

MARKER CODE				



Student Enrolment Number (SEN)									

TONGA FORM SIX CERTIFICATE

2017

BIOLOGY

QUESTION AND ANSWER BOOKLET

Time allowed: 3 Hours

INSTRUCTIONS:

1. Write your **Student Enrolment Number (SEN)** on the top right-hand corner of this page.
2. This examination booklet has THREE sections. All sections are **compulsory**.

SECTION		Pages	Total Weight
A	Multiple Choice	2-7	10
B	Short Answer	8-26	54
C	Extended Response Questions	27-32	15
		35	75

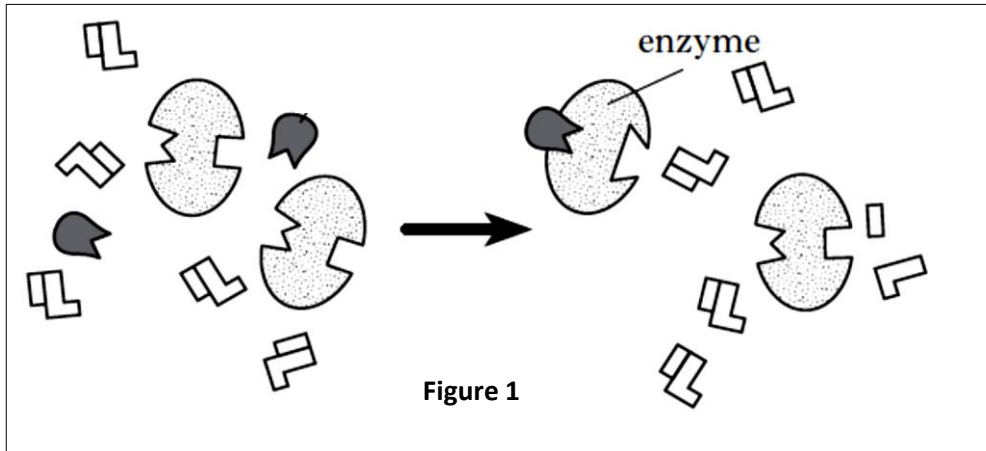
3. Additional sheets of paper can be obtained from your supervisor if necessary. Write your **Student Enrolment Number (SEN)** on each addition sheet and number the questions clearly and insert them in the appropriate part of your booklet.
4. Check that this booklet contains pages **2-35** in the correct order and that page 33-35 has been deliberately left blank.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR BEFORE YOU LEAVE
THE EXAMINATION ROOM**

SECTION A: MULTIPLE CHOICE

Circle the **LETTER** of the BEST answer.

1. **Figure 1** below illustrates an enzyme – catalyzed reaction.



Which concept of ‘enzyme’ is correctly defined by the reaction illustrated in **Figure 1**?

- A. Enzyme active-site
- B. Enzyme specificity
- C. Substrate active site
- D. Substrate specificity

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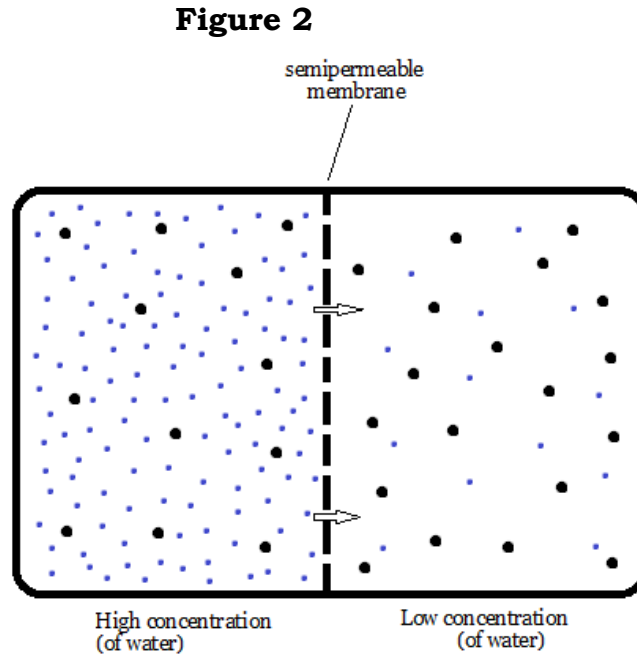
2. Examine **table 1** to determine which statement is true about the definition of ‘Photosynthesis’ in green plants?

