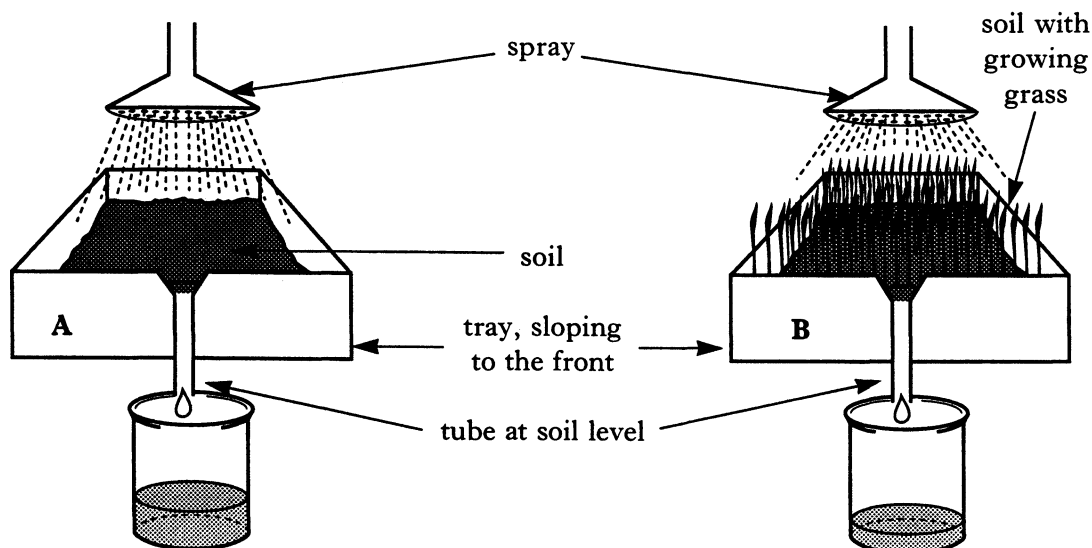
(1)

(b) Explain what is meant by the term *pyramid of biomass*.

(2)

Marks

3. An investigation on the effects of the presence of plants on soil erosion was carried out. The diagram below shows the apparatus used.



Tray A contained soil only.

Tray B contained the same type of soil but with grass growing on it.

Water from a spray was allowed to fall onto each tray. Any water running off was collected and examined for soil washed from the tray.

- (a) Identify the variable which was altered in the investigation.

_____ (1)

- (b) Describe **two** variables which must be kept constant in both sets of apparatus during the investigation.

1 _____

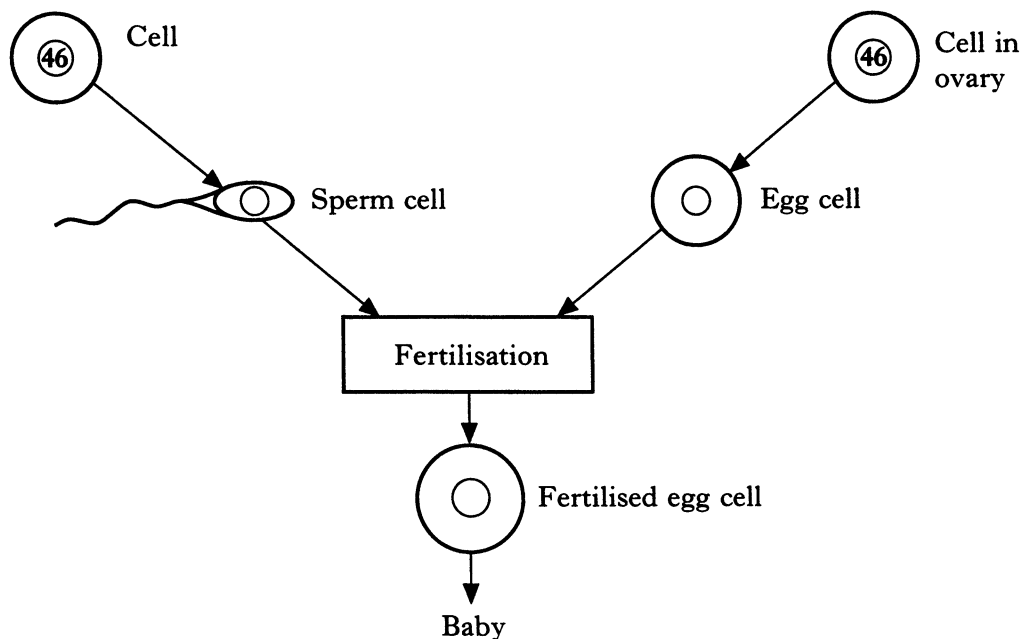
2 _____ (2)

- (c) The investigation was set up to test the hypothesis that the presence of plants reduces soil erosion.
Suggest **one** measurement or observation required in order to confirm or reject the hypothesis.

_____ (1)

Marks

4. The following diagram shows the production of sex cells in humans.
The numbers show the number of chromosomes in the cells.



- (a) Where are sperm produced?

(1)

- (b) What is the term used for a fertilised egg cell?

(1)

- (c) How many chromosomes are there in each egg cell?

(1)

- (d) The baby is a girl.

Which of the sex-determining chromosomes did she inherit from her father?

(1)

