MARKER CODE			

Student Personal Identification Number (SPIN)					

TONGA GOVERNMENT

MINISTRY OF EDUCATION AND TRAINING

TONGA FORM SIX CERTIFICATE

2015

BIOLOGY

QUESTION AND ANSWER BOOKLET

Time Allowed: 3 Hours & 10 minutes reading

INSTRUCTIONS

1. Write your **Student Personal Identification Number (SPIN)** on the right corner of this booklet and on the last page.
2. There are three sections in this paper.
   ALL SECTIONS ARE COMPULSORY.
3. Answer the questions in the spaces provided in this booklet. If you need more space for your answers, ask the supervisor for extra paper. Write your SPIN on all extra sheets used and number the questions clearly.
4. Note that you may not have seen or studied any of the organisms used as examples in this paper. You are expected to apply the principles and knowledge learned during your Biology Course.
5. This examination consists of **THREE** Sections. Recommended time allowances are suggested to consider at each section.

Section A:	**Multiple Choice Questions**	**40 marks**	**1 hr.**
Section B:	**Short Answer Questions**	**140 marks**	**1 ½ hrs.**
Section C:	**Extended Response Questions**	**20 marks**	**½ hr.**

6. Check that this booklet contains pages **1- 52** in the correct order. Pages 48-50 has been deliberately left blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

TOTAL MARKS **200**

SECTION A MULTIPLE CHOICE 40 MARKS

Write the letter of the BEST answer in the Multiple Choice Sheet at the END of this Booklet. Each question is worth 2 marks.

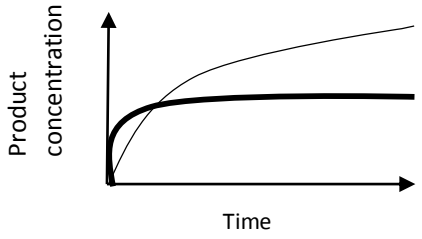
1. The role of a nucleus organelle in eukaryotic and prokaryotic cells is to _____

   A. direct all chemical reactions occurring in both cells.
   B. carry out the translation process for production of protein.
   C. act as a water storage and water usage for all cell activities.
   D. control the regulation of materials into and out of both cells.

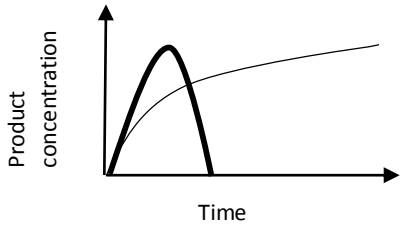
2. Two enzyme experiments were carried out. **Experiment X** (——) was carried out first at a constant temperature of 37°C. During a **second experiment** (——) the temperature was increased from **37°C to 80°C.**

   Which graph illustrates the result of how '**change of temperature'** affects the rate of how enzyme functions?

A



B



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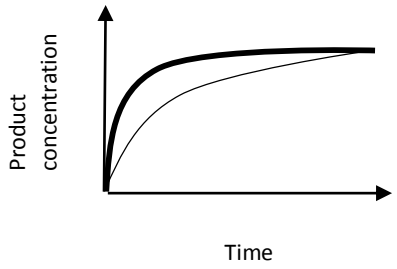
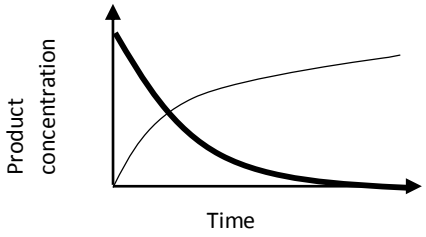


D



3. Form 6 Biology students investigated the taxonomy classification of plant species under the phylum & sub-phylum divisions:

   Algae, Fungi, Lichens, and Ferns.

   Which of the following is found common among the plant species?

   A. Vascular tissues for water transport.
   B. Seeds for plant growth and germination.
   C. Flowers for sexual reproduction process.
   D. Leafy like structures for glucose formation.

4. **Fig.1** shows a portion of an electron photomicrograph of a chloroplast. Use Fig 1.to answer **Questions 4 & 5**.

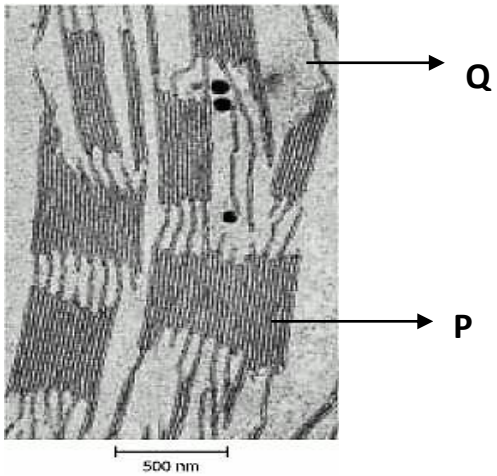


Fig 1.

Considering structure **Q and P**, which of the following terms best describes the two?

A. Q – Stroma , P – Grana.
B. Q – Grana , P – Stroma.
C. Q – Stomata, P – Grana.
D. Q – Grana , P – Stomata.

5. It is reasonable to explain that the role of photosynthesis is to **convert** the:

A. Chemical energy produced in **P** to Light Energy released in **Q**.
B. Chemical Energy produced in **Q** to Light Energy released in **P**.
C. Light Energy produced in **Q** to Chemical Energy released in **P**.
D. Light Energy produced in **P** to Chemical Energy released in **Q**.

6. Mammals that live in very cold climates have behavioral adaptations that help reduce the rate at which they lose heat. One example is;

A. decreasing daily food intake.
B. isolating themselves from others.
C. curling up into the shape of a ball.
D. having furs that fluffs out the body.

7. Which organisms directly help reduce overpopulation in a marine community?

A. Predators and prey.
B. Prey and scavengers.
C. Consumers and predators.
D. Decomposers and consumers.

8. Reference to the **equation** below, which of the following correctly matches the area where the reaction occurs in a mitochondria?

Stored A *(s)* + Reactant B *(g)* ⟹ **Product C *(g)* + Product D *(l)* + Stored E *(s)***

	CYTOPLASM	MATRIX	CRISTAE
A.	A + B	C	A + D + E
B.	A + B	C + D	C +D + E
C.	A + E	C + E	B + D + E
D.	A + E	D	A + C + B

9. **Fig 2** shows a section of a DNA molecule.

Which part indicates the '**nucleotide molecule**'?

A. A

B. B

C. C

D. D

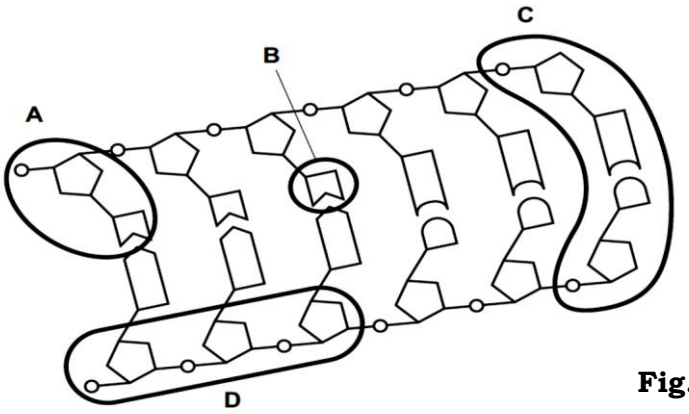


Fig.2

10. Numbers **I- IV** describes a **'carrier'** that inherits genetic materials in the nucleus of eukaryotic cells.

I. Carries the overall genetic materials.
II. Carries the genetic makeup of a trait.
III. Carries all the four nitrogenous bases.
IV. Carries sections of the genetic materials.

