

2005

PRELIMINARY COURSE

**TERM 2 (Y11) ASSESSMENT TASK –
THEORY EXAMINATION (PATTERNS
IN NATURE)**

BIOLOGY

General Instructions

- Reading time – 5 minutes
- Working time – 30 minutes
- Write using black or blue pen

- Draw diagrams using pencil
- Write your Student Number on the Part A Answer Sheet and the Part B Question and Answer Book

Total marks for this paper: 36

This paper has two parts, Part A and Part B

Part A

Total marks (5)

- Attempt all questions
- Allow about 5 minutes for this part

Part B

Total marks (31)

- Attempt all questions
- Allow about 25 minutes for this part

PART A

Total marks (5)

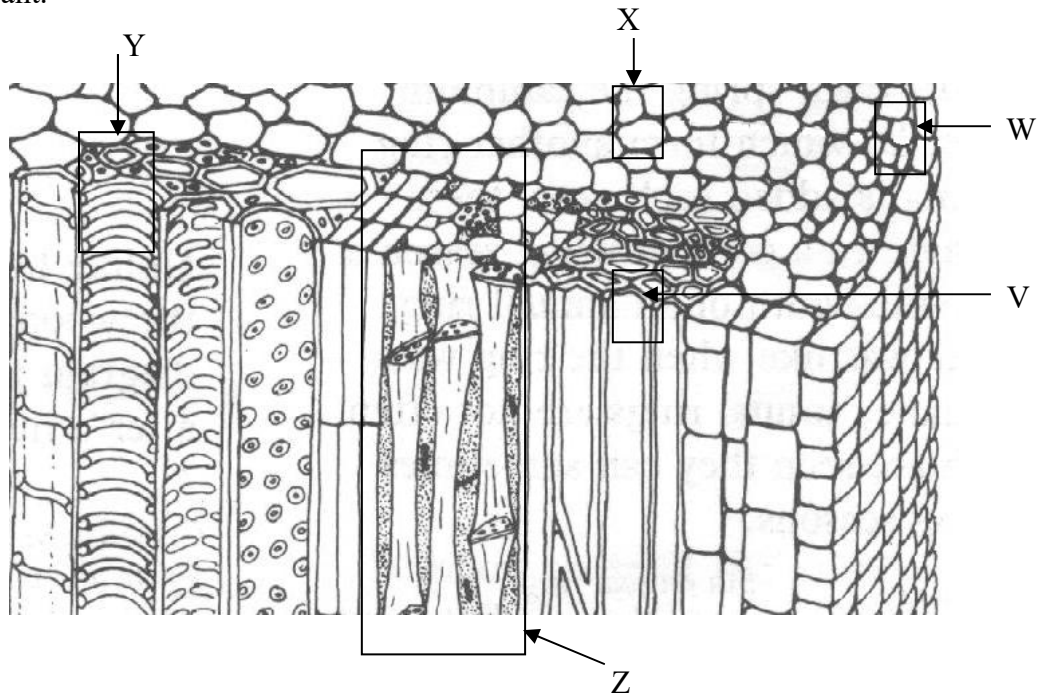
There are 5 questions in this part. Attempt all questions.

Each question is worth one mark.

Allow about 5 minutes for this part.

Select the most appropriate answer and use ink to place an X in the corresponding space on your answer sheet.