Marks

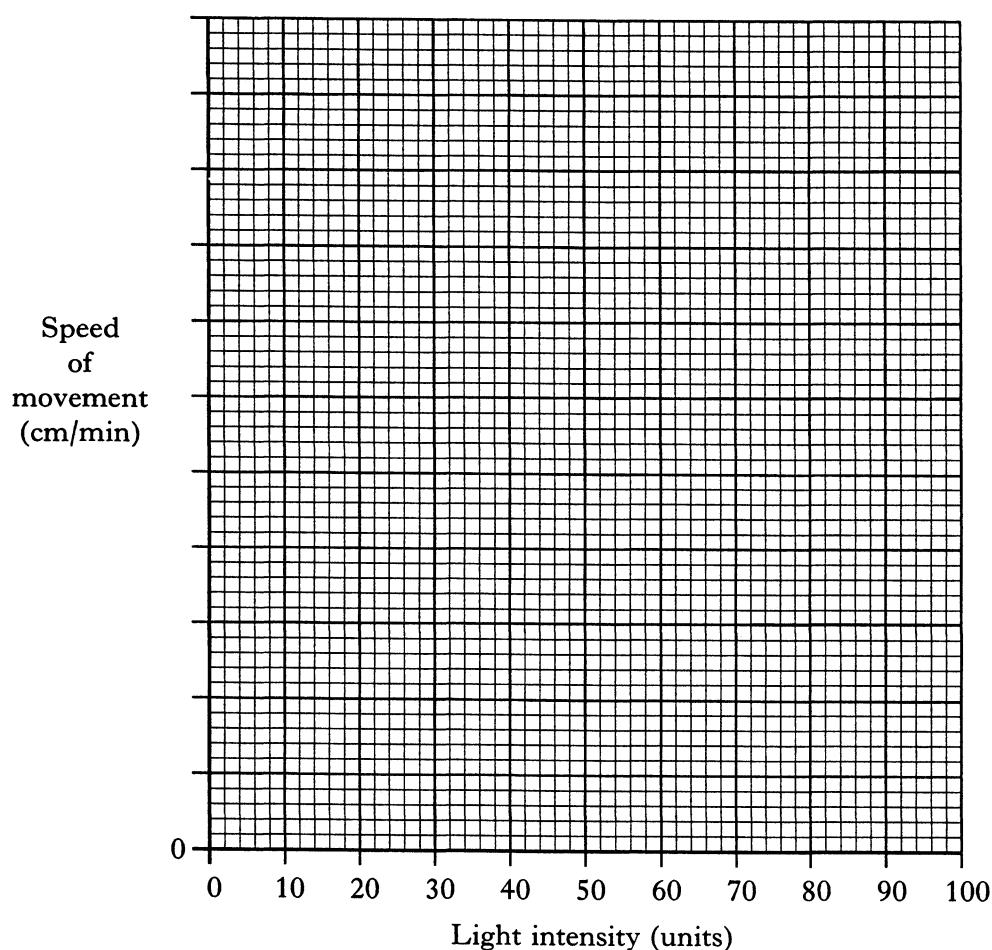
5. (a) Blowflies lay eggs which hatch into larvae.

The following table shows the effect of light intensity on the speed of movement of blowfly larvae.

<i>Light intensity (units)</i>	<i>Speed of movement (cm per minute)</i>
0	1.6
20	3.6
40	3.8
60	4.0
80	4.6
90	5.1

- (i) On the grid below, plot a suitable line graph to show the effects of increasing light intensity on the speed of movement of the blowfly larvae.

(Additional graph paper, if required, will be found on page 32.)



(2)

Marks

5. (a) (continued)

- (ii) Describe the relationship between the intensity of the light and the speed of movement of the larvae.

(1)

- (b) Some organisms, eg woodlice, move more rapidly in dry conditions than in damp conditions.

Explain how this contributes to their survival.

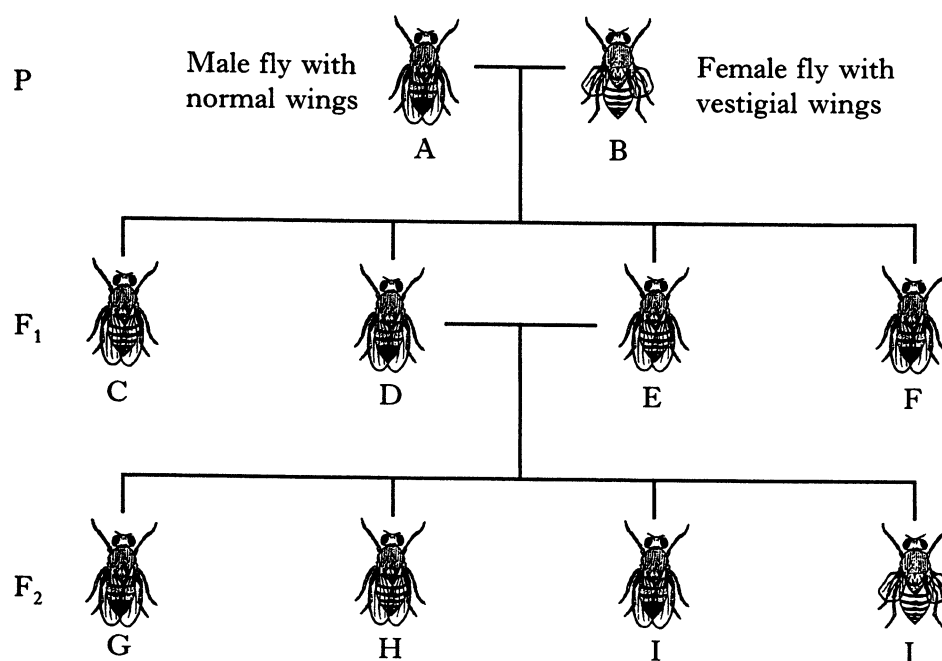
(2)

Marks

6. True-breeding fruit flies with normal wings were crossed with true-breeding fruit flies which had vestigial wings. All the offspring had normal wings.

Two of these offspring, D and E, were crossed together and the next generation contained normal winged and vestigial winged flies.

Some of the flies in these crosses are shown in the diagram below.



Use the letters from the diagram to answer the following questions.

- (a) (i) Identify **two** flies from **different generations** which have the same phenotype.

Fly _____ and Fly _____

Describe that phenotype.

(1)

- (ii) State the dominant wing characteristic of the flies used in these crosses.

(1)

- (iii) From the parental and first generation only, identify **two** flies which have the same phenotype but different genotypes.

Fly _____ and Fly _____

(1)

Marks

6. (continued)

- (b) In a second experiment ten F_1 flies were selected and bred together.
The F_2 generation of flies was examined and counted and the results are shown in the table below.

	<i>Number of flies</i>
Flies with normal wings	153
Flies with vestigial wings	39

- (i) In a cross like this, what would be the expected number of flies with vestigial wings in the F_2 generation?

Space for working

_____ flies (1)

- (ii) Give **one** reason to account for the difference between the expected number and actual number of flies with vestigial wings in the F_2 generation of this cross.

