



**PLEASE NOTE THE COPYRIGHT OF THIS EXAM BELONGS TO MLC AND THE TEACHERS WHO CREATED THE EXAM. SHARING OF THIS EXAM, EITHER IN PRINT OR BY ELECTRONIC MEANS, WITH STUDENTS OR OTHERS OUTSIDE OF MLC IS EXPRESSLY FORBIDDEN WITHOUT WRITTEN PERMISSION FROM MLC.**

**Methodist Ladies' College  
Semester 1 Examination, SAMPLE**

**Question/Answer Booklet**

**BIOLOGY  
ATAR Year 11**

Student Name: \_\_\_\_\_

Teacher Name: \_\_\_\_\_

**Time allowed for this paper**

Reading time before commencing work: 10 minutes

Working time for paper: 2 ½ hours

**Materials required/recommended for this paper**

***To be provided by the supervisor***

This Question/Answer Booklet

Multiple-choice Answer Sheet

Number of additional  
answer booklets used  
(if applicable):

***To be provided by the candidate***

Standard items: pens (blue/black preferred), pencils (including colours), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: non-programmable calculators approved for use in the WACE examinations

**Important note to candidates**

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

## Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of total exam	Mark
Section One: Multiple-choice	30	30	40	60	37.5	
Section Two: Short response	6	6	80	80	50	
Section Three: Extended answer	3	2	25	20	12.5	
				<b>Total</b>	100	

## Instructions to candidates

- The rules for the conduct of ATAR course examinations are detailed in the 2016 Year 11 Information Handbook. Sitting this examination implies that you agree to abide by these rules.
- Answer the questions according to the following instructions.

Section One: Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through the square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answer. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write your answers in this Question/Answer Booklet. Wherever possible, confine your answers to the line spaces provided. Use a black or blue pen for this section. Only graphs and diagrams may be drawn in pencil.

- You must be careful to confine your responses to the specific questions asked and to follow any instruction that are specific to a particular questions.
- Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
  - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the questions that you are continuing to answer at the top of the page.

**Section One: Multiple-choice****50 Marks**

This section has 25 questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time for this section is 35 minutes.

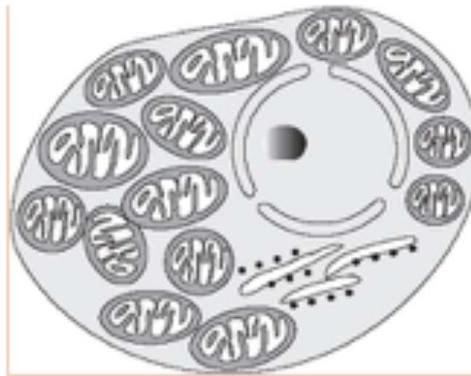
---

1. In humans, damaged body cells are replaced through:
  - (a) meiosis.
  - (b) mitosis.
  - (c) mutation.
  - (d) exocytosis.
  
2. The cell wall is responsible for which of the following:
  - (a) Maintaining turgid cell structure.
  - (b) Controlling movement of substances in and out of cell.
  - (c) Preventing plasmolysis of the cell.
  - (d) Containing the genetic material of the cell.
  
3. Biologists use stains such as iodine and methylene blue when preparing material for microscopic observation.

These stains are used in order to:

  - (a) improve the resolving power of the microscope and reduce the light intensity.
  - (b) change the colour of the background so that the cells can be seen clearly.
  - (c) show the presence of different chemicals in the cell.
  - (d) slow osmosis so cell organelles are shown more clearly.

4. When the leaves of a flowering plant are exposed to light there is a net (i.e. overall) movement of:
- (a)  $\text{H}_2\text{O}$  from the surrounding atmosphere to the leaves.
  - (b)  $\text{CO}_2$  to the surrounding atmosphere from the leaves
  - (c)  $\text{O}_2$  from the surrounding atmosphere to the leaves.
  - (d)  $\text{CO}_2$  from the surrounding atmosphere to the leaves.
5. Examine the following diagram of a cell.



Based on its internal structure, this cell is likely to:

- (a) require a high concentration of carbon dioxide.
- (b) produce large quantities of secretory product.
- (c) require high levels of oxygen.
- (d) produce high levels of sugar.

**Questions 6 and 7 relate to the following information.**

Biologists designed an experiment to investigate which of four landscape treatments would attract the largest numbers of the Common Blue Butterfly to a location. The experiment ran at four different locations. At each location, four different landscape treatments were set up as follows:

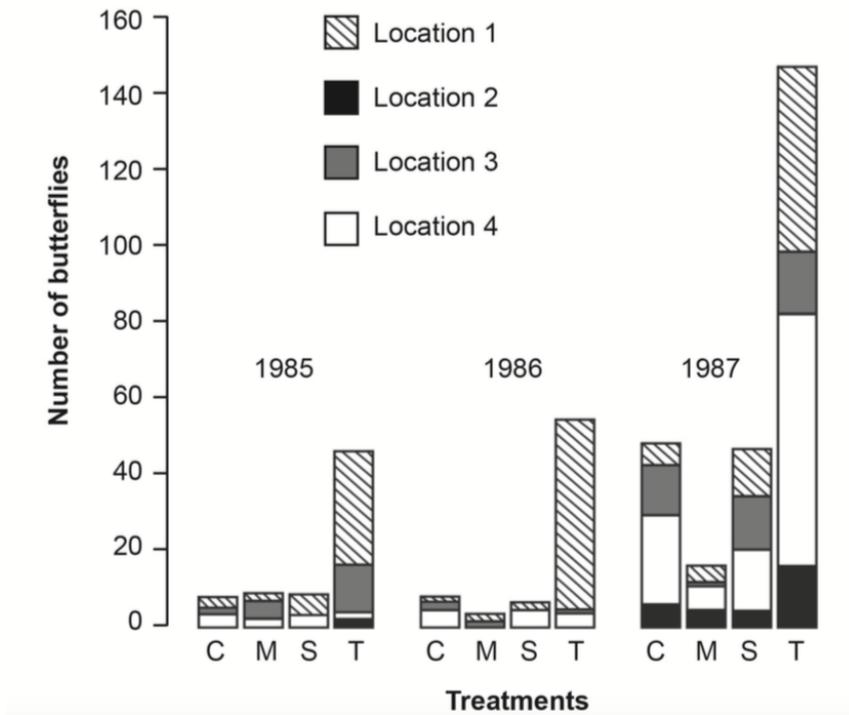
Control (C) = the landscape was left undisturbed.