Table 1

	<i>Source of Energy</i>	<i>Converted to</i>	<i>Converted to</i>
A	ATP Chemical Energy	Sunlight Energy	Glucose Chemical Energy
B	ATP Chemical Energy	Glucose Chemical Energy	Sunlight Energy
C	Light Energy	ATP Chemical Energy	Glucose Chemical Energy
D	Light Energy	Glucose Chemical Energy	ATP Chemical Energy

Skill level 1	
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3. **Figure 2** shows the movement of water particles across a semi-permeable membrane.



From your understanding of the concepts of '**Transport Processes**', what process is represented in the diagram above.

- A. diffusion
- B. active transport
- C. osmosis
- D. facilitated diffusion

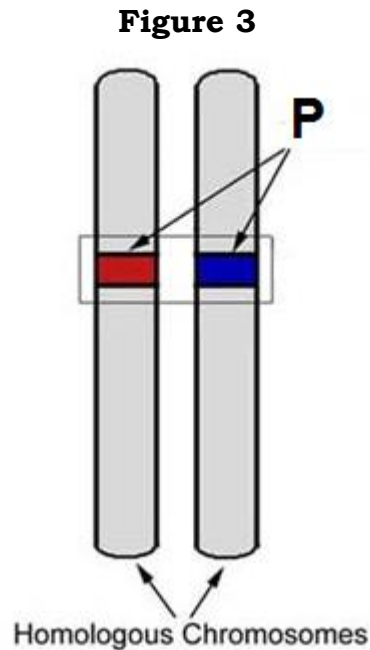
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4. Which of the following examples belong to the Phylum Mollusca?

	Examples
A	oysters, mussels, squids, octopus
B	spiders, millipede, butterfly, centipede
C	liver fluke, hookworm, planarian, earthworm
D	Sea urchin, sea stars, starfish, sea gull

Skill level 1	
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5. **Figure 3** shows a pair of chromosome from the same cell.



What do the lines labelled **P** point to?

- A. the site of alleles made up of two or more genes which are always the same.
 - B. the site of alleles made up of two or more genes which might be different.
 - C. the site of genes made up of two or more alleles which are always the same.
 - D. the site of genes made up of two or more alleles which might be different.
6. In 2000, two different species of mice were set free on an island where they had never lived before. The table shows the “Population Size” changing in the next six years.

Year	Mice Population Species 1	Mice Population Species 2
2000	15	15
2001	62	86
2002	237	237
2003	531	105
2004	926	95
2005	456	60
2006	629	15

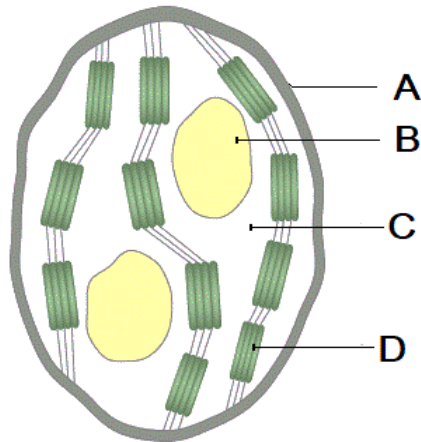
With reference to **Gause's Principle**, what can be concluded from this data?

- A. Both species are occupying independent habitats
- B. Both species are occupying different habitats
- C. Both species have similar ecological niches
- D. Both species have different ecological niches

Skill level 1	
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7. Dark Phase Reaction (DPR) is part of the **Photosynthesis Process**.

Figure 4



Which structure (A-D) of **Figure 4** would the Dark Phase Reaction specifically occur?

- A. A
- B. B
- C. C
- D. D

Skill level 1	
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8. Bats are able to hibernate through winter. Hibernation enable bats to live in a variety of climates, surviving through cold temperatures and limited food supplies in winter.

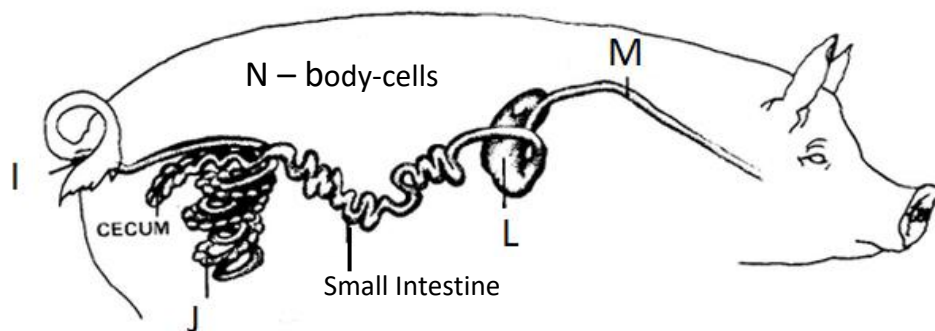
Which 'adaptive feature' do bats show when they hibernate?