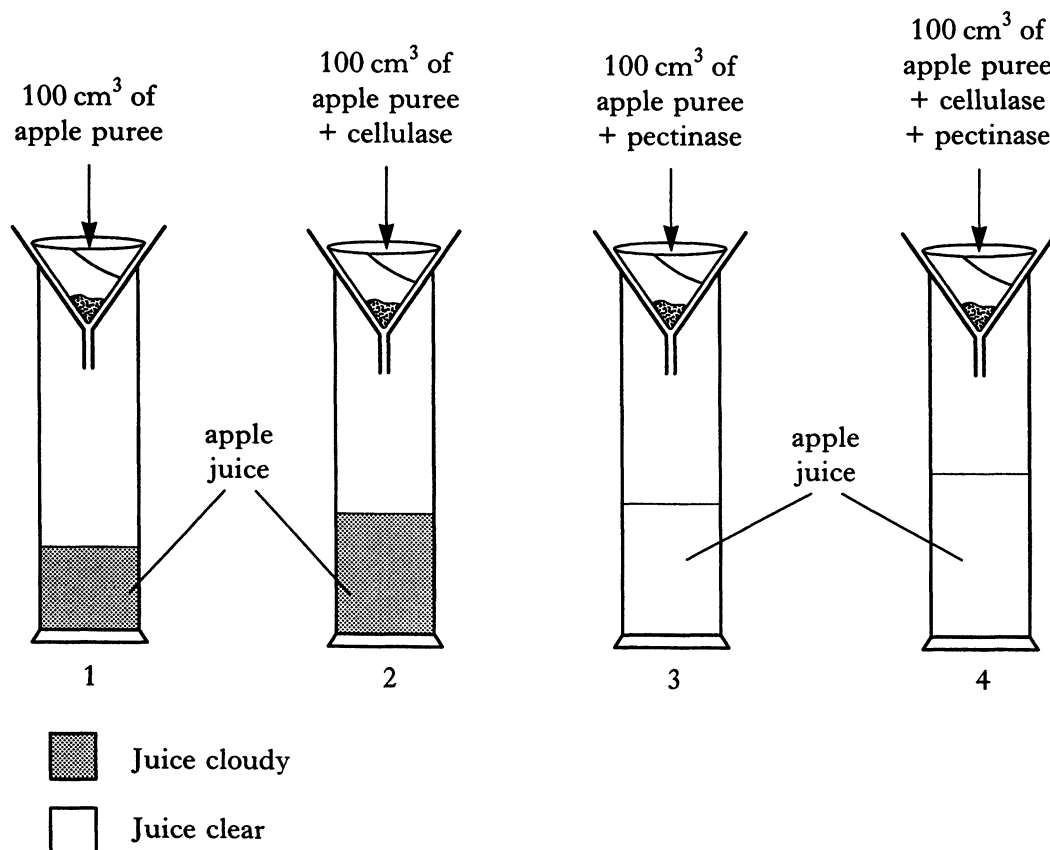
(1)

Marks

7. (a) Cellulase and pectinase are enzymes which break down different parts of plant cell walls. These enzymes are used in the commercial production of apple juice.

A group of students carried out an investigation into the effect of these enzymes on apple tissue at room temperature (20 °C).

The diagram below shows the apparatus used.



The investigation was left for 24 hours and then the volume of apple juice in each cylinder measured.

The results are shown in the table below.

Cylinder	1	2	3	4
Volume of apple juice extracted (cm ³)	25	34	39	50

Marks

7. (a) (continued)

- (i) Calculate the volume of apple puree required to produce 1000 cm^3 of apple juice, if **both** enzymes were used in the extraction.

Space for calculation

_____ (1)

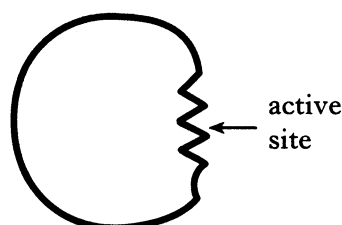
- (ii) Predict the effect on the volume of apple juice which would be extracted if the cylinders were placed in a refrigerator at 3°C for the 24 hours, instead of being kept at room temperature.

_____ (1)

- (iii) State **one** effect of the addition of pectinase on the extraction of apple juice.

_____ (1)

- (b) The diagram below represents the molecular structure of cellulase – the enzyme which breaks down cellulose in plant cell walls.



Use the information given above to explain the *specificity* of cellulase.

_____ (1)

- (c) Enzymes act as catalysts.
Describe **two** characteristics of catalysts.

1 _____

2 _____

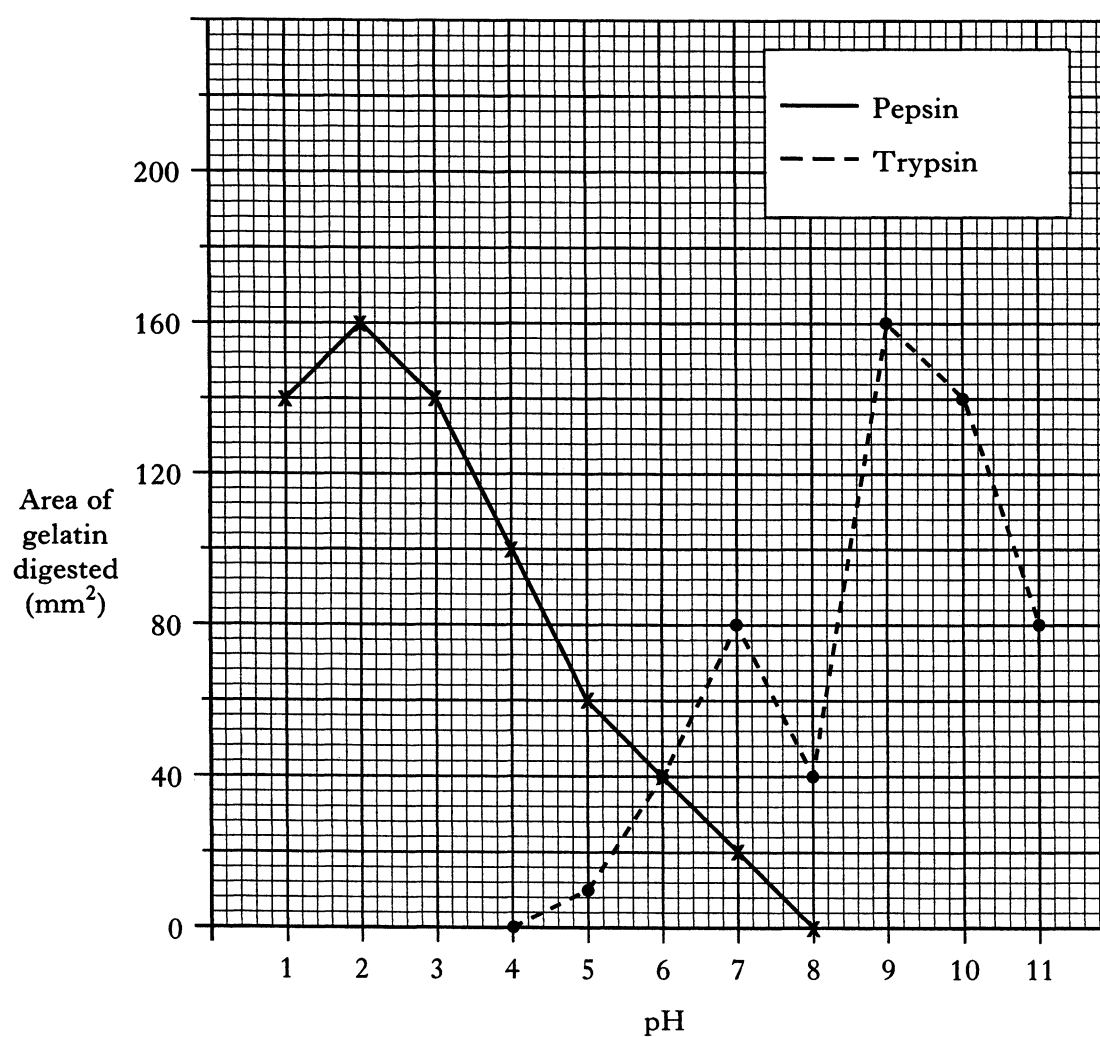
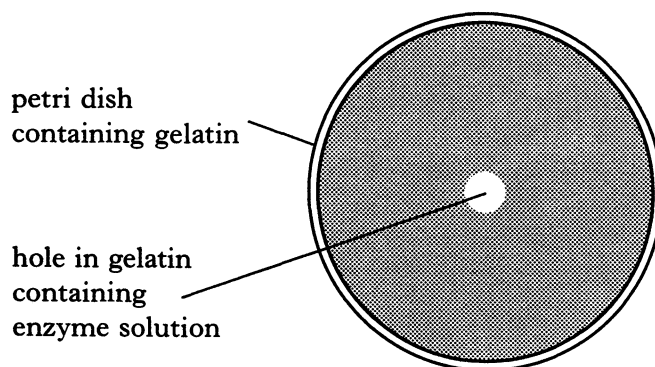
_____ (2)