Mound (M) = the landscape had a limestone mound to encourage the growth of specific plants.

Short (S) = the landscape was sown with short-growing grasses and wild flowers.

Tall (T) = the landscape was sown with tall-growing grasses and wild flowers.

The biologists then monitored the numbers of butterflies on each treatment at each location for three years. The results are shown in the graph below. The treatments are shown on the horizontal axis and the result for each of the four locations is shown with different patterns in the bars.



6. The dependent variable in this experiment is the:
- (a) number of butterflies.
  - (b) landscape treatment.
  - (c) location at which the experiment took place.
  - (d) year in which the measurement was taken.
7. Which of the following is a suitable hypothesis for the experiment?
- (a) Does landscape treatment influence the number of butterflies at a location?
  - (b) Landscape treatment does not influence the number of butterflies at location.
  - (c) Is the number of butterflies the same at different locations?
  - (d) The number of butterflies is the same at different locations.

8. Four organelles are shown in the electron micrographs below.

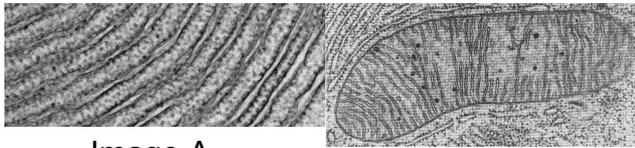


Image A

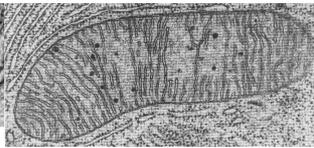


Image B

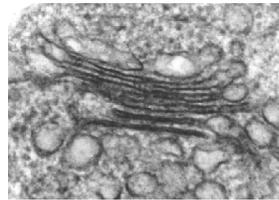


Image C

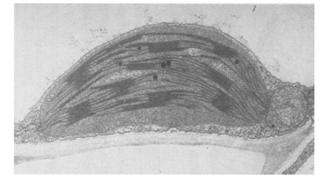


Image D

Which student correctly names for the organelles?

	Image A	Image B	Image C	Image D
(a)	Mitochondria	Nucleus	Golgi body	Ribosome
(b)	Golgi Body	Chloroplast	Smooth Endoplasmic Reticulum	Mitochondria
(c)	Rough Endoplasmic Reticulum	Nucleus	Cell Membrane	Chloroplast
(d)	Rough Endoplasmic Reticulum	Mitochondria	Golgi body	Chloroplast

9. An 8.0cm long strand of the filamentous alga Spirogyra was examined under the microscope. It was seen to be made of a single chain of long, cylindrical cells joined end to end. The average length of a cell was 400µm. The closest estimate of the number of cells in the strand is;

- (a) 200.
- (b) 2 000.
- (c) 500.
- (d) 5 000.

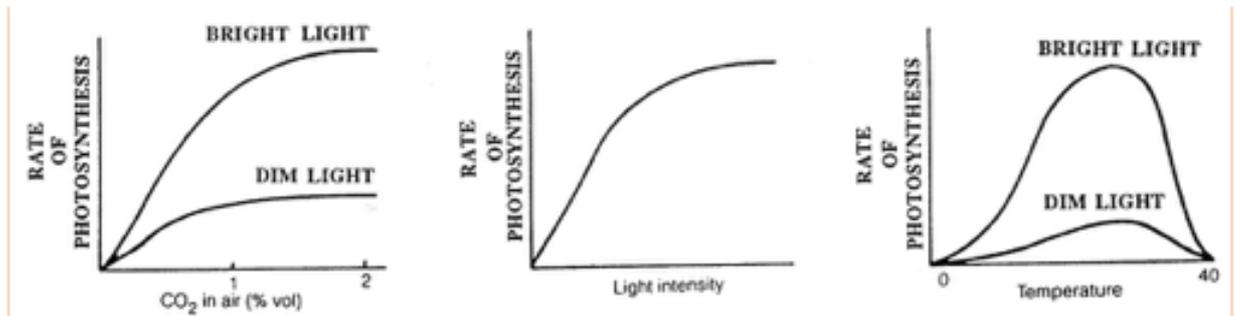
10. The results of a scientific experiment will be more reliable if:

- (a) the experiment is repeated.
- (b) outliers are removed.
- (c) a controlled variable is included
- (d) the experimental method is changed.

**The next three questions refer to the following information:**

A student conducted a brief investigation into the feeding habits of hermit crabs. She fed some hermit crabs wheat and other hermit crabs barley. She then recorded their growth rate by measuring their mass.

10. Given the description of this investigation, which statement represents the hypothesis being tested?
- (a) A diet of wheat contains more protein than a diet of barley.
  - (b) On a daily basis, Hermit crabs digest wheat more easily than barley.
  - (c) Hermit crabs consume more wheat than barley.
  - (d) Hermit crabs grow quicker on a wheat diet than on a barley diet.
11. Which one of the following would best help you determine the reliability of the results of this one investigation?
- (a) The presence of a control group.
  - (b) The number and type of variables that were controlled.
  - (c) The size of the sample.
  - (d) The species and age of the hermit crabs investigated.
12. A control group for this experiment would consist of:
- (a) Hermit crabs of the same sex, health, age and species.
  - (b) The use of multiple trials and replicates.
  - (c) Either the crabs fed wheat or the crabs fed barley.
  - (d) Crabs of a different species.
13. The effects of carbon dioxide concentration, light intensity and temperature on the rate of photosynthesis are shown below.