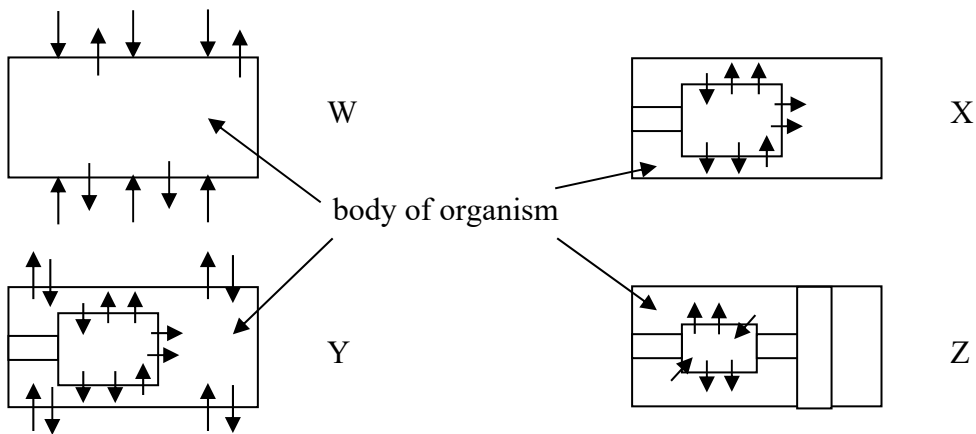
Questions 1 and 2 refer to the diagram, which shows a longitudinal section of the stem of a flowering plant.



- What is the major function of the tissue labelled 'Z'?
 - Provides support and structure to the stem.
 - Transport of sugars through the stem.
 - Transport of water through the stem.
 - Transport of gases in and out of the stem.
- Which area of the stem represents the location of lenticels when they appear later in the plant's development?
 - V
 - W
 - X
 - Y

3. Which organism does not require a blood transport system to transport the gases involved in respiration?
- (A) frogs
 (B) insects
 (C) mammals
 (D) fish

Questions 4 to 5 refer to the diagrams, which represent the respiratory systems of several different types of organisms – frog, fish, possum and an earthworm. The small arrows represent the flow of carbon dioxide and oxygen gases.



4. What type of respiratory system is represented by each diagram?

	W	X	Y	Z
(A)	tracheae	gills	lungs	cutaneous
(B)	gills	tracheae	cutaneous	lungs
(C)	lungs	lungs and cutaneous	gills	tracheae
(D)	cutaneous	lungs	lungs and cutaneous	gills

5. Which diagram represents the respiratory system of which organism?

	W	X	Y	Z
(A)	frog	fish	possum	earthworm
(B)	fish	frog	earthworm	possum
(C)	possum	earthworm	fish	frog
(D)	earthworm	possum	frog	fish

--	--	--	--	--

Part B

Student Number

There are 5 questions in this part. Attempt all questions.

Marks vary for each question.

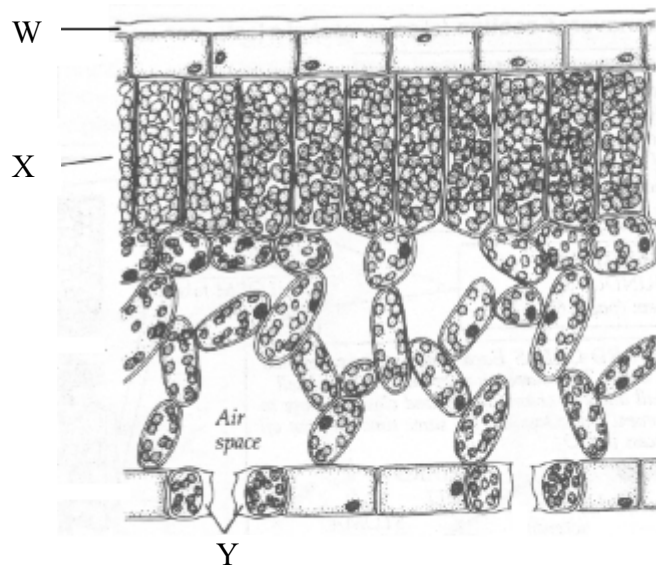
Answer the questions in the spaces provided in this Part B Question and Answer Book.

Write your student number at the top of each page.

Allow about 25 minutes for this part.

Question 1 (6 marks)

This question refers to the diagram, which represents the cross-section of a leaf.



Complete the table.

Structure	Name of structure	Function
W		
X		
Y		

--	--	--	--	--

Student Number

Question 2 (6 marks)

(a) Write a word equation for photosynthesis. (2 marks)

.....