8. The effect of pH on the activity of two protease enzymes, pepsin and trypsin, was investigated.

An enzyme solution, adjusted to the required pH, was placed in a hole made in the middle of a layer of gelatin in a petri dish. Gelatin is a jelly made of protein.

After one hour the activity of the enzymes was estimated by measuring the area of gelatin digested by the enzyme.

The results are shown in the graph below.



Marks

8. (continued)

- (a) Identify the pH at which both enzymes were equally active.

(1)

- (b) The students suspected that one of the results may have been due to experimental error.

- (i) Identify this result.

Enzyme _____

pH _____

(1)

- (ii) Suggest a possible explanation for the experimental error.

(1)

- (c) The optimum pH for pepsin is pH2.

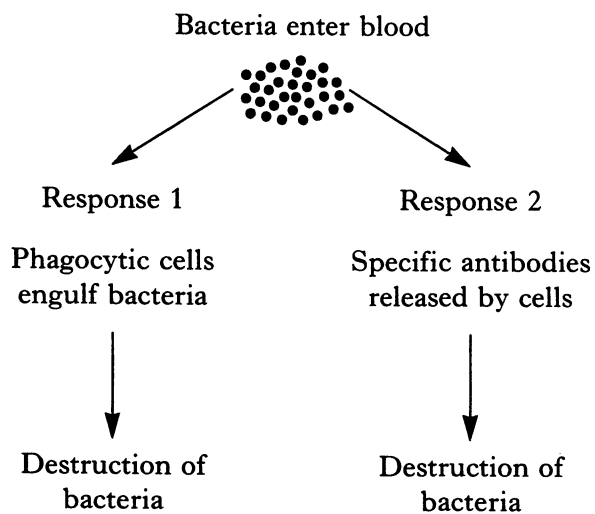
This condition is found in the stomach.

Explain how this condition is created in the stomach.

(1)

Marks

9. The diagram below represents two responses of the human body to invasion by bacteria.



- (a) Name a type of cell which carries out phagocytosis.

(1)

- (b) Name the type of cell which releases antibodies.

(1)

- (c) Explain what is meant by the term *specific* with reference to antibodies.

(1)

Marks

10. In an investigation, the effect of drinking a litre of salty water was monitored by measuring the volume of urine excreted and its salt concentration every 30 minutes for 2 hours.

At 30 minutes, 55 cm³ of urine with a salt concentration of 5 grams per litre was collected; at 60 minutes, 132 cm³ of urine with a salt concentration of 14 grams per litre was collected; at 90 minutes, 210 cm³ of urine with a salt concentration of 17 grams per litre was collected. At the end of the investigation, 112 cm³ of urine with a salt concentration of 13 grams per litre was collected.

- (a) Present this data in a table.

(2)

- (b) Describe what happens to the salt concentration of the urine as the investigation proceeds.

(1)

- (c) The hormone ADH acts on the kidney tubules to control water balance.

Use the words **increases** or **decreases** in each space to complete the following paragraph correctly.

After a long period without drinking, the water concentration of the

blood _____. The production of ADH by the pituitary

gland _____ and the reabsorption of water by the kidney

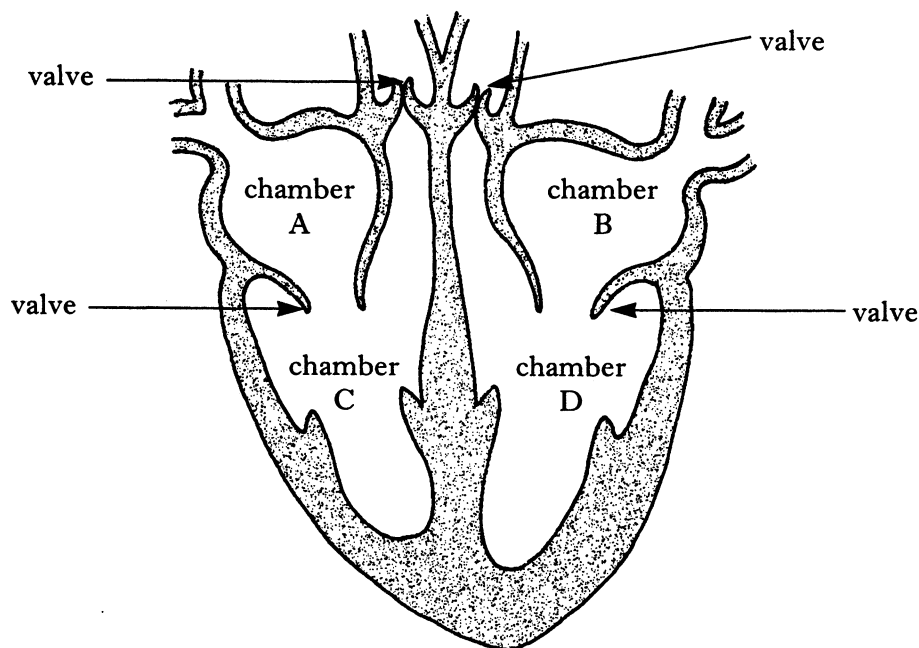
tubules _____. As a result, the water concentration of the

urine _____.

(2)

Marks

11. (a) The diagram below shows some of the structures in the human heart.



- (i) **Underline** one word in each box to make the sentence correct.

Heart chamber A is the

right
left

ventricle
atrium

(1)

- (ii) **Draw arrows on the diagram** to show the direction of blood flow into and out of chamber B.

(1)

- (iii) Describe the function of the valves in the heart.