- A. Structural
- B. Behavioral
- C. Morphological
- D. Physiological

Skill level 1	
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9. **Figure 5** outlines a simple show of the digestive tract of a pig.

Figure 5

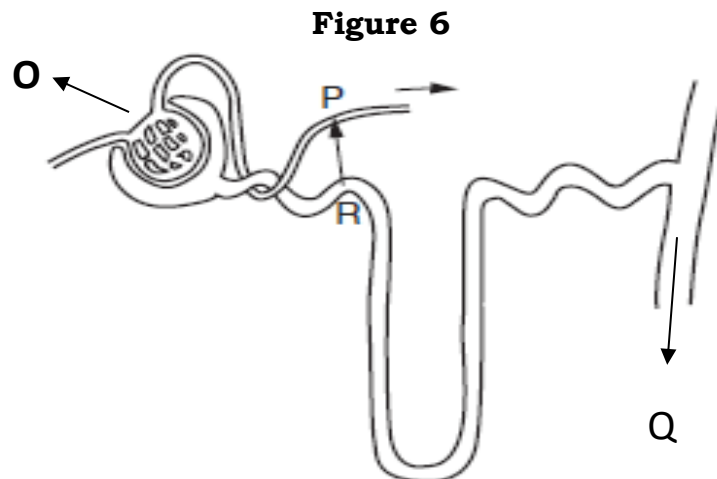


Which of the following statement defines the process of **absorption** in the small intestine?

- A. Receiving bolus-like food from L and releasing it to J
- B. Receiving of soup-like food from L and releasing it at J
- C. Receiving undigested food from M and releasing it at I
- D. Receiving chyme-like food from L and releasing it to N

Skill level 1	
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10. **Figure 6** shows a kidney tubule and some of its associated blood vessels.



Nitrogenous waste is excreted in which area and in what form?

- A. Excreted in O as Ammonia
- B. Excreted in P as Urine
- C. Excreted in Q as Urea
- D. Excreted in R as Uric Acid

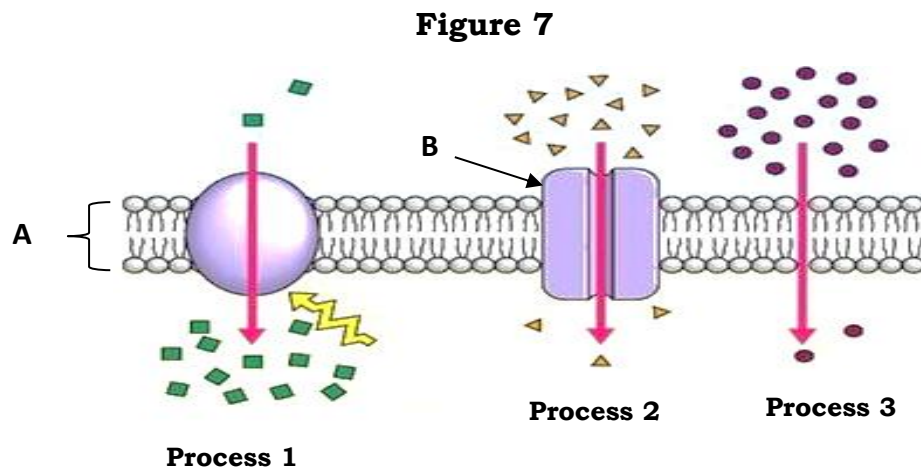
Skill level 1	
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SECTION B: SHORT ANSWERS

This section consists of **FIVE** questions. **ATTEMPT ALL** questions in the spaces provided.

QUESTION 1

1. **Figure 7** shows part of a cell organelle that plays an important role in the cells of an organism.



- a. Describe the **features** of the cell organelle shown in Figure 7 that allows it to function well in cells.

Skill level 2	
2	
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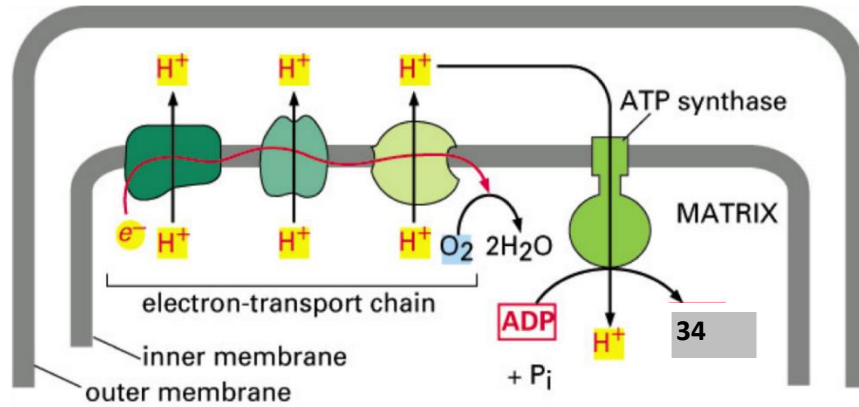
- b. Choose **TWO** processes from **Figure 7** to compare and contrast their roles in transporting molecules across cells.