(b) Describe how you would demonstrate that sunlight is needed for photosynthesis in plants. You may not simply say “plants die when not provided enough light” for your test. (4 marks)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Questions continue over →

--	--	--	--	--

Student Number

Question 3 (4 marks)

(a) Explain the role of transpiration in plants. (2 marks)

.....

.....

.....

.....

(b) Describe the role of root hair cells in transpiration. (2 marks)

.....

.....

.....

.....

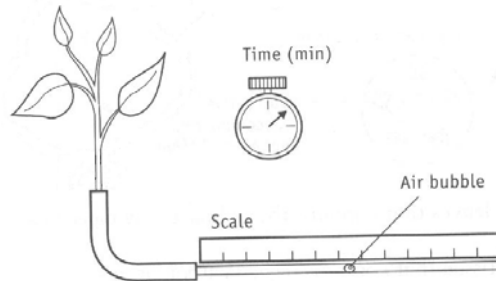
.....

--	--	--	--	--

Student Number

Question 4 (7 marks)

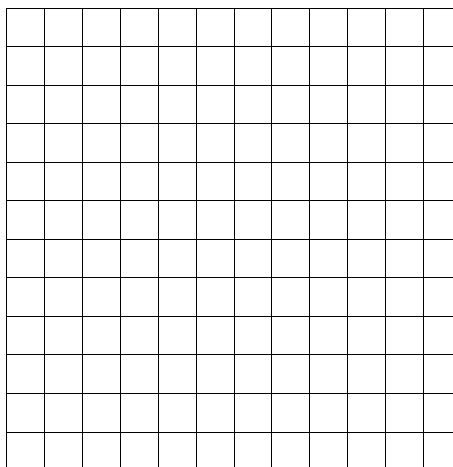
The diagram shows a device called a potometer that enables a measure of the rate of water flow through a plant.



The table contains the results of an investigation of the rate of water movement in a plant as recorded by the movement of the air bubble along the measuring column (scale) for two conditions: 15% humidity and 95% humidity.

Time (hours)	condition: 15% humidity distance air bubble moved (cm)	condition: 95% humidity distance air bubble moved (cm)
0	1	2
1	2	5
2	3	9
3	5	10
4	7	11
5	8	11

- (a) On the grid provided, construct line graphs for the data obtained in the table. Use the same grid for both sets of data. (3 marks)



--	--	--	--	--

Student Number

Question 4 continued.

(b) Describe what the graphs show about the effect of the different conditions on the movement of water through the plant as recorded by the potometer. (2 marks)

.....

.....

.....

.....

(c) Explain the shape of the graph for the 15% humidity condition. (2 marks)

.....

.....

.....

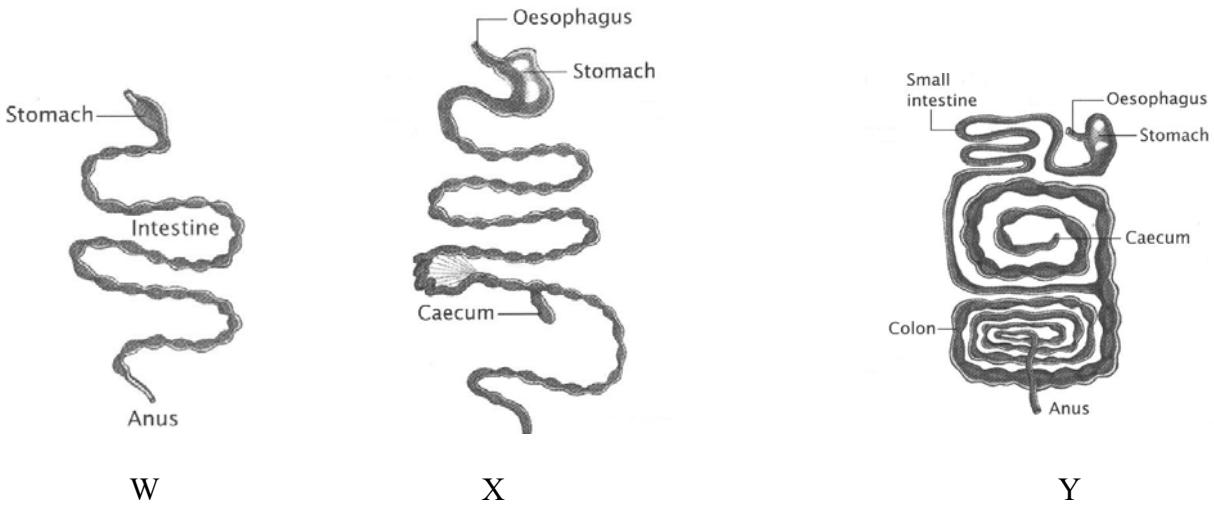
.....