The names for each carrier would be'?

	I	II	III	IV
A	chromosome	genes	alleles	DNA
B	chromosome	alleles	genes	DNA
C	DNA	alleles	genes	chromosome
D	DNA	genes	alleles	chromosome

11. A scientist used a light microscope to examine a range of human cells and the structures they contained. **Fig 3** represents a structure seen in one of the cells.

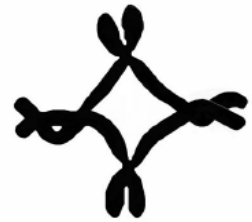


Fig .3

The cell is most likely to undergo _____ cell division in _____ cells of human.

A. meiosis - oviduct
B. mitosis - ovaries
C. meiosis - testis
D. mitosis - uterus

12. Black hair color (B) is observed dominant over brown hair color (b) among Tongans. **Fig.4** shows an example of the inherited traits in a Tongan family. The shaded ones represent individuals that contain the **'b'** trait.

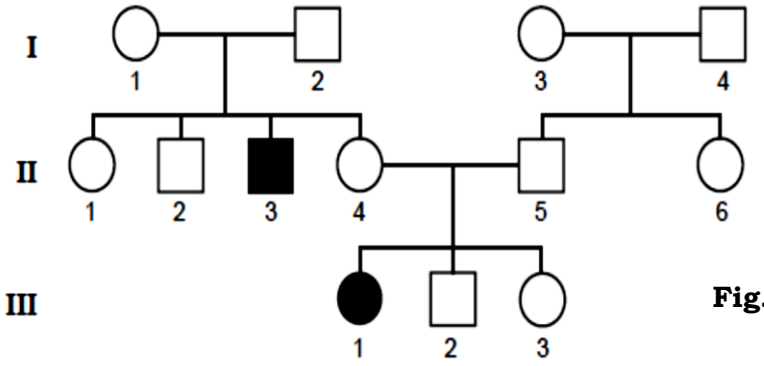


Fig.4

With respect to the hair color gene locus, it is BEST to comment that individuals _____.

A. **I** – 1 is homozygous dominant.
B. **I** – 4 are heterozygous recessive.
C. **II** – 3 are heterozygous dominant.
D. **III** -1 are homozygous recessive.

13. **Fig 5** shows transverse sections of a plant.

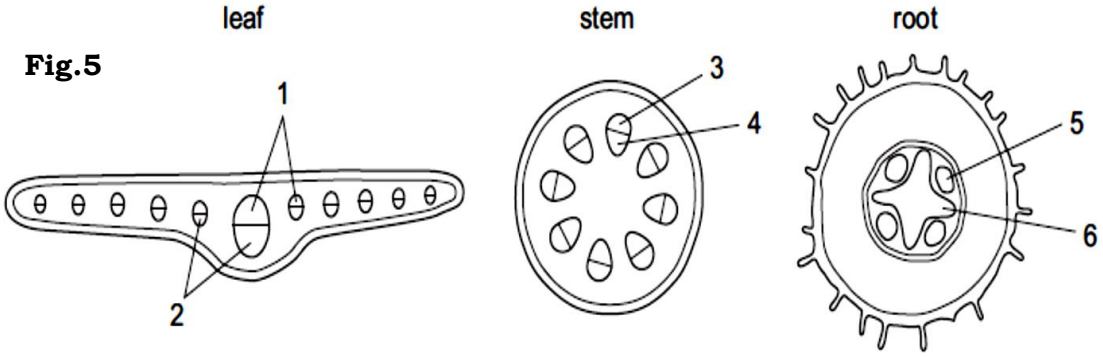


Fig.5

Structures **1** to **6** are BEST represented by which **conducting tissue**?

	Leaf		**Stem**		**Root**	
	Phloem	Xylem	Phloem	Xylem	Phloem	Xylem
A	1	2	3	4	5	6
B	1	2	4	3	6	5
C	2	1	3	4	5	6
D	2	1	4	3	6	5

14. **Fig 6** below is classified as **herbivorous feeder**.

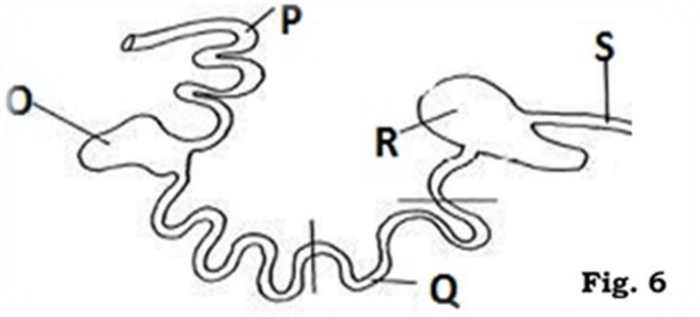


Fig. 6

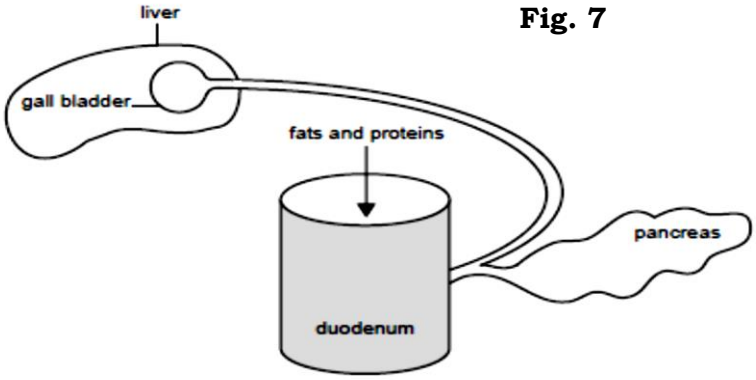
Considering the alimentary canal, which statement justifies the organism's classification?

The presence of _____.

A. **Q** and **P** where egestion process occurs
B. **S** and **O** where ingestion process occurs
C. **O** and **R** where digestion process occurs
D. **P** and **S** where absorption process occurs

15. When fats and proteins are present in the duodenum, the pancreas and gall bladder take action. **Fig. 7** illustrates the relationship of the organs.

Fig. 7

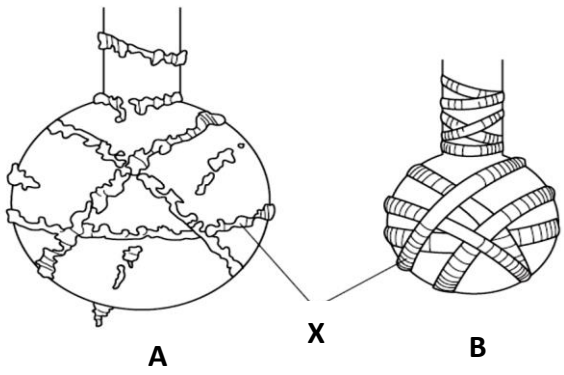


It is reasonable to conclude that;

A. signaling molecules carry messages from the duodenum to both gall bladder and pancreas.
B. signaling molecules would diffuse through tissue fluid to fill spaces between different organs
C. an increase in digestive enzymes from the pancreas results in an increase of fats in the duodenum.
D. an increase in bile from the gall bladder increases the breakdown of fats.

16. **Fig. 8** shows two alveoli from the lungs of a smoker A and non-smoker B after **exhalation** is completed.