[illegible]

Skill level 3	
3	
2	
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NR	

3. During the last phase of cellular respiration, the following reaction occurs in the matrix of the mitochondria.

Figure 9



- a. Define cellular respiration.

Skill level 1	
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- b. List the products of aerobic respiration.

Skill level 1	
1	
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NR	

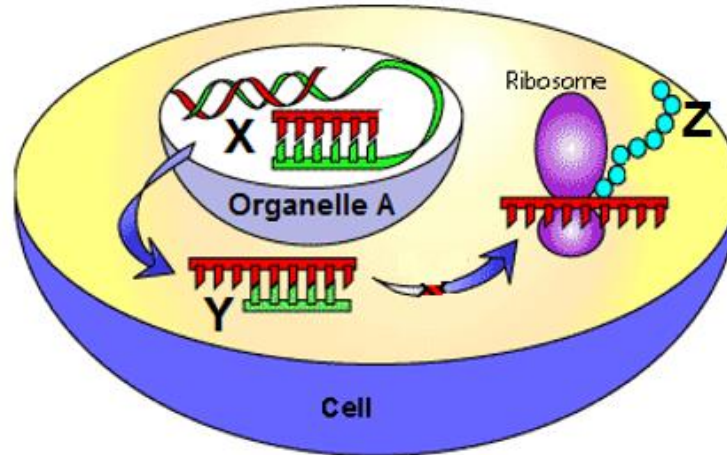
- c. Describe what happens at the stage of respiration illustrated in **Figure 9**.

Skill level 2	
2	
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0	
NR	

QUESTION 2

1. **Figure 11** represents the stages of protein synthesis occurring in a cell.

Figure 11



- a. Name **Organelle A**.

Skill level 1	
1	
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NR	

- b. State **TWO** (2) differences between structure **X** and structure **Y**.

Skill level 2	
2	
1	
0	
NR	

- c. Explain the relationship between structures **X**, **Y** and **Z** in protein synthesis.

Skill level 3	
3	
2	
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NR	

2. Three babies born at Vaiola Hospital were mixed up at birth. The parents of these babies made enquiries at the hospital about the true identity of the babies they took home.

The table below shows the information taken from the chart of the three babies and their parents.

BLOOD TYPE OF PARENTAL COUPLES vs INFANTS

Parents	Mother	Father	Infants
Parent 1	A	B	BABY X : B
Parent 2	O	AB	BABY Y : O
Parent 3	B	O	BABY Z : AB

- a) Predict the identity of **Baby X, Y** and **Z** by using the information shown above to determine their real parents.

[Use the Punnet Squares on the next page to determine the inheritance of blood types and draw evidences to support your answer.]

Parents for Baby **X**: _____

Parents for Baby **Y**: _____

Parents for Baby **Z**: _____

Evidences:

Skill level 3	
3	
2	
1	
0	
NR	

Punnet Squares:

Parent 1: _____

X		

or

Parent 1: _____

X		

or

Parent 1: _____

X		

Parent 2: _____

X		

or

Parent 2: _____

X		

or

Parent 2: _____

X		

Parent 3: _____

X		

or

Parent 3: _____

X		

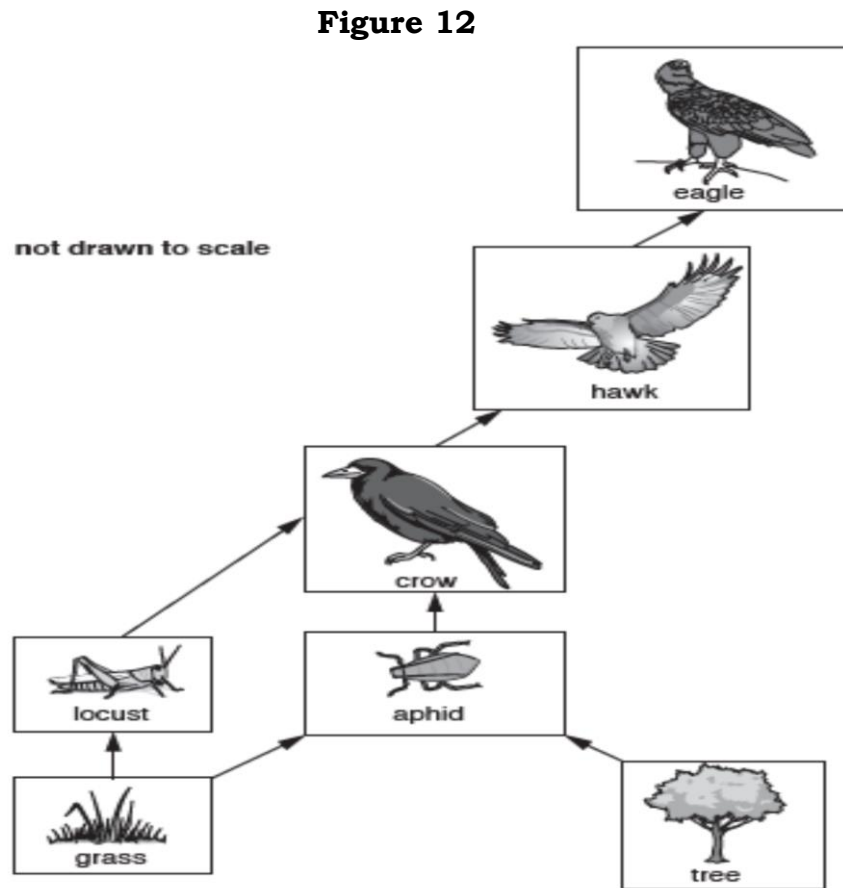
or

Parent 3: _____

X		

QUESTION 3

1. **Figure 12** shows the relationships between some organisms in an ecosystem.



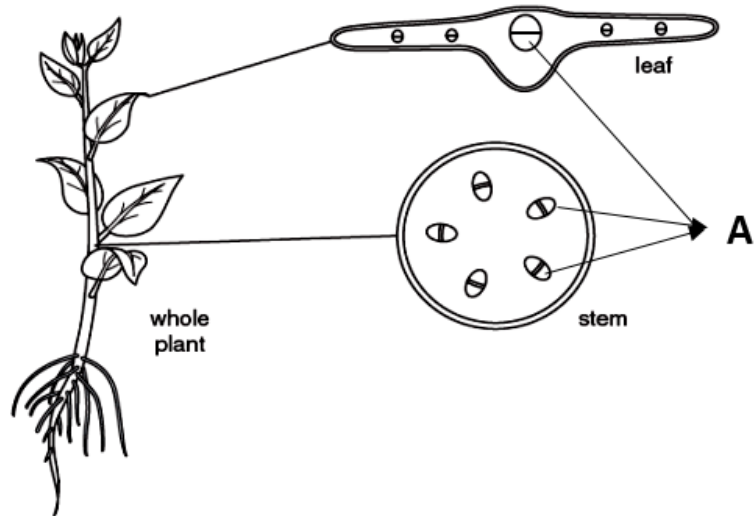
- a. Describe the interactions of all the organisms in the above ecosystem using the illustrated food web.

Skill level 2	
2	
1	
0	
NR	

QUESTION 4

1. **Figure 13** shows a monocotyledon plant and the sections through its stem and a leaf.

Figure 13: Plant



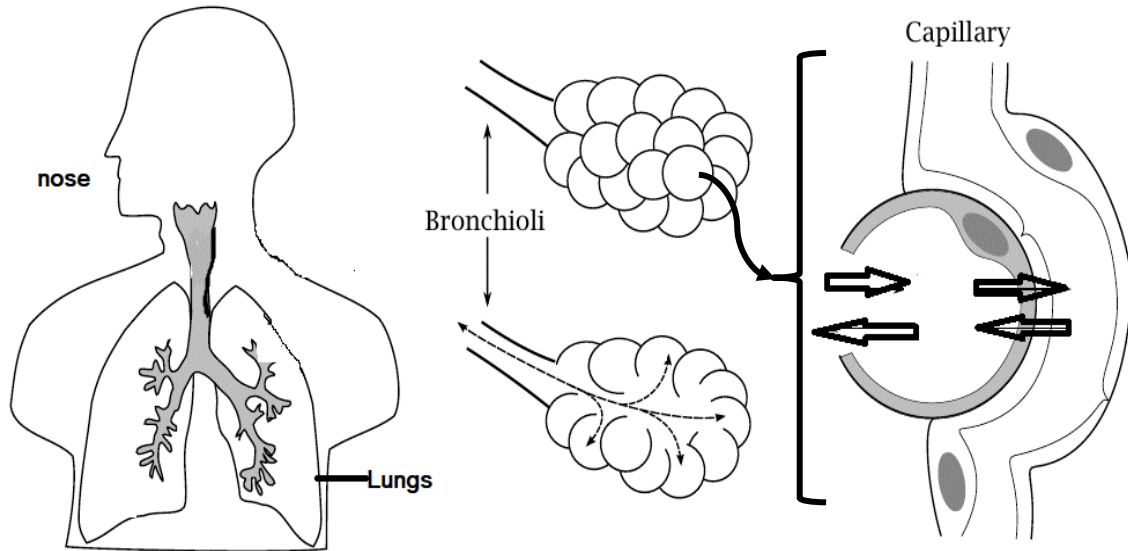
Complete the table below to identify structures **A**, its function and its arrangement in the stems of a monocotyledon plant.