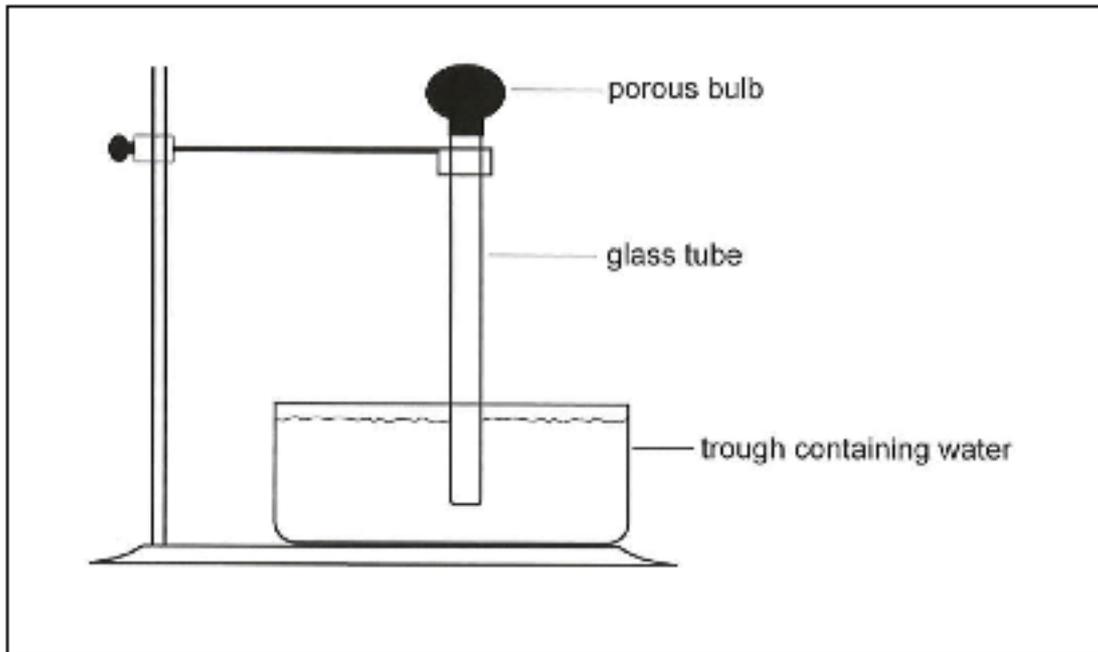


What conclusion can be drawn from these graphs?

- (a) Carbon dioxide is a limiting factor for photosynthesis.
  - (b) Light intensity is not a limiting factor for photosynthesis.
  - (c) Temperature is not a limiting factor for photosynthesis.
  - (d) Oxygen is a limiting factor for photosynthesis.
14. Investigations into the structure of the plasma membrane of beetroot cells showed that when slices of beetroot were placed in a strong acid, pigment normally contained in the vacuoles of the cells leaked into the surrounding solution. This experiment supports the idea that the plasma membrane is composed of a substantial amount of:
- (a) carbohydrates.
  - (b) water.
  - (c) proteins.
  - (d) nucleotides.
15. Eukaryotic cells have membrane-bound organelles that result in the formation of compartment-like structures.
- This is useful for a cell because it:
- (a) enables particular molecules to selectively enter and exit the cell.
  - (b) maintains the total isolation of the nucleus from the cytosol.
  - (c) provides a structural network that acts to support the cell.
  - (d) creates a variety of intracellular environments.

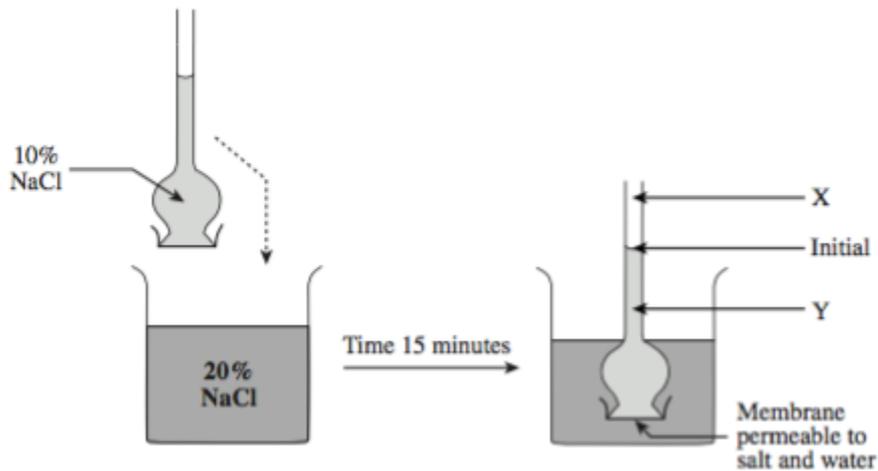
**The following diagram shows a model that represents a process in a typical plant.**

Use this diagram to respond to questions 16 and 17.



16. If the bulb represents a leaf, what occurs at the bulb to produce an upward stream of water?
- (a) water evaporates.
  - (b) a vacuum is produced.
  - (c) air forces the water out of the bulb.
  - (d) there is more salt in the leaf (bulb) than there is in the trough.
17. What part of a plant would the glass tube represent?
- (a) Phloem.
  - (b) Root hair cells.
  - (c) Stomata.
  - (d) Xylem.
18. A thistle tube contains 10% solution of NaCl and the end is covered by a semi-permeable membrane which is permeable to salt and water. It is placed in a

beaker containing a 20% salt solution.