Fig 8

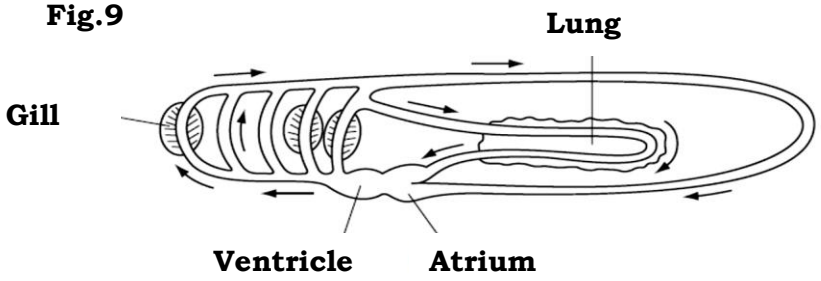


The exhalation rate of smoker A is recorded **higher** than that of non- smoker B. This is mainly due to the followings EXCEPT the;

A. absence of alveoli due to part X.
B. presence of X and alveoli structures.
C. damage shown to the capillary vessel X.
D. nicotine release from cigarettes affect X.

17. **Fig.9** shows the circulatory system (CS) in an organism and the direction of blood flow in the vessels.

Fig.9

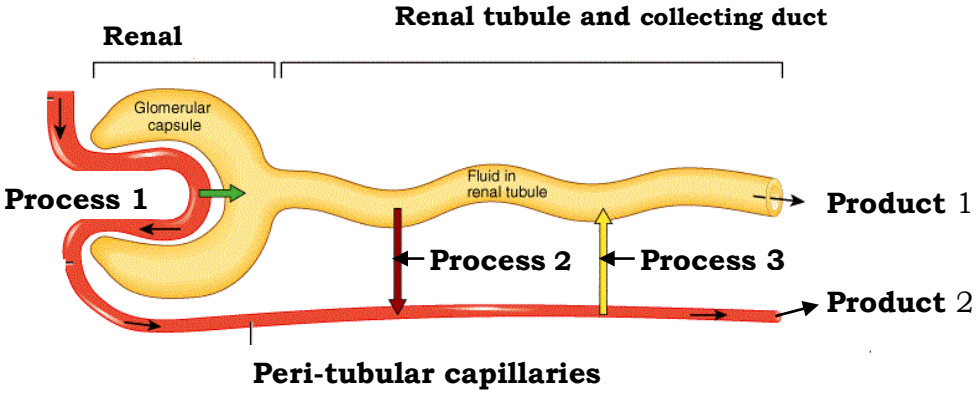


The circulatory system (CS) in this organism is described to be:

A. open single.
B. open double.
C. closed single.
D. closed double.

18. **Fig. 10** illustrates a section of the nephron structure. Normal functioning of a nephron begins with process 1 - 3 and ends with product 1 & 2.

Fig.10

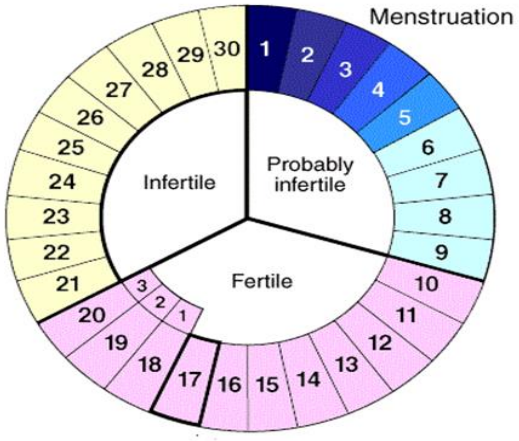


Which of the followings match how the **nephron** section functions?

	Process 1	**Process 2**	**Process 3**	**Product 1**	**Product 2**
A	Filtration	Reabsorption	Secretion	Urine	Glucose , amino acids , water
B	Filtration	Secretion	Reabsorption	Urine	Glucose , amino acids , water
C	Secretion	Reabsorption	Filtration	Glucose , amino acids , water	Urine
D	Secretion	Filtration	Reabsorption	Glucose , amino acids , water	Urine

19. **Fig.11** illustrates the Menstrual Cycle in women.

Fig 11.



During the infertility periods of the cycle, two hormones are released to stimulate the monthly response of the ovary. They are known as _____.

	Day 1-9	**Day 21-30**
A	Estrogen	Testosterone
B	Estrogen	Progesterone
C	Progesterone	Estrogen
D	Progesterone	Testosterone

20. Which of the followings BEST describes examples of the **Ecological Terms**?

	Ecosystem	**Community**	**Population**	**Niche**
A	Freshwater shrimps	Freshwater lake	All lake organisms	Pond weed as primary producer
B	Pond weed as primary producer	Freshwater lake	Freshwater shrimps	All lake organisms
C	Pond weed as primary producer	All lake organisms	Freshwater shrimps	Freshwater lake
D	Freshwater lake	All lake organisms	Freshwater shrimps	Pond weed as primary producer

SECTION B SHORT ANSWERS [140 MARKS]

This section consists of SEVEN Questions. Each question is worth 20 marks. ATTEMPT ALL questions in the space provided.

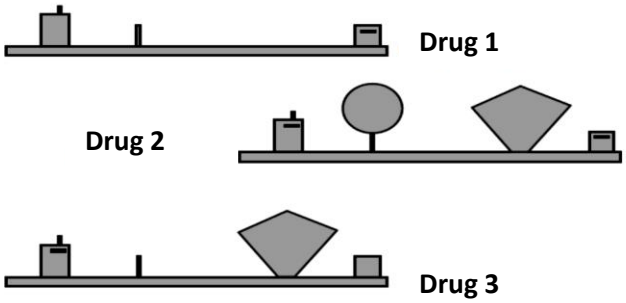
QUESTION ONE [20 MARKS]

1. It is known, that **Enzyme A** (fig.12) acts on a **polypeptide I** to produce **polypeptide II**, a powerful blood pressure 'normalizing agent'.

Fig 12

A range of **polypeptide I** (fig. 13) were designed, tested and manufactured. Sample of the molecular shaped of polypeptides are shown as Drug 1, 2 & 3 below.

Fig 13



a. Out of the three polypeptides, which is the **best drug**?

Best Drug: _____

1 Mark	
1	
0	
NR	

b. Describe how the nature of **Enzyme A** function to produce **polypeptide II**.

Nature of Enzyme A :

_____

_____

_____

_____

1 Mark	
1	
0	
NR	

b. Use the pair of axis in **Fig.14** to answer the following questions:

(i) Sketch the possible **<u>resulting trends</u>** if the following reactions occurred:

a. *Enzyme A vs Best Drug Designed* (Label trend: A)
b. *Best Drug Designed vs Blood Pressure Level* (Label trend: B)

Fig.14

2 Marks	
2	
1	
0	
NR	

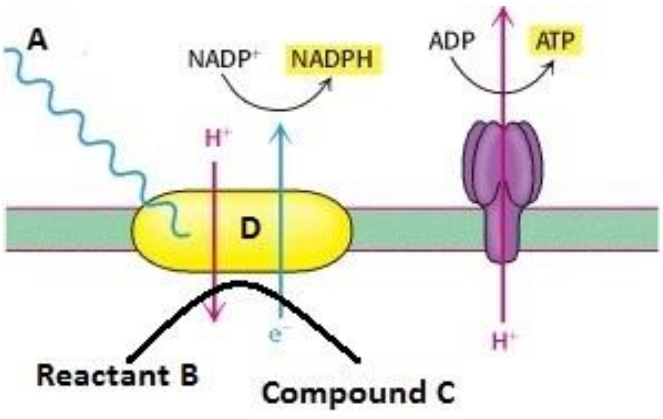
(ii) Explain how the resulting trend labelled **'B'** may benefit human health.