(1)

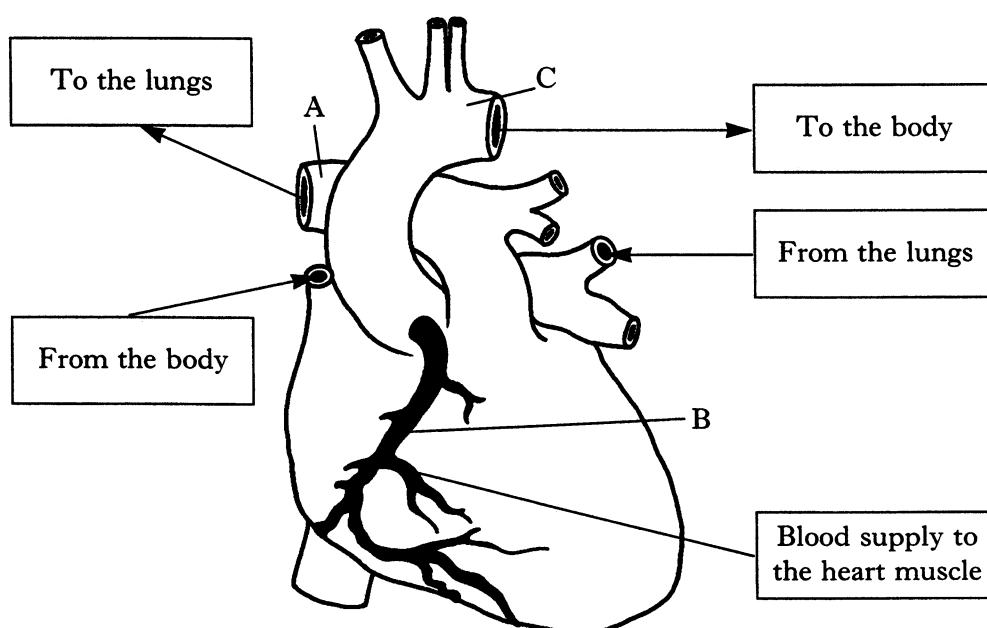
- (iv) Explain why the wall of chamber D is thicker than the wall of chamber C.

(1)

Marks

11. (continued)

(b) The diagram below shows an exterior view of a human heart.



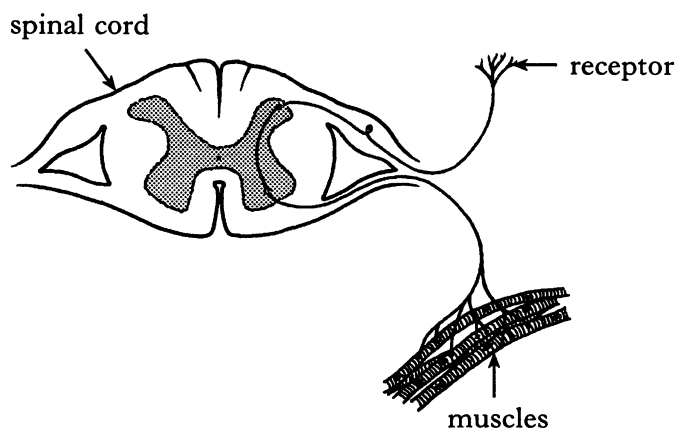
Complete the table below to show whether the blood in vessels A, B and C is oxygenated (high oxygen concentration) or deoxygenated (low oxygen concentration) by placing a tick (✓) in the correct column.

<i>Vessel</i>	<i>Oxygenated blood</i>	<i>Deoxygenated blood</i>
A		
B		
C		

(2)

Marks

12. (a) The diagram below shows the nerve cells (neurones) involved in a reflex arc through the spinal cord.



The incomplete list below contains descriptions of some of the stages in a reflex action.

Stage 1 Detection of stimulus by receptor

Stage 2 _____

Stage 3 Impulse sent along relay fibre

Stage 4 _____

Stage 5 Response made by effector organ

Complete the list by describing stages 2 and 4.

Stage 2 _____

Stage 4 _____ (2)

- (b) Complete the table below by inserting R against those responses which are reflex actions.

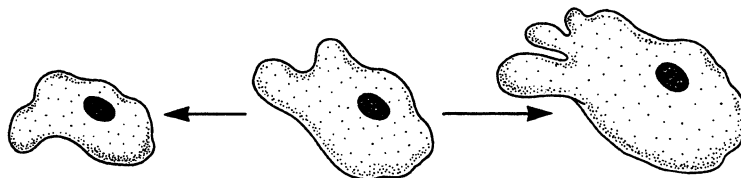
<i>Responses</i>	
Pupil of the eye gets smaller in bright light	
Eating when hungry	
Running cold water over a burnt hand	
Swallowing when food touches the back of the throat	

(2)

Marks

13. A single-celled organism is found living in the water of an estuary where the salt concentration of the water is constantly changing.

The changes in the salt concentration are observed to cause volume changes in the organism.

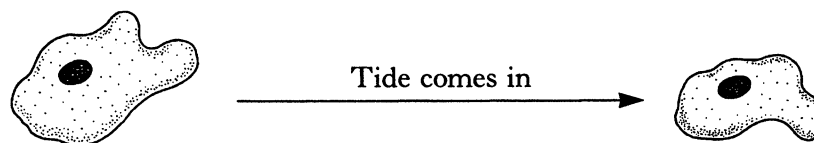


- (a) The volume changes are due to the movement of water in and out of the organism by osmosis.

Describe what is meant by the term *osmosis*.

(1)

- (b) When the tide comes in, the organism undergoes the volume change shown below.



Underline **one** word in the set of brackets to make the sentence correct.

The organism is now surrounded by { a hypotonic
an isotonic
a hypertonic } solution.

(1)

- (c) This organism depends on the process of diffusion.

Explain the importance of diffusion to organisms.

(1)

SECTION C

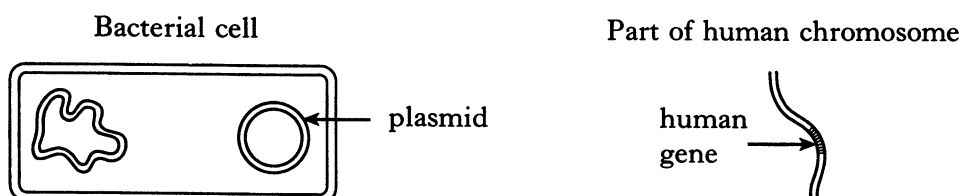
Answer BOTH questions 1 and 2 on the blank pages provided.

Marks

You may use labelled diagrams where appropriate.