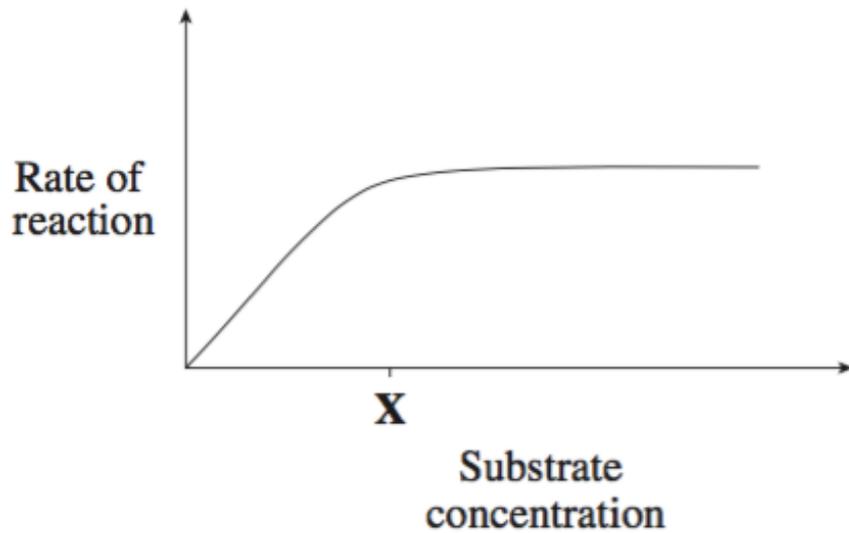


After 15 minutes the concentration of the solution in the tube has:

- (a) increased and the solution level will be at **X**.
  - (b) decreased and the solution level will be at **X**.
  - (c) increased and the solution level will be at **Y**.
  - (d) decreased and the solution level will be at **Y**.
19. Which of the following most affects the collision rate between the enzyme and the substrate molecules in a solution?
- (a) The pH of the solution.
  - (b) The presence of other molecules in solution.
  - (c) The shape of the enzyme.
  - (d) The temperature of the solution.
20. Which line of the table correctly identifies the main organs of gas exchange in each organism?

	<b>locust</b>	<b>shark</b>	<b>paramecium</b>	<b>whale</b>
(a)	lungs	lungs	gills	blow hole
(b)	tracheal tubes	gills	body surface	lungs
(c)	tracheal tubes	lungs	gills	lungs
(d)	lungs	gills	body surface	gills

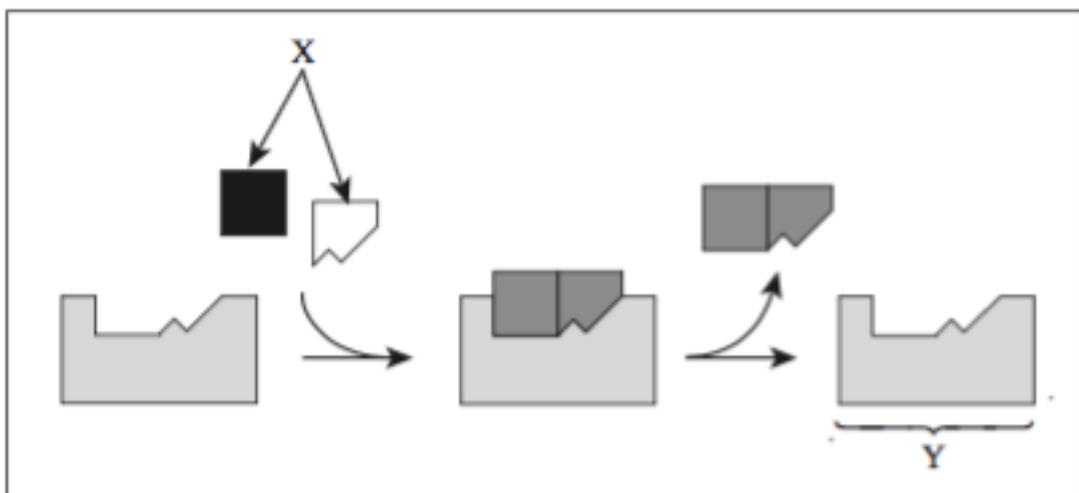
21. The graph illustrates the effect of substrate concentration on the rate of an enzyme-catalyzed reaction.



Why does the rate of the reaction show no further increase after the concentration indicated at **X**?

- (a) The shape of the active sites is changed.
- (b) All the substrate has been used up in the reaction.
- (c) The substrate is too concentrated to react with the enzyme.
- (d) All of the enzyme's active sites are occupied by the substrate.

Use the following diagram to answer questions 22 and 23



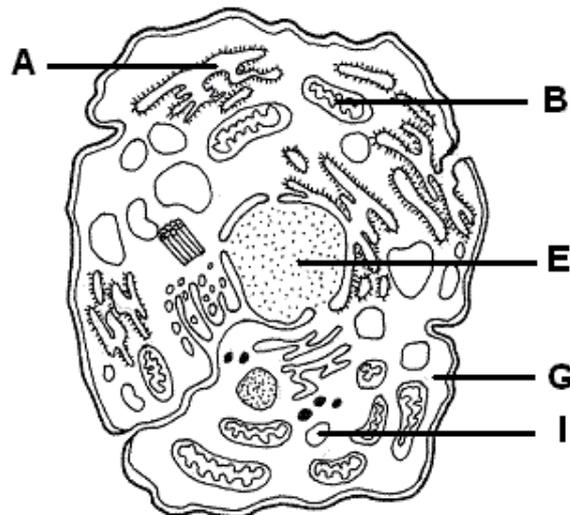
22. What are the structures labelled **X**?

- (a) Products.
- (b) Enzymes.
- (c) Substrates.
- (d) active sites.

23. A permanent change in the shape of structure **Y** is called:

- (a) inhibition.
- (b) metabolism.
- (c) denaturation.
- (d) activation energy.

The following questions relate to the diagram of a cell shown below.