_____
_____
_____
_____

1 Mark	
1	
0	
NR	

2. The simplified diagram in **Fig 15** below summarizes one type of **reaction** in the photosynthesis process.

Fig.15



a. Indicate the name for this type of **'reaction'** and explain one reason using evidence from **Fig.15** to why it is classified under this reaction?

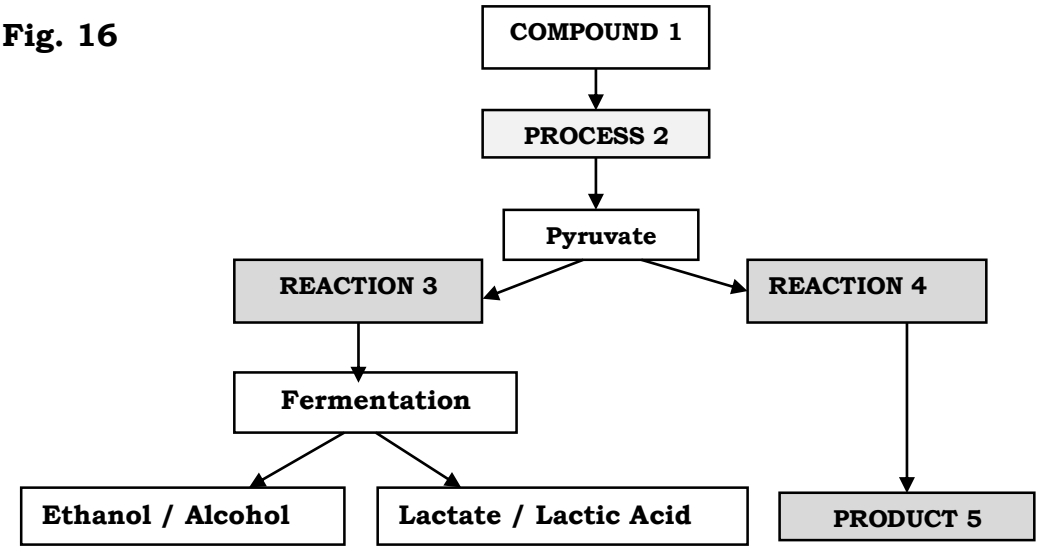
2 Marks	
2	
1	
0	
NR	

b. Explain how NADPH and ATP are released as products in this phase.

2 Marks	
2	
1	
0	
NR	

3. **Fig. 16** summarizes the **Cellular Respiration** process.

Fig. 16



a. Considering the names for **compound 1** and **process 2** in your answer, explain why a **split reaction** occurs after pyruvate molecules are formed?

2 Marks	
2	
1	
0	
NR	

b. **Reaction 3** leads to Fermentation process.

Write **one advantage** of such reaction in plants and **one disadvantage** if occur in animals.

2 Marks	
2	
1	
0	
NR	

Reaction 4 constantly produces large amount of **product 5**.

Suggest the name for product 5?

1 Mark	
1	
0	
NR	

d. Describe the importance of producing a large amount of product 5 in the respiration process?

1 Mark	
1	
0	
NR	

4. **Fig. 17** outlines the production of protein in a cell when structure **F** is activated.

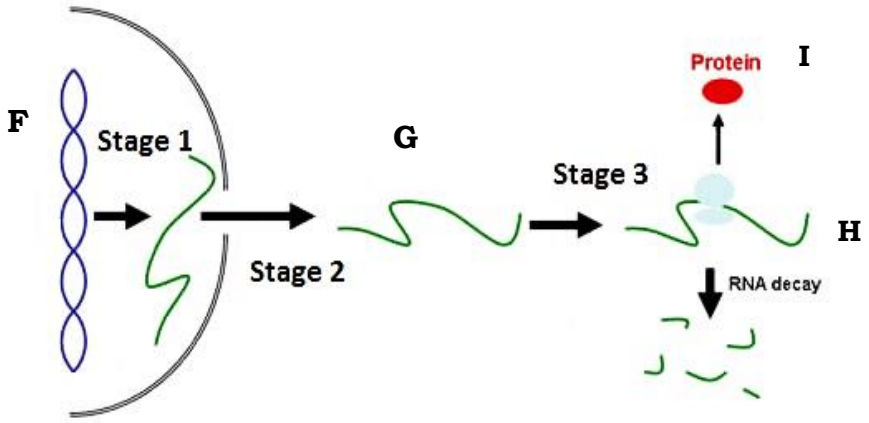


Fig. 17

a. By stating the names for structures **F** and **G**, explain how the process occur from **Stages 1 & 2.**

2 Marks	
2	
1	
0	
NR	

b. Proteins are produced in **stage 3** with a sequence of amino acids as below.

Glycine – Arginine – Lysine – Serine

The table gives possible mRNA codons that codes for each amino acid.

Amino Acids	**mRNA codons**
arginine	UCC or GCG
glycine	CCA or CCU
lysine	UUC or UUU
serine	AGG or UCG

Suppose the mRNA code sequence reads **GGU AGG AAG AGC.**

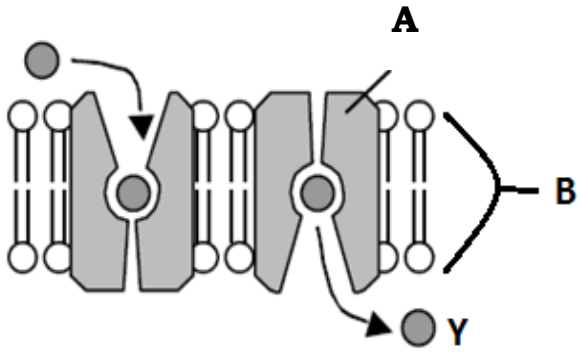
Write the possible tRNA paired strand coding for the production of protein in **stage 3**. Include in your answer the role of tRNA anticodons in stage 3.

3 Marks	
3	
2	
1	
0	
NR	

QUESTION TWO 20 MARKS

1. **Fig.18** illustrates the process of movement of particles in a cell. Substance **Y** is transported across the membrane as directed by arrows.

Fig. 18



a. In terms of '*Energy and Permeability*', explain how structures **A and B** facilitate the movement of substance **Y** across the cell.

2 Marks	
2	
1	
0	
NR	

b. Similar transport processes occur in **structure B** in the leaf of a plant**.**

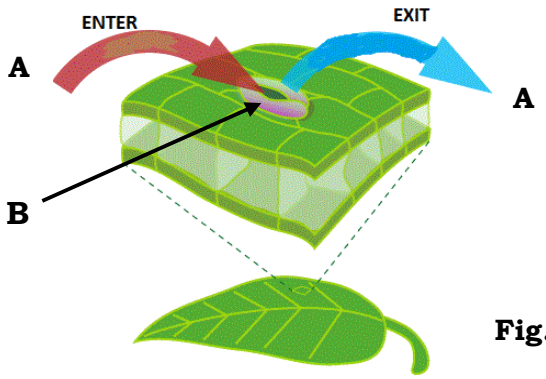


Fig.19

During the hot days in Tonga, the rate of transpiration increases in **Fig 19**. Explain a reason for this. Use correct terms for **A and B** in your answer.