--	--	--	--	--

Student Number

Question 5 (8 marks)

This question refers to the diagrams that represent the digestive systems of a Tasmanian devil (carnivore), koala (herbivore) and a honey possum (nectar feeder). The diagrams are not necessarily in stated order.



(a) Identify which diagram represents the digestive system of the Tasmanian devil (carnivore). Give a reason for your answer. (2 marks)

.....

.....

.....

(b) Identify which diagram represents the digestive system of the koala (herbivore). Give a reason for your answer. (2 marks)

.....

.....

.....

(c) Identify which diagram represents the digestive system of the honey possum (nectar feeder). Give a reason for your answer. (2 marks)

.....

.....

.....

--	--	--	--	--

Student Number

(d) Complete the table. (2 marks)

Name of structure	Function
stomach	
small intestine	

End of theory paper

--	--	--	--	--

Part A Answer Sheet

Student Number

Total marks (5)**There are 5 questions in this part. Attempt all questions.****Each question is worth one mark.****Allow about 8 minutes for this part.****Write your Student Number at the top of this Part A Answer Sheet.**

Select the most appropriate answer and use ink to place an X in the corresponding space on your answer sheet.

	1	2	3	4	5
(A)					
(B)					
(C)					
(D)					

Marking guidelines

Part A

	1	2	3	4	5
(A)					
(B)	X	X	X		
(C)					
(D)				X	X

32

Part B

Question 1 (6 marks)

Structure	Name of structure	Function
W	Cuticle (1)	Acts as a barrier for preventing water loss from leaf and preventing disease-causing organisms such as viruses, bacteria and insects from getting into the leaf. (1)
X	palisade mesophyll cells (1)	Contain chloroplasts for photosynthesis. (1)
Y	guard cells (1)	Determine the size of the stoma thus determining the opening and closing of stomates. (1)

Question 2 (6 marks)

(a) Write a word equation for photosynthesis. (2 marks)

Carbon dioxide + water (+sunlight) → glucose (sugar or starch) + oxygen

(1): reactants, (1): products

- (b) Describe how you would demonstrate that sunlight is needed for photosynthesis in plants. You may not simply say "plants die when not provided enough light" for your test. (4 marks)

Locate two leaves on a plant that is in a sunny position. Ensure the leaves are about the same size and age. Cover one leaf with aluminium foil for 10 days; leave the other leaf uncovered. After 10 days, remove both leaves from the plant and perform the following test on them. Firstly, cut sections off each leaf and put them in a small beaker of methylated spirits. Place the small beaker of methylated spirits in a large beaker of water thus forming a water bath. Heat the water. This process removes the chlorophyll from the leaves thus removing the green colour of the leaf. Next, place the sections of each leaf onto separate petri dishes (one labelled 'sunlight-exposed leaf', the other labelled 'no sunlight leaf'). Add iodine and observe for any colour change. If starch is present – due to photosynthesis – the iodine will change colour from brown to black/blue. The leaf exposed to sunlight should contain starch and give a positive test. The leaf with no light should not contain starch and thus give a negative test (no change to the iodine colour).

- (1) comparison situation: no sunlight condition and light condition
 (2) for 2 distinct steps described for the procedure (e.g., "place leaves in methylated spirits"; "add iodine") *or* *indicating starch is being tested for*
 (1) for stating the expected result of the procedure (e.g., "sunlight leaf contains starch and thus iodine changes colour"; "no sunlight leaf does not change the iodine's colour").