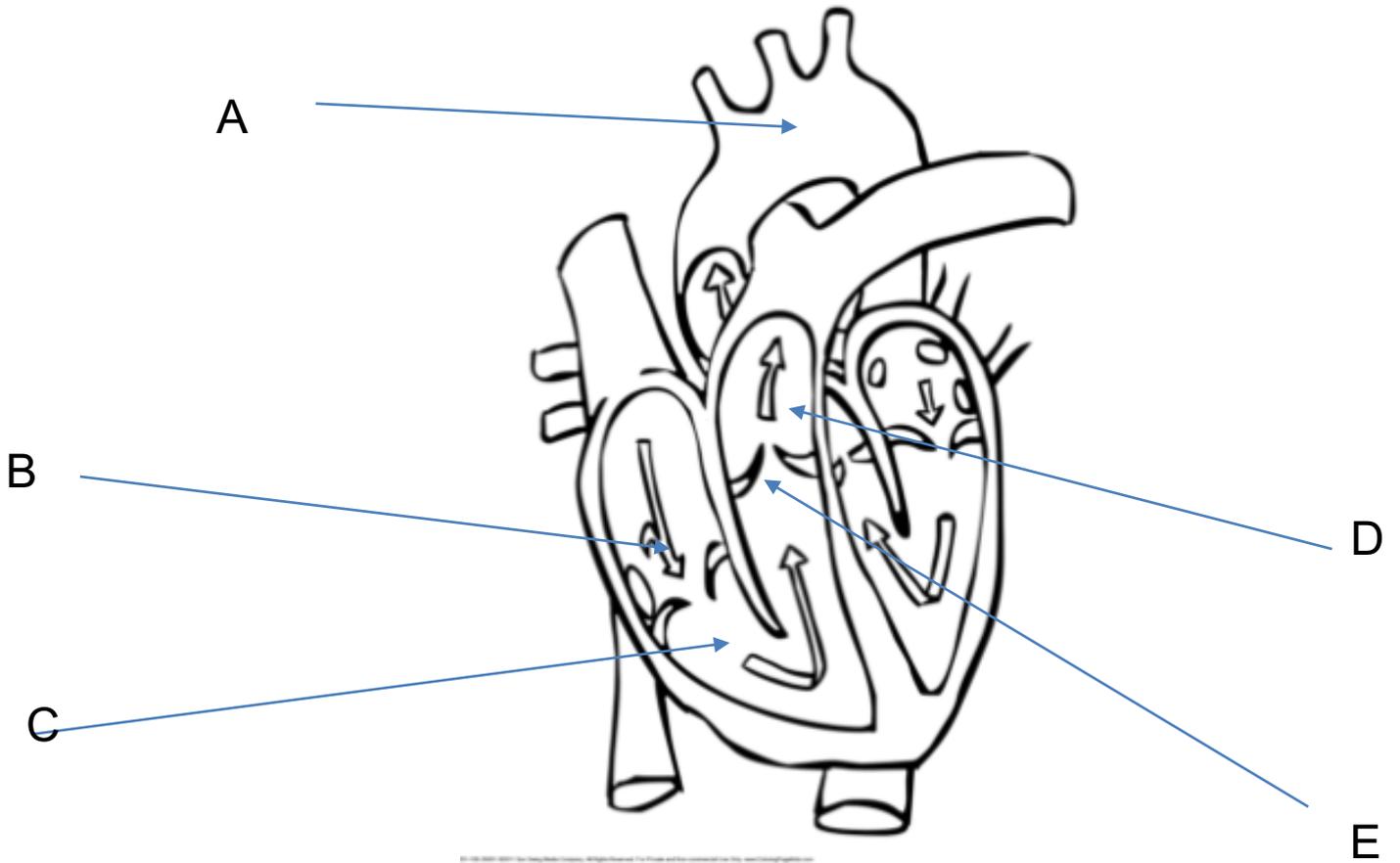


**An animal cell**

25. What is the function of the organelle labelled B?

- (a) To make ATP.
- (b) To synthesize proteins.
- (c) To hydrolyze food particles.
- (d) To package and modify proteins.

26. What is the function of the organelle labelled I?
- (a) To make ATP.
  - (b) To synthesize proteins.
  - (c) To hydrolyze food particles.
  - (d) To package and modify proteins.
27. What is the function of the organelle labelled A?
- (a) To make ATP.
  - (a) To synthesize proteins.
  - (b) To hydrolyze food particles.
  - (c) To package and modify proteins.
28. The greatest advantage of closed circulatory systems compared to open circulatory systems is
- (a) The pressure in vessels remains high
  - (b) The circulation times are faster
  - (c) Nutrients can be carried in the circulating fluid
  - (d) A muscular heart is used to pump fluid
29. Compared to a single circulation, a double circulation
- (a) takes twice as long for blood to pass around the body
  - (b) sends blood through the heart twice for every once around the body
  - (c) contains both red blood cells and white blood cells
  - (d) carries two essentials for the body: ie oxygen and nutrients



30. Which of the following statements about the heart above is true?
- (a) There will be more oxygen in the blood at B than at A
  - (b) The curved structures E force the blood to travel one way
  - (c) Blood at B will be at higher pressure than at C
  - (d) C is an atrium with thick walls, D is a ventricle

**END OF SECTION ONE**

**Section Two: Short answer**

**80 Marks**

This section has **six (6)** questions. Answer **all** questions. Write your answers in the space provided in this Question/Answer Booklet. Wherever possible, confine your answers to the line spaces provided. Use a blue or black pen (**not** pencil) for this section.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- **Planning:** If you use the spare pages for planning, indicate this clearly at the top of the page.
- **Continuing an answer:** If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