2 Marks	
2	
1	
0	
NR	

2. Blood cells were placed in three beakers to show the water potentials through osmosis.

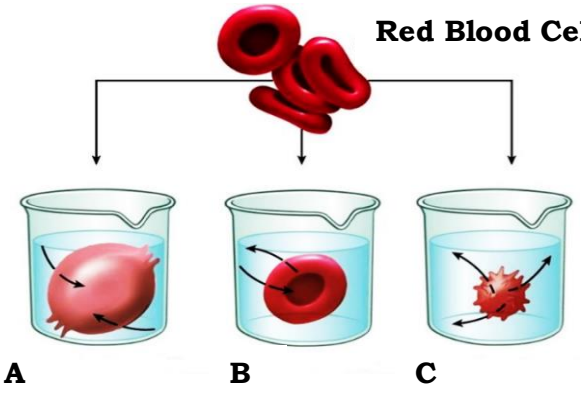


Fig. 20

Explain why the water potential differs in **Beaker A and C** as compared to **Beaker B**.

2 Marks	
2	
1	
0	
NR	

3. An experiment was performed to find the effect of surface area to volume ratio on the rate of osmosis. Pieces of yam were cut into cubes of the following sizes:

- Cube A : 2 cm X 2 cm X 2 cm (surface area = 24 cm^2 , volume = 8 cm^3)
- Cube B : 1 cm X 1 cm X 1 cm (surface area – 6 cm^2 , volume = 1cm^3)

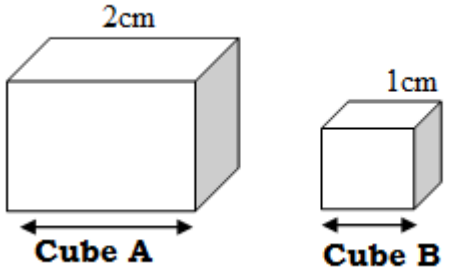


Fig 21

One Cube A – placed in a Beaker and covered with distilled water.
Eight Cube B – placed in another beaker of distilled water, making sure that they were all covered with distilled water.

At intervals for a period of 45 hours, the cubes were removed from the beakers, blotted dry, reweighed and then replaced into fresh distilled water. The results are shown in **Fig. 22** below.

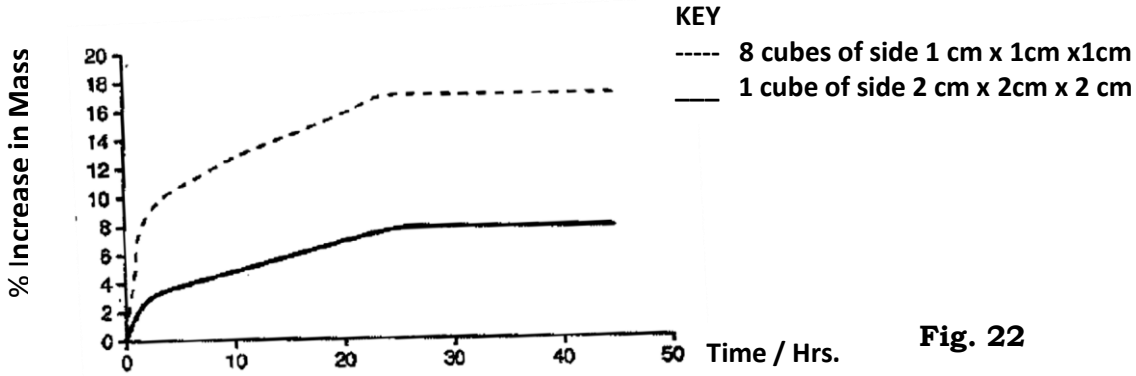


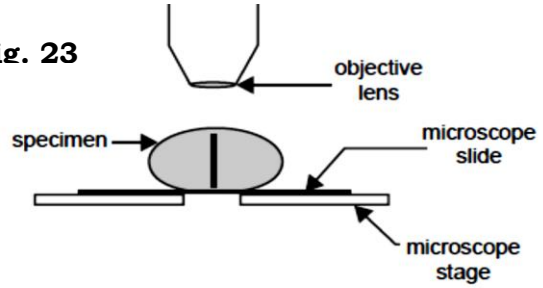
Fig. 22

In terms of '*Surface Area (SA) to Volume Size (VS)'*, discuss the relationship between SA : VS and the rate of osmosis.

3 Marks	
3	
2	
1	
0	
NR	

4. A Form 6 Biology student set up a light microscope as **Fig.23** below.

Fig. 23



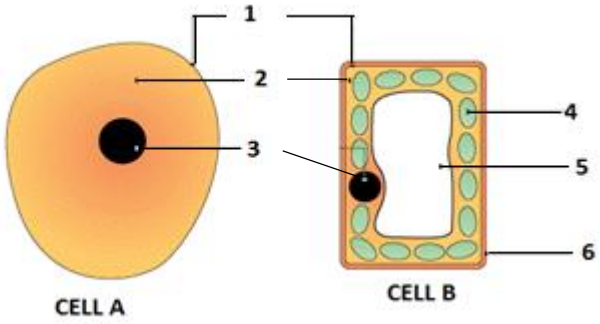
The black strip was then replaced with a specimen. The image was seen at first view to be **blurry and unresolved.**

a. Suggest two reasons for the problem. Your answer should only refer to the named parts in **Fig 23**.

2 Marks	
2	
1	
0	
NR	

b. After solving the problem the student viewed the specimen again. **Fig. 24** illustrates the second image and was labelled Cell A and B.

Fig. 24



i. With the use of correct names to numbered structures 1-6, assign two similarities of the viewed specimen.

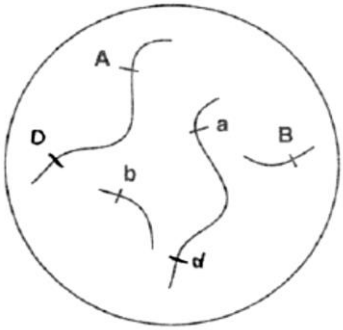
2 Marks	
2	
1	
0	
NR	

ii. **Organelle 5** are present only in Cell B. Justify two reasons for this.

2 Marks	
2	
1	
0	
NR	

6. **Fig. 25** illustrates FOUR chromosomes in a pollen cell of a plant. The locus of **3 genes (A B D)** are given.

Fig.25



a. Sketch a labelled diagram to show the possible **recombinant genes** if crossing over occur in loci A & D. One example is provided below.

3 Marks	
3	
2	
1	
0	
NR	

b. Offer two reasons to justify how the outcome of '**crossing over'** may benefit plants.

2 Marks	
2	
1	
0	
NR	

QUESTION 3 [20 MARKS]

1. The ABO Blood Groups in human is determined by the ABO gene consists of the alleles;

   I^A: A antigen produced, I^B: B antigen produced, I: no antigen produced

   One blood type in human is known to be **Co- dominant.**

a. Define the term **co-dominant** and state the genotype for this blood group.

2 Marks	
2	
1	
0	
NR	

2. A father who is **Blood Type O** married a woman with **Blood Type A**. He found out later that Sione was not his child. Sione was identified to carry the co-dominant antigens in his blood.

   Draw a punnet square to prove the father is not Sione's biological father?

2 Marks	
2	
1	
0	
NR	

3. In dogs, two genes have the following alleles

   Gene 1 : B - black coat colour **b - grey coat colour**

   Gene 2 : T - no spotted white colour **t - white spotted colour**

Two dogs, **F and G**, were mated. The litter of four pups in **fig 26** is the resulted phenotypes of the cross.