Monocotyledon Plant	Structure A
i. Name	
ii. Function	
iii. Arrangement in stems	

Skill level 2	
2	
1	
0	
NR	

2. **Figure 14** illustrate structures involved in human gas exchange.

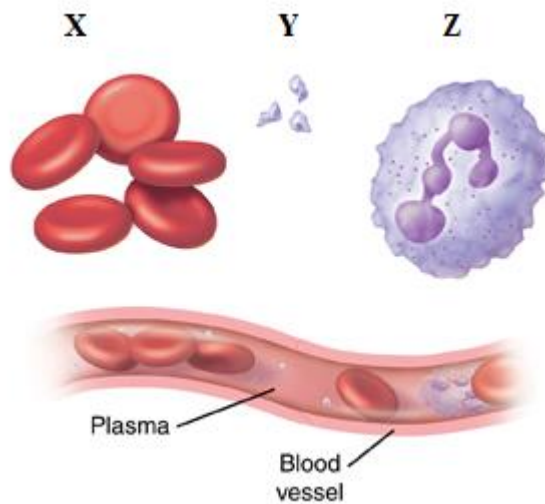
Figure 14



Describe the differences between the process of **ventilation** and **gas exchange** as shown in **Figure 14**.

Skill level 2	
2	
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NR	

3. The diagram below shows some of the cell that makes up the components of blood.

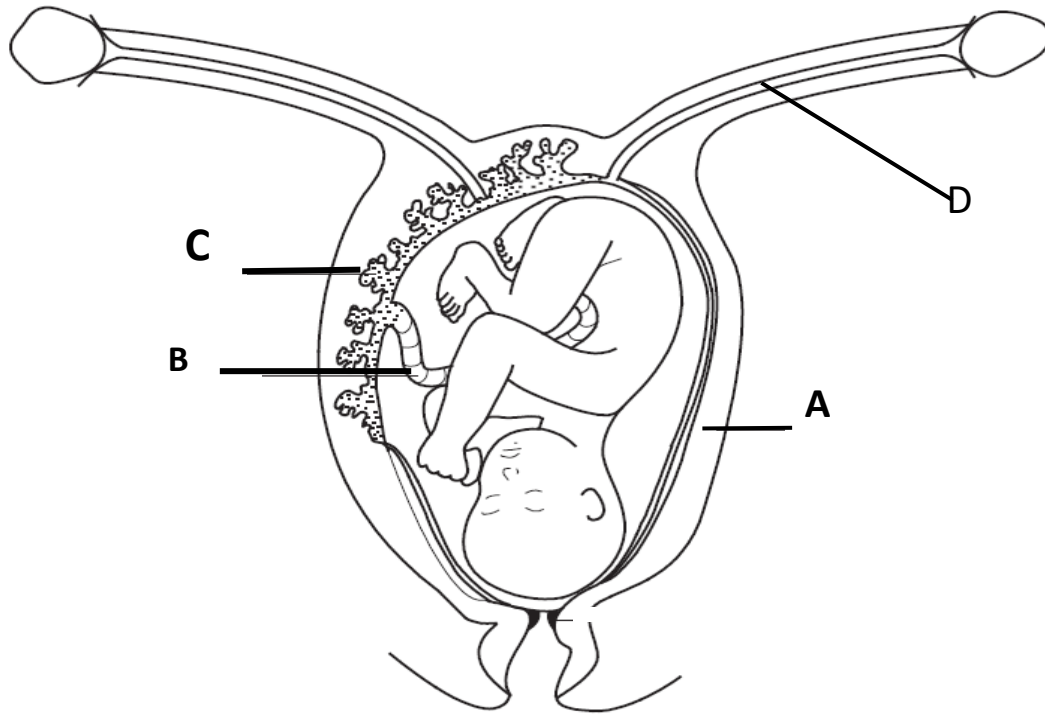


Describe the roles of structure **X** and structure **Y** in blood circulation.