1. Answer **either** A or B.

A. The diagrams below show a bacterial cell and part of a human chromosome.



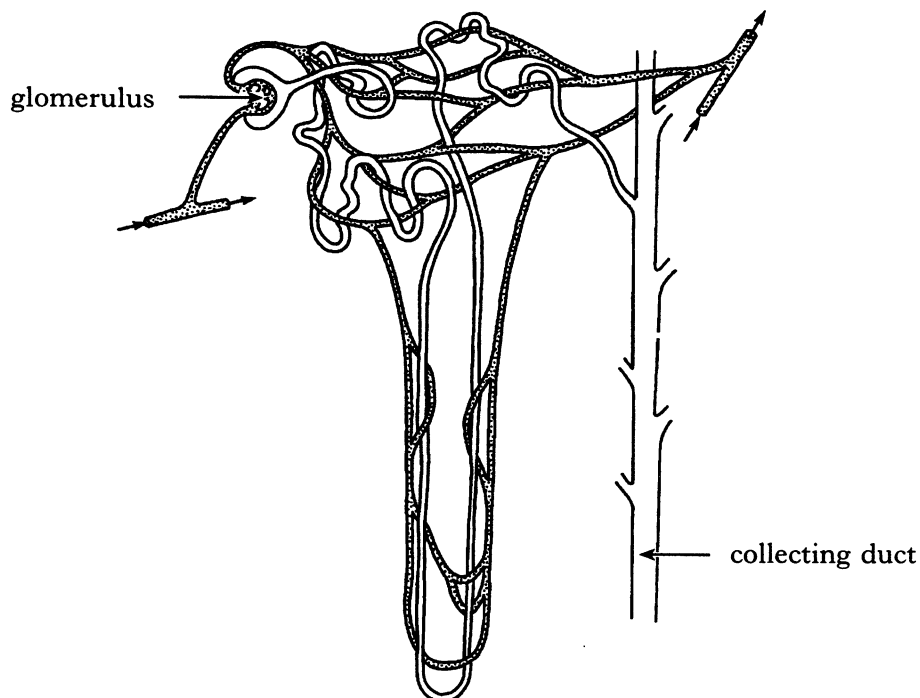
Genetic engineering can be used to produce bacterial cells capable of making a human protein.

Describe the steps carried out to produce bacterial cells containing a human gene.

(5)

OR

B. The diagram below shows a kidney nephron.



Give an account of what happens to both glucose and urea molecules in the blood entering the glomerulus of a kidney nephron.

(5)

2. Answer **either** A **or** B.

Marks

A. Give an account of the breakdown of glucose and the production of ATP during aerobic respiration.

(5)

OR

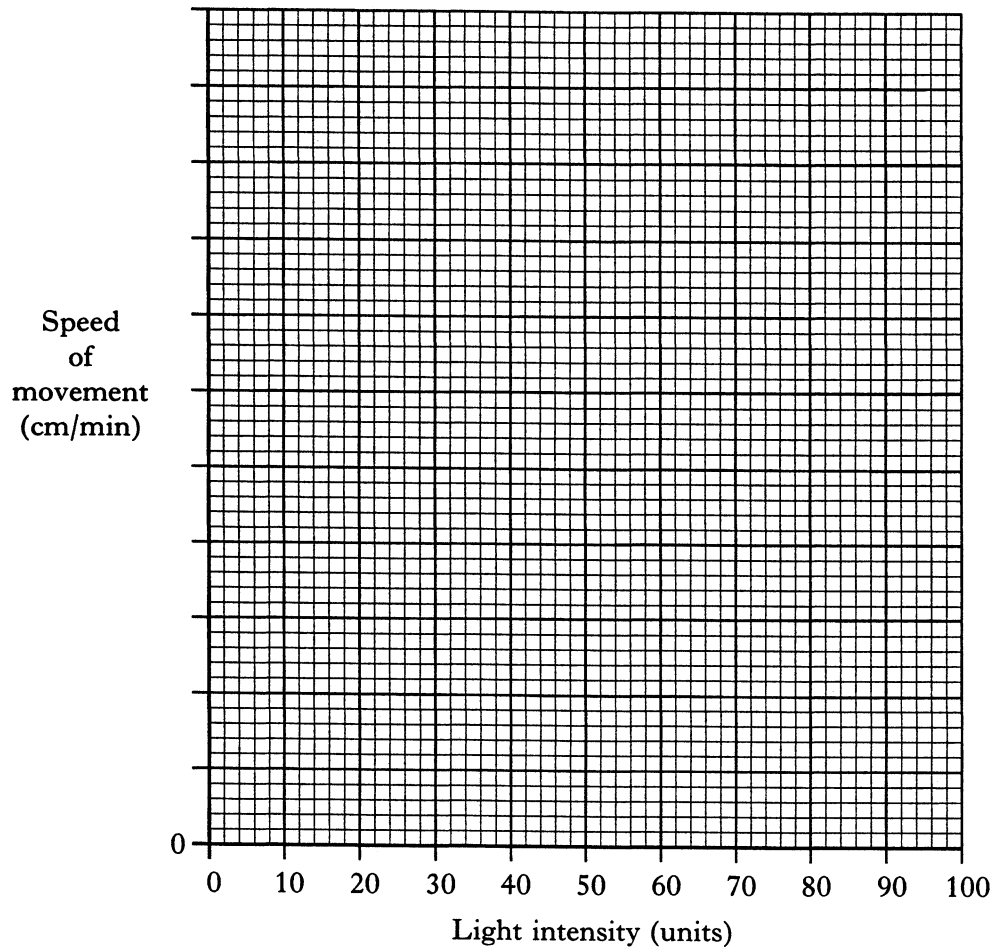
B. Describe how pollution can affect the variety of species in an ecosystem.

(5)

[END OF QUESTION PAPER]

SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 5(a)(i)



SPACE FOR ANSWERS

Intermediate 2
Biology
Section A
Specimen Question Paper

NATIONAL
QUALIFICATIONS

ANSWER SHEET

Full name of school or college

Town

First name and initials

Surname

Date of birth

Day Month Year

Candidate number

Number of seat

Using ink, indicate your choice of answer by a single stroke joining the two dots in the box, as in the following example:

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	A	B	C	D
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

[C007/SQP042]

Intermediate 2
Biology
Specimen Marking Instructions

NATIONAL
QUALIFICATIONS

Marking Guidelines for Biology

General information for marking unit tests and course examinations in Biology

Mark schemes are rarely definitive. Some reasonable interpretation is always necessary and professional judgement must be applied.