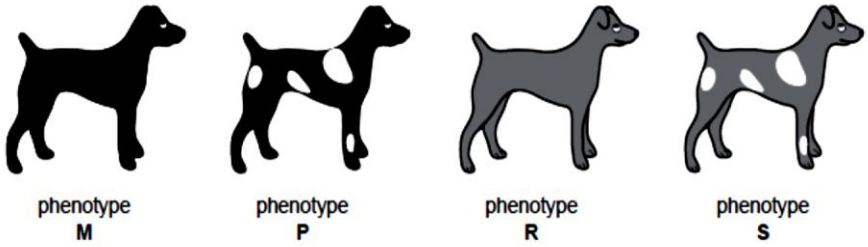


Fig 26

Use the punnet square below to show the possible genotypes of the puppies, Parent **F & G** and the phenotypic ratio of the cross.

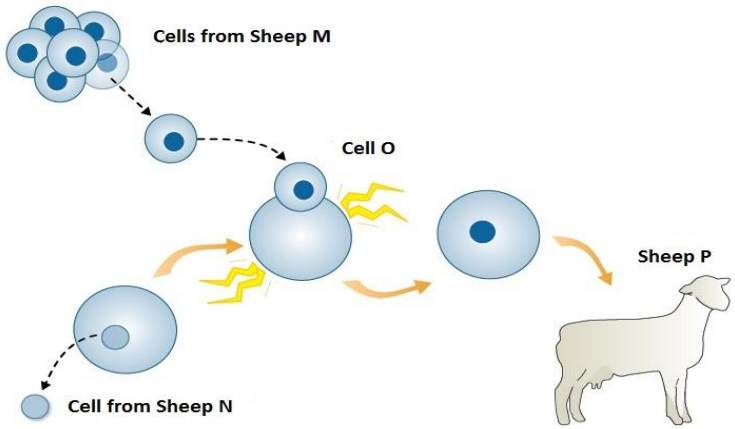
2 Marks	
2	
1	
0	
NR	

1 Mark	
1	
0	
NR	

Phenotypic Ratio: _____

4. **Fig 27** summarizes the steps involved in the production of a cloned sheep.

Fig 27



a. With respect to the cloning production, which Cell (M, N, O) would possibly be identical to Sheep P and why?

2 Marks	
2	
1	
0	
NR	

b. Suggest three reasons why Cloning may be of advantage to human?

3 Marks	
3	
2	
1	
0	
NR	

c. Explain three reasons why Genetic Modified Organism (GMO) Projects may be too risky to human?

3 Marks	
3	
2	
1	
0	
NR	

5. The following graph shows the changes in biomass (dry weight) of two species of clover grown together in equal numbers in the same plot. Equal numbers of each species germinated.

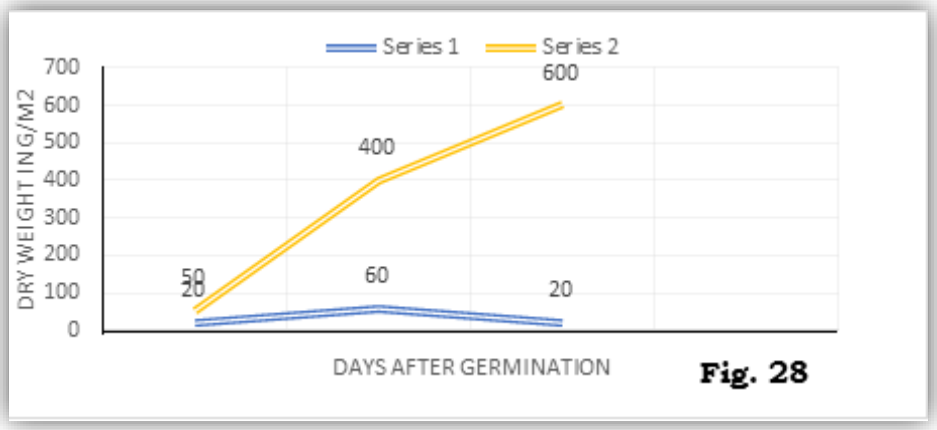


Fig. 28

a. Explain how the plotted trends support "Gause's Principle".

2 Marks	
2	
1	
0	
NR	

b. Suppose the two clover species experienced a drought season. How may it affect the relationship of the clover species?

2 Marks	
2	
1	
0	
NR	

c. What biological term is used to describe the interaction of clovers in your answer in **'a'** above?

1 Mark	
1	
0	
NR	

QUESTION FOUR [20 MARKS]

1. **Fig. 29** represents a transverse section of the root of a plant.

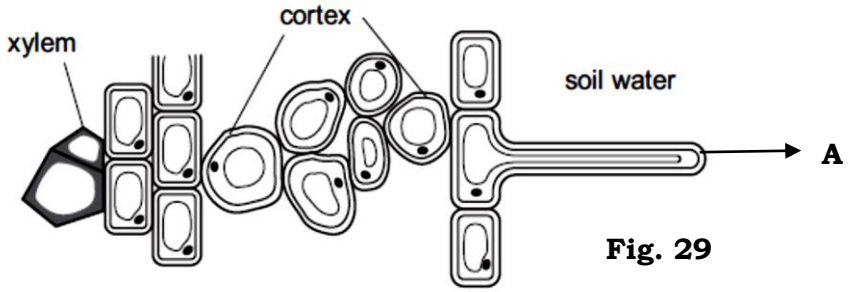


Fig. 29

a. Explain two purposes of the soil water in plants.

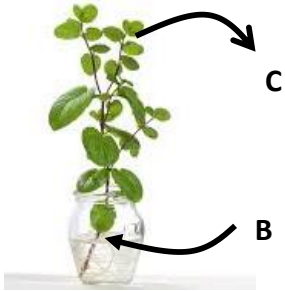
2 Marks	
2	
1	
0	
NR	

b. In terms of *'structural adaptation'*, explain how structure A assist the uptake of soil water in plants. Include in your answer the name of structure A.

2 Marks	
2	
1	
0	
NR	

c. Suppose the whole plant is soaked in a beaker of water as **Fig 30**.

Fig.30



Explain how soil water is transported in the plant from **B to C.**

3 Marks	
3	
2	
1	
0	
NR	

2. Another set up is shown in **fig. 31** using a potometer.

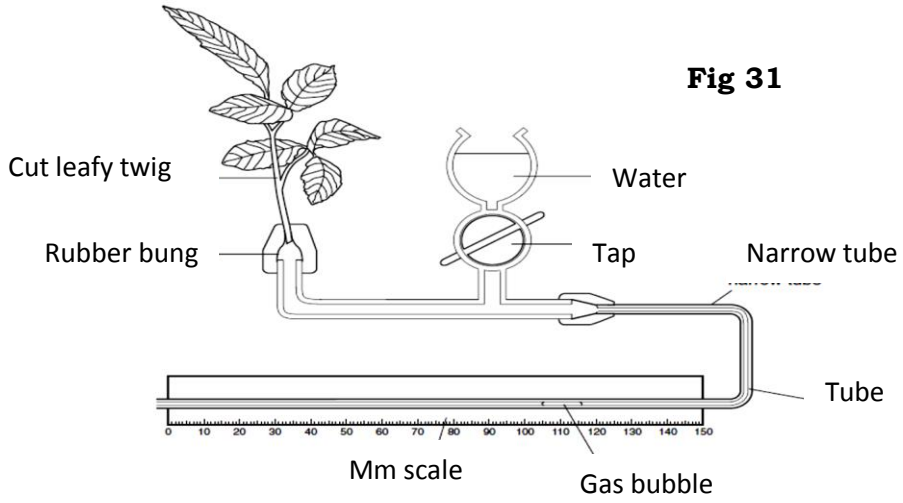


Fig 31

a. The set- up investigated the rate of water uptake of a cut leafy twig under six different conditions. The students changed two environmental conditions around the plant, temperature & wind speed.