**Suggested working time for this section is 85 minutes.**

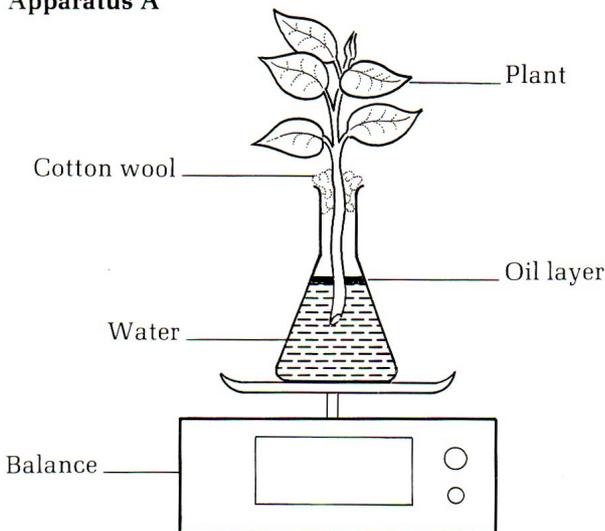
---

**Question 26**

**20 marks**

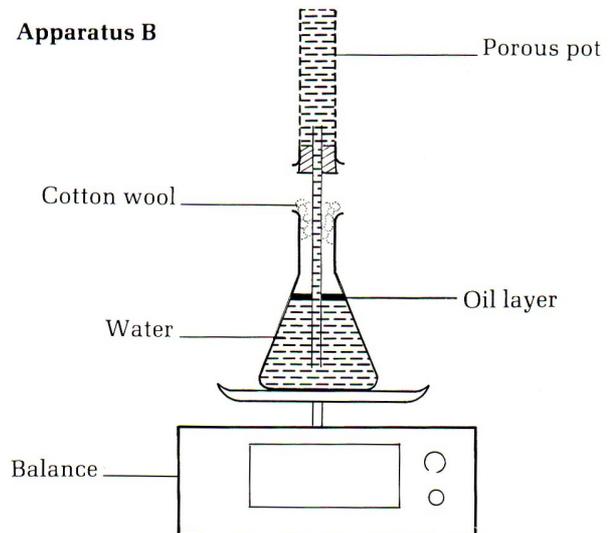
An investigation was carried out to study the effect of light intensity on the opening and closing of the stomatal pores. The procedure was carried out as follows;

**Apparatus A**



Apparatus A was used to measure the rate of water loss from the leaves at several light intensities.

**Apparatus B**



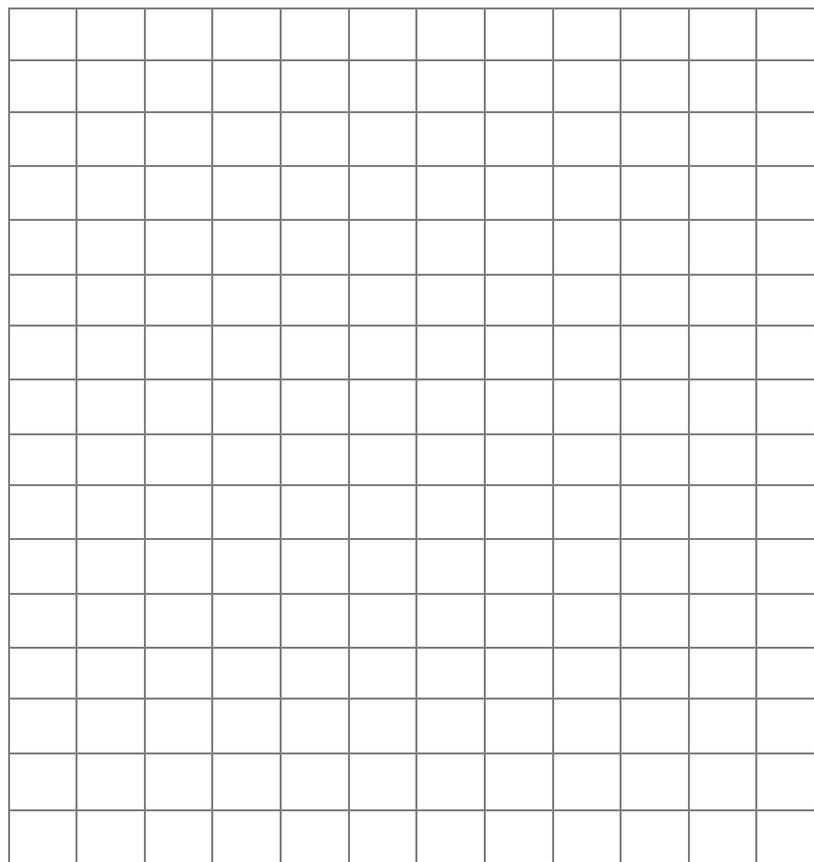
Apparatus B was used to measure water loss through a porous pot during the same period

At each light intensity the apparatus was left for 15 minutes before starting the measurements. The water loss was recorded in the dark and four different light intensities.

The results are shown in the table below.

<b>Light Intensity (kilolux)</b>	<b>A Loss of water (g/hour)</b>	<b>B Loss of water (g/hour)</b>
0	1	20
10	15	20
20	20	20
30	22	20
50	22	20

- a. Plot a line graph of water loss from the plant against increasing light intensity. Spare graph paper at end of examination.



- b. State the relationship between light intensity and water loss, as seen in the plant apparatus.

---



---

2 marks

- c. What evidence from the data supports the statement that the stomata are fully open at a light intensity of 30 kilolux?

---



---

1 mark

- d. How do the results from Apparatus B allow you to conclude that other environmental factors remain unchanged during the period of experimental investigation?

---



---

2 marks

- e. Predict what would be the effect on the results if the investigation is carried out at a lower temperature. Explain your prediction.

---



---

2 marks

- f. Explain why an oil layer over the water surface in the flasks makes the results more reliable.

---



---

1 mark

- g. Without modifying the apparatus, how could you improve the reliability of the results obtained at each light intensity?

---



---

1 Mark

h. A number of forces are required to move materials through the xylem.

Name and describe three (3) of these forces.

Force #1 \_\_\_\_\_

\_\_\_\_\_

Force #2 \_\_\_\_\_

\_\_\_\_\_

Force #3 \_\_\_\_\_

\_\_\_\_\_

6 marks

**Question 27**

**22 marks**

- a. A biologist took two identical containers, one (A) filled with normal air containing 20% oxygen and the other (B) filled with 100% carbon dioxide. Into each container she put matching test tubes of warm glucose solution containing yeast cells. After three hours the number of yeast cell was measured.