1. In Biology, no half marks are given. Where three answers are needed for two marks, normally one or two correct answers gain one mark.
2. Spelling should be correct, but where minor errors do not affect phonetics, marks can be given, eg chlorophyll, protien, pestiside.
However, care should be taken with words which can be easily confused.
ureter and urethra, meiosis and mitosis, glycogen and glucagon
3. If a numerical answer is required and units are not given in the stem of the question or in the answer space, then candidates must supply the units to gain the mark. However, if units are required on more than one occasion, candidates should not be penalised repeatedly.
4. Where questions on data are in two parts, if the second part of the question is correct in relation to an incorrect answer given in the first part, then a mark can often be given. The general rule is that candidates should not be penalised twice for one error.
5. When marking graphs, credit can be given for:
Choosing the correct form of graph: bar chart, histogram or line graph.
Labelling the axes correctly
Using the x axis for the independent variable
Plotting the points
Joining the points either with straight lines or curves as appropriate (best fit rarely used)
Using more than around 50% of the graph paper. (graph paper provided will always allow for maximum use of the paper)
6. If a description or explanation is asked for, a one-word answer is not acceptable.
7. Where a description or explanation is required, it is often good practice to offer three or four acceptable answers and accept any two or three of these for marks.
8. If two answers are given which contradict one another, the first answer should be taken. However, there are occasions where the second answer negates the first and no marks are given. There is no hard and fast rule here and professional judgement must be applied. Good marking schemes often cover these eventualities.
9. Where data is read off a graph, it is often good practice to allow for acceptable minor error. So an answer may be given 7.3 ± 0.1 .
10. Words not required in the syllabus can still be given credit if used appropriately.
eg *metaphase* of meiosis, *denaturing* of enzymes.
11. Abbreviations which are in common usage are acceptable: eg NADP ATP DNA ADH RuBP FSH.

Mark Scheme

Section A

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. D | 2. D | 3. B | 4. A | 5. B |
| 6. A | 7. A | 8. B | 9. C | 10. D |
| 11. B | 12. C | 13. C | 14. B | 15. C |
| 16. A | 17. A | 18. C | 19. D | 20. B |
| 21. B | 22. C | 23. A | 24. A | 25. C |

Section B

1. (a) (i) chlorophyll

(ii) water

(iii) chemical

(iv) carbon fixation/Calvin cycle

(v) cellulose

- (b) (i) A = yellow
B = red
C = purple

3 correct – 2 marks

2, 1 correct – 1 mark

(ii) same tubes without leaves

(iii) (1) A
(2) C

2. (a) (i) Primary consumer – tadpole/water snail
Predator – water boatman/great diving beetle
Decomposer – bacteria

(ii) pondweed → tadpole → water boatman → great diving beetle

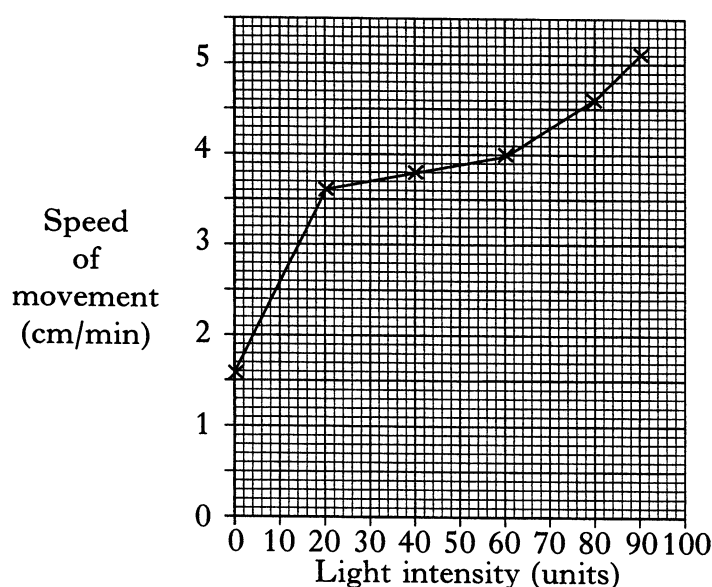
(b) *2 ideas, 1 mark each*

- total/weight/mass of organisms
- is less/decreases at each stage of a food chain/web

3. (a) presence of plants/growth of grass/with or without grass
- (b) *Any two from:*
- volume/depth/level/mass/weight of soil
 - size/area of trays
 - rate of water flow from spray/volume/pressure/intensity of water delivered
 - angle of/slope of tray
 - time/temperature of water
 - height of spray/size/diameter of spray head/holes
- (c) mass of soil washed from each tray/cloudiness of water collected

4. (a) testis/testes (b) zygote (c) 23 (d) X

5. (a) (i)



Scale correct for 1 mark

All 6 points plotted correctly for 1 mark

Points must be joined with a line

Point(s) missed out
Line extended beyond (90,5.1)
A bar chart

} *negates the plot mark*

- (ii) As the light intensity increases the speed of movement increases
Not acceptable: As the speed increases the light intensity increases

- (b) more likely to reach damp place/more likely to stay in damp place *1 mark*
and so/because
 less likely to dry out and die
 reduces water loss
 prevents gas exchange surface drying out
 need dampness/moisture to exchange gases
- } *1 mark for any 1*

6. (a) (i) A + any one of C, D, E, F, G, H, I
or
 any one of C, D, E, F + any one of G, H, I
or
 B and J — vestigial wings } normal wings
- (ii) normal wings
- (iii) A + any one of C, D, E, F
- (b) (i) 48
- (ii) chance/random effects at fertilisation
 fusion of gametes is random
 some may have died/not survived
 small sample size
7. (a) (i) 2000 cm³ **or** 2 litres (*units needed for mark*)
- (ii) less juice/reduced volume
- (iii) more juice extracted/juice clear/juice not cloudy
- (b) only cellulose molecules fit the shape of the active site
- (c) *Any two from:*
- lower the energy input required for chemical reactions
 - speed up chemical reactions
 - take part in reactions but remain unchanged
8. (a) 6
- (b) (i) trypsin
 pH8
- (ii) incorrect pH used/pH6 used by mistake
 measurement taken too soon/time shorter
 temperature lower in this dish/wrong temperature used
 lower enzyme concentration/volume used
 enzyme A and pH6 used by mistake
 area calculated incorrectly/mistake in measurement
 gel was thicker/deeper in this dish
 hole in gel was smaller at the start
- (c) the stomach lining has acid-secreting cells
 hydrochloric acid is found in the stomach

9. (a) macrophage(s)
 (b) lymphocyte(s)
 (c) each antibody only acts on one type of antigen

10. (a) *Correct column headings, including units – or units stated all the way down each column*
+ correct data
Either horizontal or vertical table acceptable
Columns can be in any order

1 mark

1 mark

<i>Time</i> (h)	<i>Time</i> (min)	<i>(Volume of) urine</i> (cm ³ or ml)	<i>Salt (concentration)</i> (g/l)
$\frac{1}{2}$	30	55	5
1	60	132	14
$1\frac{1}{2}$	90	210	17
2	120	112	13