For each experiment, the apparatus was left in the conditions until the rate of water uptake by the leafy shoot became constant.

Several measurements were taken during each experiment and calculated the mean rate movement of the gas bubble.

The results are recorded in table below:

Experiment	Temperature / ^0C	Wind Speed	Mean Rate of Movement of gas bubble / mmh^{-1}
1	15	Low	12
2	15	High	22
3	25	Low	24
4	25	High	45
5	35	Low	64
6	35	High	120

a. Explain the purpose of using a potometer and a cut leafy twig in this experiment.

2 Marks	
2	
1	
0	
NR	

b. From the data recorded, explain how the changes of conditions affect the rate of water uptake.

Temperature:

2 Marks	
2	
1	
0	
NR	

Wind:

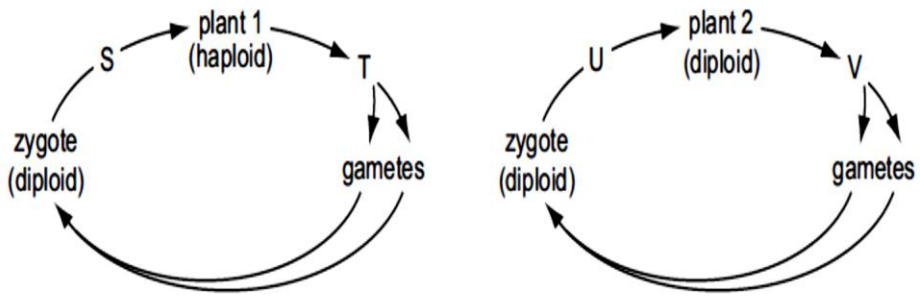
2 Marks	
2	
1	
0	
NR	

c. The rate of water movement up the leafy shoot was measured before it was cut from the plant. The rate was found to be less than the rate of water uptake from the potometer.

Explain why the rate of water uptake in an intact shoot is less than that measured in the potometer.

2 Marks	
2	
1	
0	
NR	

3. **Fig. 32** illustrates the alternative generation growth in plants.



a. In terms of '***gametophyte' and 'sporophyte'***, explain where along the life cycle of Plant 1 and 2 and LETTER S, T, U and V does the two alternative generation process occur.

2 Marks	
2	
1	
0	
NR	

b. Suppose Plant 1 is a '***hibiscus plant***', name the type of reproduction that is involved in this life cycle and explain one advantage and disadvantage it is to the cycle.

3 Marks	
3	
2	
1	
0	
NR	

QUESTION 5 [20 MARKS]

1. Tonga has been recorded to be the world's most overweight nations. It is argued in the record that 88.3% of Tongan women and 83.5% of Tongan men over the age of 20 are overweight and 52.6% of Tongan girls and 34.5% of Tongan boys under the age of 20 are also overweight.

   One possible causal factor is the influence of **Meal A** in Fig 33.a.

Fig.33.a MEAL A

Fig.33.b Ingredient B

a. Explain THREE reasons why the collective data can be 'true' for Tongans?

3 Marks	
3	
2	
1	
0	
NR	

b. Meal A is interpreted as the '*yummy meal'* as compared to a '*yucky dish'* made with ingredient B. Clearly explain why this can be **misleading** to children.

Meal A : Yummy Meal:

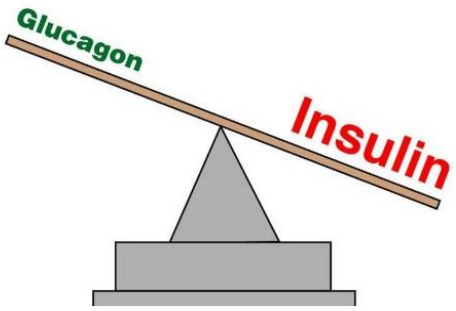
2 Marks	
2	
1	
0	
NR	

Ingredient B makes a Yucky Dish:

2 Marks	
2	
1	
0	
NR	

2. The incline below illustrates the level of insulin and glucagon in the human body.

Fig. 34



a. With reference to Fig. 34, what does it say about the level of sugar in the body?

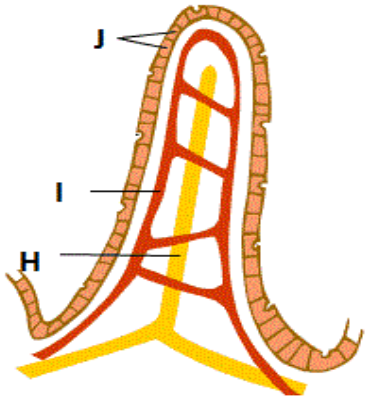
1 Mark	
1	
0	
NR	

b. Explain how homeostasis controls the blood sugar level stated in '**a**' above.

2 Marks	
2	
1	
0	
NR	

3. **Fig. 35** illustrates a villus which assist the digestive system in human.

Fig. 35



a. Considering structures **H and I,** describe its role in the villus of human.

2 Marks	
2	
1	
0	
NR	

b. Explain two adaptive features of a villus that supports its role in the digestive system.

2 Marks	
2	
1	
0	
NR	

4. The graph below shows three enzyme activities as related to different pH level in the human body.

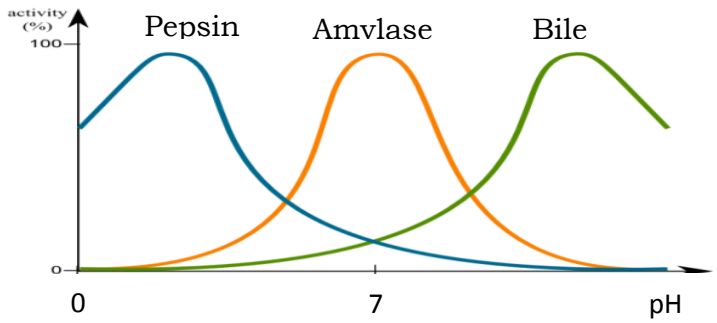
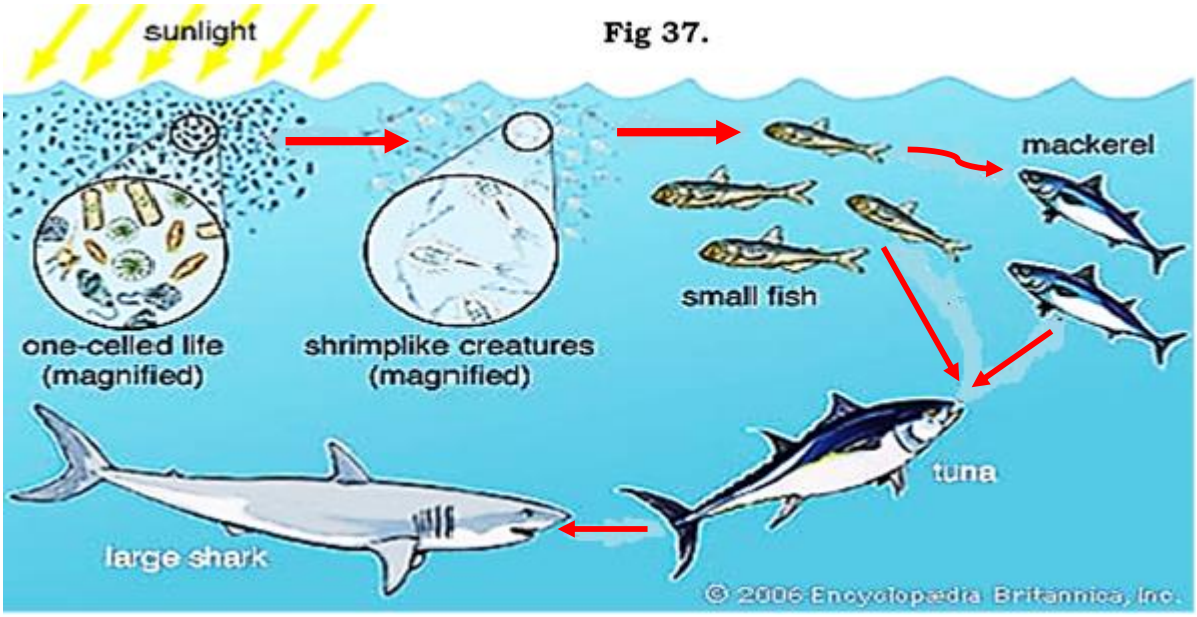