Skill level 2	
2	
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4. **Figure 16** shows a fetus developing in the womb of a mother.

Figure 16



- a. Describe the process occurring at **structure D** that has led to a successful implantation of the fetus in **structure A**.

Skill level 2	
2	
1	
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NR	

- b. Explain the significant role of **structure C** on the successful development of the fetus during the period of pregnancy.

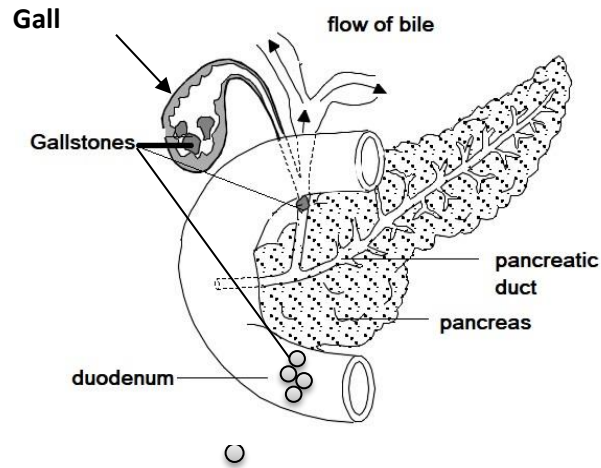
This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Skill level 3	
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QUESTION 5

1. **Figure 17** below shows gallstones found along the human digestive system.

Figure 17



- a. Define the term **digestion**.

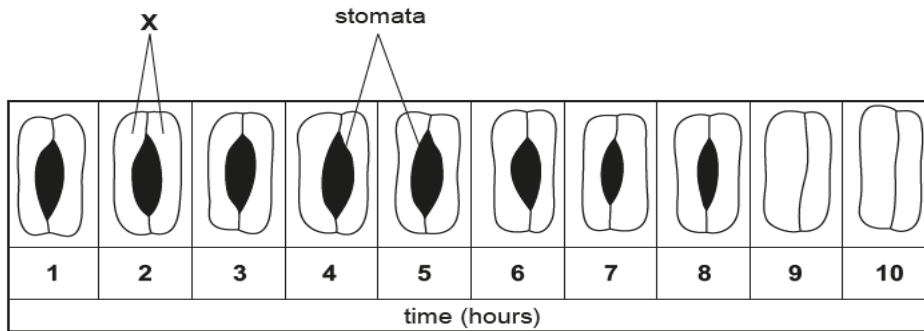
- b. Explain how the presence of gallstones can lead to the malfunction of the human digestive system.

Skill level 1	
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Skill level 3	
3	
2	
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2. A form 6 student set up an experiment to observe the role of the stomata and structure X during daytime hours. **Figure 18** illustrates the result of 10 hours of observation.

Figure 18



Discuss the observation recorded in **Figure 18** to explain how the size of the stomata relates to the time of the day and its impact on transpiration. You may include in your discussion the following:

- i. Significant role of the stomata in Transpiration
- ii. Reason for the shape of structure X in the first 8 hours
- iii. Reason for change of shape to structure X after 8 hours

[illegible]

Skill level 3	
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3. The osmoregulation process in marine fish results in the excretion of ammonia as nitrogenous waste.

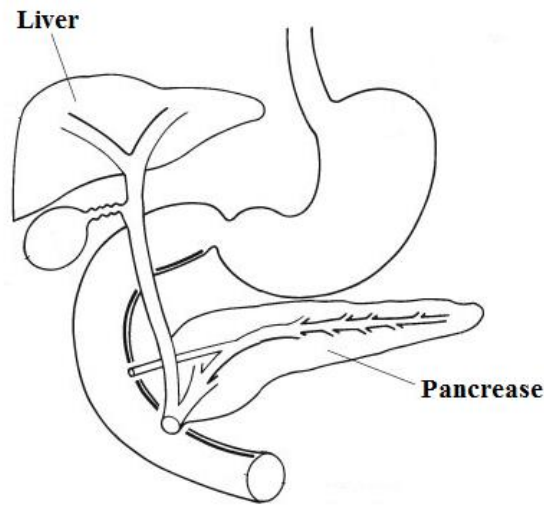
Explain the importance of how osmoregulation functions to release ammonia in marine fish.