In A, yeast cells increased by over 8 times their original number.

In B, yeast cells increased by only 1.5 times the original number.

- i. What type of division would the yeast cells have undergone in both tubes?

---

1 mark

- ii. What different processes occurred within the yeast cells in container A and container B?

A. \_\_\_\_\_

B. \_\_\_\_\_

2 marks

- iii. Outline in the table below the difference between the processes in A and B, in terms of the inputs and outputs of all key molecules, and where in the cell the processes occurred.

	Container A	Container B
Inputs		
Outputs:		
Site/s within cell		

8 marks

- iv. Why did a difference in the environment of the yeast cells lead to a large difference in the cell numbers produced?

---

---

---

2 marks

- v. If glucose were continually added to each container, which of A or B would continue to have a healthy colony of yeast cells? Justify your answer.

---

---

---

2 marks

- b. Plants are often termed 'producers' as they produce their own food with energy from the sun.

- i. Name the 'food' that plants produce.

---

1 mark

- ii. A biologist placed a potted plant into a sealed air-filled container with a probe to measure gas concentrations. When the plant was put into strong sunlight the oxygen concentration in the container increased.

Describe the cell processes causing this increase.

---

---

---

---

3 marks

- iii. The biologist measured the rate of oxygen production of the plant and found it was 50 ppm (parts per million) per second. She then filled the container with 100% carbon dioxide, keeping all other conditions the same.

Describe and explain what she would observe about the rate of oxygen production.

---

---

---

---

2 marks

**Question 28**

**12 marks**

- a. Cells come in a wide variety of shapes and sizes.

(i) State a shape that has a high surface area to volume ratio.

---

1 mark

(ii) State a shape that has a low surface area to volume ratio.

---

1 mark

(iii) Some cells have a high surface area to volume ratio. Describe how a high surface area to volume ratio beneficial to a cell.

---

---

3 marks

b. The transport of materials into and out of a cell can be active or passive.

(i) State the main difference between active and passive transport.

---

2 marks

(ii) Name **two** types of active transport.

---

---

2 marks

c. Name the energy-storing molecule that is produced by aerobic respiration and describe how this molecule stores and releases energy.

---

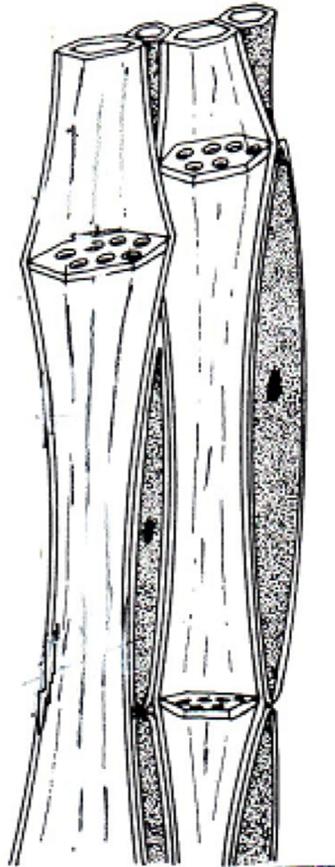
---

---

---

4 marks

The figure below shows, in longitudinal section, a tissue which occurs in the roots, stems and leaves of flowering plants



a. Describe the function of this tissue.

---

---

1 mark

b. With reference to two specific features of the structure of this tissue, explain how it is suited to its function.

---

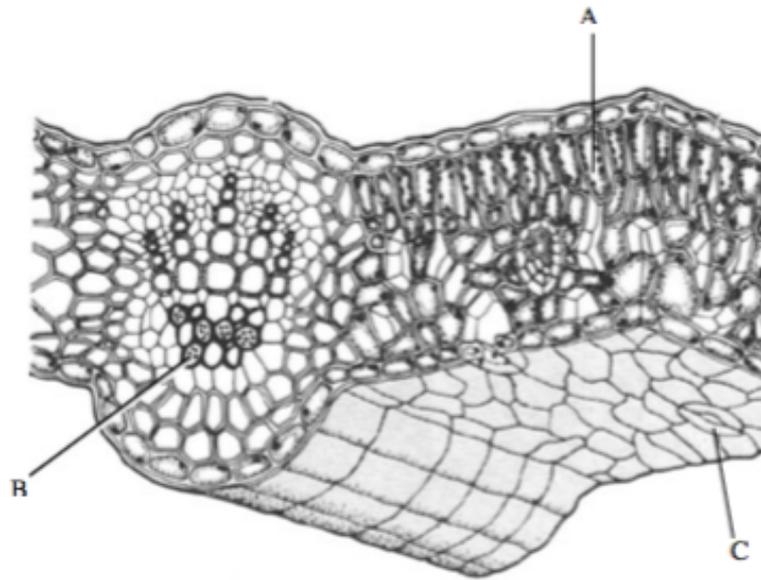
---

---

---

4 marks

This question refers to the leaf section diagram given below.



c. Name **ONE** of the cell types labelled A or C.

---

1 mark

d. Outline and explain **TWO** ways in which the structure of cell selected for 29c suits its function.

---

---

---

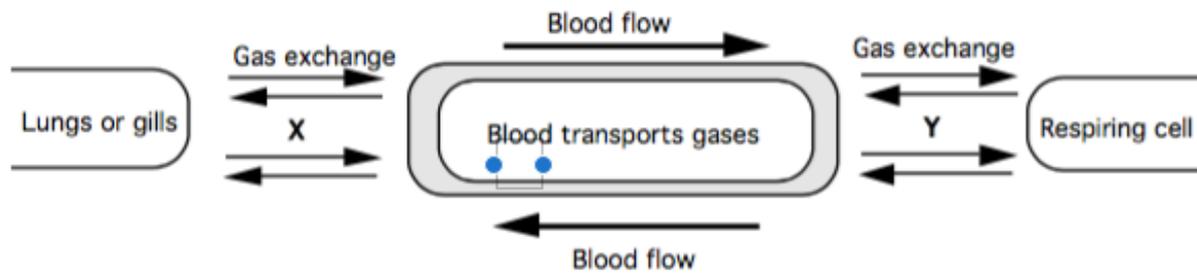
---

4 marks

**Question 30**

**5 marks**

The diagram below represents the gas exchange between an organism and its environment.