1 no sunlight/sunlight condition
 1 same plant (i.e. same genes)
 1 same H₂O, soil (must state both)
 not a valid test *was affect*
 starch test *at plant*

Question 3 (4 marks)

- (a) Explain the role of transpiration in plants. (2 marks)

Transpiration enables the uptake and movement of water and minerals in the plant. This enables the plant to obtain water for use in photosynthesis, transport material through the plant (translocation) and for heat balancing purposes. Transpiration also causes minerals and salts to move through the plant.

- (1): water *into plant / throughout plant* (1): minerals *or other vils e.g. water used for P.S. e.g. H₂O used for metabolism/respiration.*

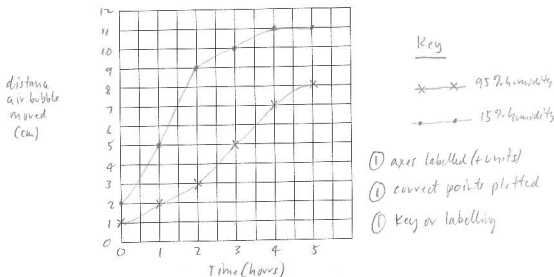
- (b) Describe the role of root hair cells in transpiration. (2 marks)

Root hair cells enable the absorption of water and minerals from the soil into the plant. This occurs via their finger-like shape, which gives them an increased surface area.

- (1): uptake of water (1): increased surface area *or other vils ∴ salt; H₂O moves in via osmosis in the vils*

Question 4 (7 marks)

- (a) On the grid provided, construct line graphs for the data obtained in the table. Use the same grid for both sets of data. (3 marks)



- (b) Describe what the graphs show about the effect of the different conditions on the movement of water through the plant as recorded by the potometer. (2 marks)

The 15% humidity condition had a greater rate of transpiration (greater rate of water movement) than the 95% humidity condition for the first 3 seconds. However, transpiration stopped in the 15% condition in the last 2 seconds. Thus, water movement ceased in the last 2 seconds for the 15% condition. Water moved through the plant throughout the time allocated for the 95% condition.

- (1): correct description for the water movement in the 15% condition. *"low humidity had greater loss" (1)*
 (1): correct description of the water movement in the 95% condition. *"must include 'limited' part of set (1)"*

- (c) Explain the shape of the graph for the 15% humidity condition. (2 marks)

The steep line (high slope) indicates rapid water movement through the plant. This is a result of the low humidity (dry air), which causes water to diffuse from the leaf to the dry air. The plateau effect is a result of the leaf closing its stomates in order to prevent excessive water loss from the plant.

- (1): steep slope explanation. *must mention water movement (transpiration rate)*
 (1): plateau explanation. (e.g. "due to other limiting factors") *maximise (1) for description of graph*

Question 5 (8 marks)

- (a) Identify which diagram represents the digestive system of the Tasmanian devil. Give a reason for your answer. (2 marks)

X = Tasmanian devil. (1) is a carnivore, which has a short small intestine since it does not have a plant or carbohydrate-based diet - such diets require a longer small intestine for the digestion (breaking into smaller pieces) of food and absorption of nutrients. It has a large stomach, in which most of the digestion occurs. (1)

caecum is small (1)
must mention another reason
R order to differentiate from 'W' (nectar feeder)
must mention this, to get the 2nd mark

- (b) Identify which diagram represents the digestive system of the koala (herbivore). Give a reason for your answer. (2 marks)

Y = Koala. (1) Long caecum which contains bacteria thus enabling the digestion of plant-based diet. (1)

- (c) Identify which diagram represents the digestive system of the honey possum (nectar feeder). Give a reason for your answer. (2 marks)

W = Possum. (1) Simple digestive system since nectar contains mainly simple carbohydrates thus not much digestion involved. (1)

- (d) Complete the table. (2 marks)

Name of structure	Function
stomach	Holds food ball; some breaking down of proteins occur. (1)
small intestine	Digestion and absorption of food material. (1)