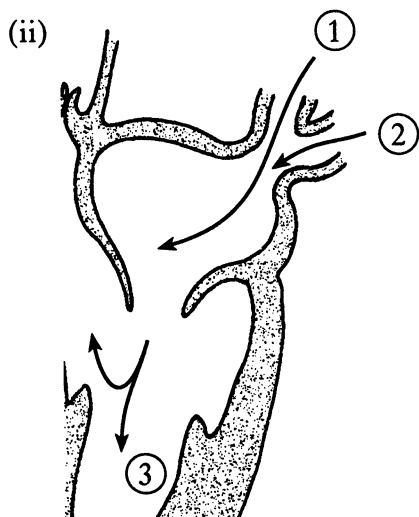
- (b) It increases then decreases/it goes up then down

- (c) decreases
 increases
 increases
 decreases

4 correct – 2 marks

3, 2 correct – 1 mark

11. (a) (i) right ventricle
left atrium



1 mark for either/both arrows ① and ② plus arrow ③ or one continuous arrowed line

- (iii) to prevent backflow of blood
 to stop blood flowing back into the heart/re-entering the heart
 to keep blood flowing (all) in one direction/(all) one way
- (iv) *There must be some comparison stated to gain mark*
 because D has to pump the blood all round the body/further/to all parts of the body whereas C only pumps blood to the lungs

- (b) A ✓ 3 correct – 2 marks
 B ✓ 2 correct – 1 mark
 C ✓ 1 correct – 0 marks

12. (a) Stage 2 – nerve impulse moves along sensory neurone
 Stage 4 – nerve impulse moves along motor neurone

- (b)
- | | |
|---|------------------------------|
| ✓ | 1 correct, 1 wrong – 1 mark |
| | 2 correct, 1 wrong – 1 mark |
| | 1 correct – 1 marks |
| ✓ | 1 correct, 2 wrong – 0 marks |

13. (a) Movement of water from a high to a low concentration across a selectively/ semi-permeable membrane
or
 Diffusion of water across a selectively/semi-permeable membrane

- (b) hypertonic

- (c)
- organisms obtain oxygen/glucose/water/soluble nutrients
 - organisms can get rid of waste products/carbon dioxide/water
 - allows exchange of materials with surroundings/other cells

Section C

1A Describe the steps carried out to produce bacterial cells containing a human gene.

Any 4 points from

plasmid removed from bacterial cell	1
human gene removed from chromosome	1
plasmid cut open and human gene inserted	1
plasmids mixed with bacteria which lack plasmids	1
plasmid returned to bacterial cell	1
bacteria growth under conditions for rapid growth/multiplication	1

Coherence

- *is the writing organised in a logical manner?*
- *is related information grouped together?*
- *is there evidence of a logical progression in the account/description?*

Any two of the above 1 mark
one or less 0 mark

1B Describe what happens to glucose and urea molecules in a nephron.

Any 4 points from

blood is filtered (into Bowman's capsule)	1
some glucose and urea enter the tubule	1
glucose is completely reabsorbed into bloodstream in (proximal/first part of tubule)	1
process is active/requires energy	1
urea is not reabsorbed	1
end product is urine (containing urea dissolved in water)	1

Coherence

- *is the writing organised in a logical manner?*
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Any two of the above 1 mark
one or less 0 mark

2A Give an account of the breakdown of glucose and the production of ATP during aerobic respiration.

Any 5 points from

energy is released/glucose is broken down	
in a series of enzyme controlled reactions	1
glucose is broken down to pyruvic acid	1
in a process called glycolysis	1
the end products are carbon dioxide and water	1
energy released is used to synthesise ATP	1
from ADP and Pi	1
in aerobic respiration, 38 ATP molecules from each glucose molecule	1

2B Describe how pollution can affect the variety of species in an ecosystem.

Any 5 points from

reduces the variety of species because:	1
toxins/poisons kill organisms	1
removal of oxygen kills animals	1
food chains/webs disrupted	1
can lead to limited range of species thriving	1
because of reduced competition	1
any reasonable named example of above	1

[END OF MARKING INSTRUCTIONS]

[C007/SQP042]

Intermediate 2
Biology
Specimen Marking Instructions

NATIONAL
QUALIFICATIONS

Intermediate 2
Biology Specimen paper

Mark Scheme

Section A

- | | | | | |
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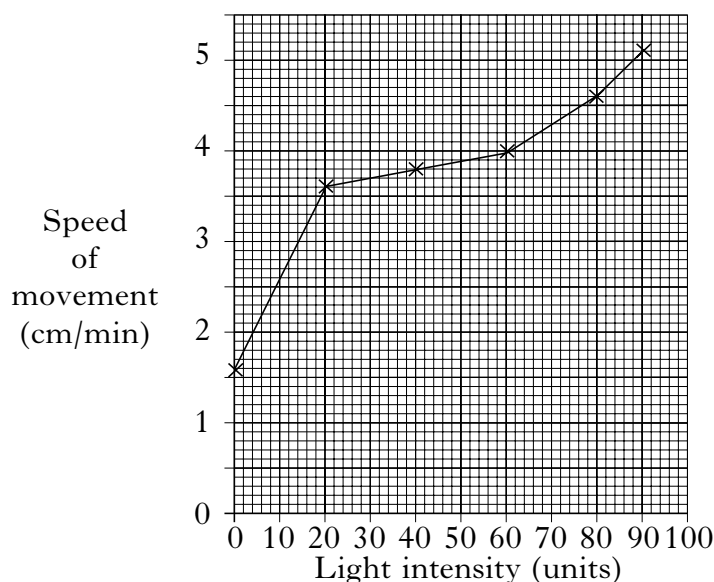
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8. (a) 6

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1 mark
1 mark

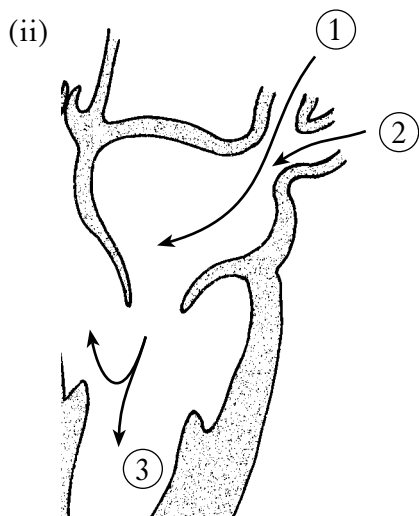
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- | |
|---|
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| |
| |
| ✓ |
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1 correct – 1 marks
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some glucose and urea enter the tubule	1
glucose is completely reabsorbed into bloodstream in (proximal/first part of tubule)	1
process is active/requires energy	1
urea is not reabsorbed	1
end product is urine (containing urea dissolved in water)	1

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2B Describe how pollution can affect the variety of species in an ecosystem.

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reduces the variety of species because:	1
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food chains/webs disrupted	1
can lead to limited range of species thriving	1
because of reduced competition	1
any reasonable named example of above	1

[END OF MARKING INSTRUCTIONS]