(i) Name **two** gases exchanged at point X.

---



---

2 marks

(ii) Name the process by which gases are exchanged at points X and Y.

---



---

1 mark

(iii) List **two** structural characteristics that make lungs and gills efficient surfaces for gas exchange.

---



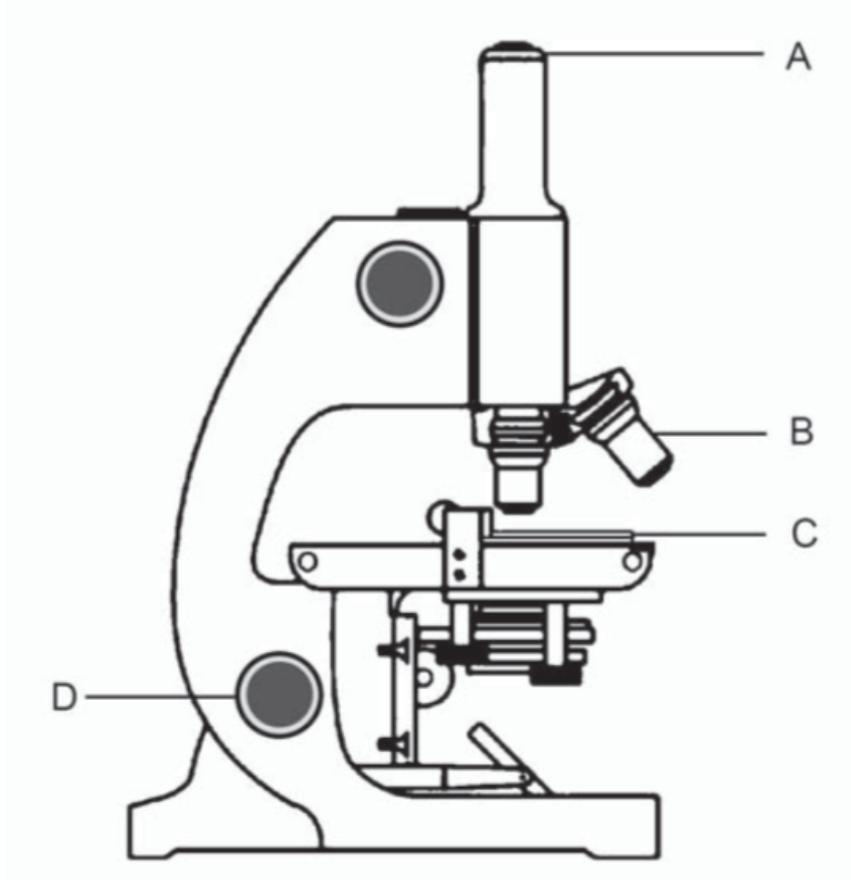
---

2 marks

**Question 31**

**11 marks**

Refer to the following diagram of a light microscope, where four parts have been labelled 'A' to 'D'.



(a)

(i) Name the parts labelled 'A' and 'B'

A: \_\_\_\_\_

B: \_\_\_\_\_

1 mark

(ii) State the functions of the parts labelled 'C' and 'D'.

C: \_\_\_\_\_

\_\_\_\_\_

D: \_\_\_\_\_

\_\_\_\_\_

2 marks

(b) A student used a special tool called a microtome to take a very thin section of plant root tip. The student placed the section on a slide, added a stain and examined the preparation under a light (compound) microscope.

(i) Why was it important for the student to take a thin section? 1 mark

---

(ii) When examining the preparation under the microscope, should the student start with high or low power? Why?

---

---

2 marks

(c) The student examined the preparation under the microscope at low power.

(i) Explain how the student could determine the magnification of the image.

---

---

2 marks

(ii) Explain in detail how the student could determine the diameter of the field of view.

---

---

---

---

3 marks

**Section Three: Extended answer 20 Marks**

This section contains **three (3)** questions. You must answer **two (2)** questions. Write your answer in the space provided. Each question carries ten (10) marks.

Answers may be presented in different ways provided they communicate your ideas effectively.

You may choose to:

- present a clearly labelled diagram
- write notes beside a clear diagram
- write lists of points, with sentences which link them
- write concisely worded sentences

Use blue or black pen for written answers and pencil for diagrams. Crossing out of incorrect material is acceptable and preferred to using correction fluid.

Spare pages are included at the end of this booklet. They can be used for:

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

**Suggested working time for this section is 25 minutes.**

---

**Answer any two questions from 32 to 34.**

**Each is worth 10 marks**

**Indicate the questions you will answer by ticking the boxes next to the questions.**

32. Name and describe a current model of cell membrane structure and function, including a labelled diagram in your answer. Describe how three (3) distinctly different types of molecules pass through the membrane. (10 marks)
33. a) In relation to fish gills, what is meant by countercurrent flow? (4 marks)  
b) Why is countercurrent flow an efficient means of exchanging gases across the gills of fish. (4 marks)  
c) Water flow over fish gills is one-way whereas the flow of air in and out of the lungs is two-way. Suggest why one way flow is an advantage to fish. (2 marks)
34. Describe the light dependent and light-independent reactions of photosynthesis in terms of the sites at which they occur, requirements and products. Include a labelled diagram of the organelle where photosynthesis occurs. (10 marks)

**END OF QUESTIONS**

---

---

Spare grid for Q 26. If you use this grid, cancel the one on p15 and indicate clearly that you are re-doing your graph here.