[illegible]

Skill level 3	
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4. **Figure 19** shows a diagram of parts of the human body.

Figure 19



The liver plays an important role in the process of excretion. Both the liver and the pancreas also play a key role in prevention of diseases.

- a. Define the term **excretion**.

- b. Explain how the liver and pancreas functions to prevent diabetes in human.

Skill level 1	
1	
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Skill level 3	
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SECTION C: EXTENDED RESPONSE QUESTIONS

This section consists of THREE **compulsory** questions. You are required to provide an extended response to all questions. Write clearly in the spaces provided for each question. Your discussion should be clear, logical and cohesive.

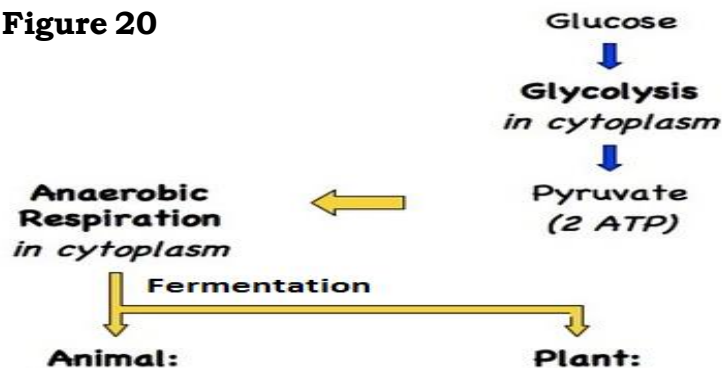
Some information are provided to help guide your discussion.

QUESTION 1

Application of the process of ANAEROBIC RESPIRATION results in the formation of domestic and commercial products.

Discuss how the process of Anaerobic Respiration can be used to create a commercial product. Use **Figure 20** to assist in your discussion.

Figure 20



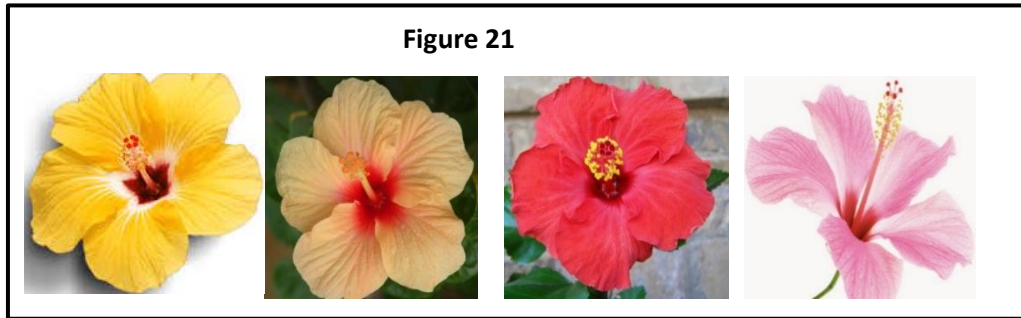
Your discussion should include the following:

- Define anaerobic respiration.
- Describe the products of anaerobic respiration.
- Explain the conditions in plants/animals that causes anaerobic respiration.
- Discuss how the processes and conditions causing anaerobic respiration have been applied in the production of a domestic or a commercial product.

Skill level 4	
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QUESTION 2

Figure 21 below illustrates four different types of hibiscus flowers found in Tonga. The phenotype is the effect of mitosis and meiosis cell division in the life cycle of each hibiscus plant.



Discuss the general function of mitosis and meiosis in producing the life cycle of hibiscus plants found in Tonga.

Your discussion should include:

- i. Definition of mitosis and meiosis
- ii. Description of the functions of mitosis and meiosis in plants.
- iii. Explain where mitosis and meiosis occurs in flowers and how it relates to its functions.
- iv. Comparison of the effects of mitosis and meiosis in the life cycle of the different types of hibiscus plants in Tonga.

[illegible]

[illegible]

QUESTION 3

Choose **ONE** Environmental Issue from the four local environmental problems shown in the diagrams below to answer the question that follows.

Issue 1: Destruction of mangroves



Issue 2: Deforestation



Issue 3: Coastal Pollution



Issue 4: Flooding of low-lying areas.



Discuss the implications of the issue you chose on the long-term survival of the ecosystem.

Your discussion should include the following:

- i. Identify the environmental issue.
- ii. Describe the environmental issue as experienced locally.
- iii. Explain the causes of the environmental issue in your local environment.
- iv. Predict the long-term impact of the issue to the survival of the ecosystem with reference to specific characteristic of the ecosystem.

Chosen Environmental Issue: _____

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