Fig.36

a. Reference to the enzymes plotted, SELECT ONE activity and explain how different pH Levels affect the rate of activity. Include in your discussion the area where the enzyme activity is operated.

2 Marks	
2	
1	
0	
NR	

4. The 'NORM' interaction for life- term survival in an Ecosystem is illustrated in **Fig. 37** below.



a. Examine **Fig 37** and explain using names the possible type of interaction occurring in the food chain.

2 Marks	
2	
1	
0	
NR	

b. In terms of energy, which organism would obtain the highest energy level and why?

_____
_____
_____
_____
_____

2 Marks	
2	
1	
0	
NR	

QUESTION 6 [20 MARKS]

1. **Fig. 38** illustrates Dichotomous key for the following species.

1. How many pairs of wings present?
   a. One pair of wings — Go to 2
   b. Two pair of wings — Go to 3

2. Does the insect have filaments at the end of abdomen?
   a. Yes — *Ephemeroptera*
   b. No — *Diptera*

3. Is the forewing _____?
   a. Hard — Go to 4
   b. Not hard — Go to 5

4. Does the insect have forceps (or pinchers) on its abdomen?
   a. Yes — *Dermoptera*
   b. No — *Coleoptera*

5. Is the forewing _____?
   a. Membranous — *Odonata*
   b. Covered with scales — *Lepifoptera*

a. Using the key provided, suggest the names for Organism **M and O**

Organism M: _____

Organism O: _____

2 Marks	
2	
1	
0	
NR	

b. Suppose another **Choice # 6** is added to this Dichotomous Key. By using **Organism N** as an example, suggest two possible descriptions to **Choice # 6**.

_____
_____
_____
_____

2 Marks	
2	
1	
0	
NR	

2. Fish consists of a special gas exchange system known as the Concurrent System. **Fig.39** illustrates this system.

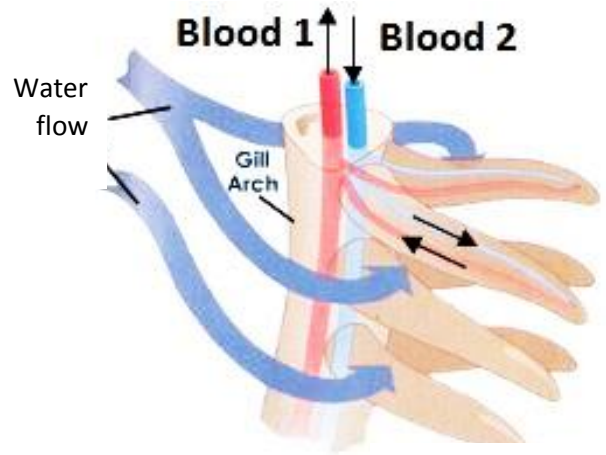


Fig.39

a. Give the names for the composition of blood flowing in arrow 1 & 2.

Blood 1: _____

Blood 2: _____

2 Marks	
2	
1	
0	
NR	

b. Explain the efficiency of this concurrent system to fish. Focus your answer in the direction of water flow and blood flow and the adaptation of gills.

3 Marks	
3	
2	
1	
0	
NR	

3. **Fig 40** below shows the cardiac cycle of an amphibian.

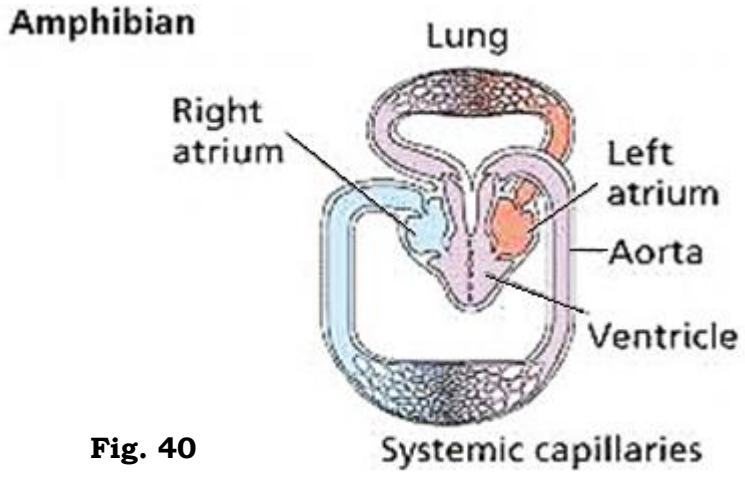


Fig. 40

a. Comparing amphibian's cardiac cycle to human, explain two reasons how they differ.

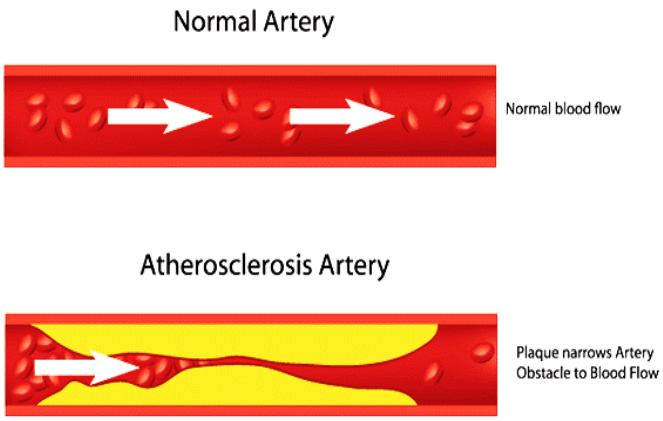
2 Marks	
2	
1	
0	
NR	

b. Considering the **role of ventricle**, explain how blood is circulated in this cardiac cycle?

2 Marks	
2	
1	
0	
NR	

4. Tonga's Ministry of Health reported that one cause of death in Tonga is the high rate of Non- Communicable Disease (NCD). Evidence of high rate cause the shift from a normal artery to blockage of heart vessel in Fig 41.

Fig. 41



Suggest THREE counselling advice you may offer to save Tongans and why.

3 Marks	
3	
2	
1	
0	
NR	

5. An ecosystem consists of **Groups A - D** of organisms as below.

Group A	Group B	Group C	Group D
Algae Mosses Ferns Pine trees Oak trees	Caterpillars Moths Worms	Chicken Birds	Soil bacteria Molds Mushrooms

a. Illustrate with examples from the table a representative of an Energy Pyramid.

2 Marks	
2	
1	
0	
NR	

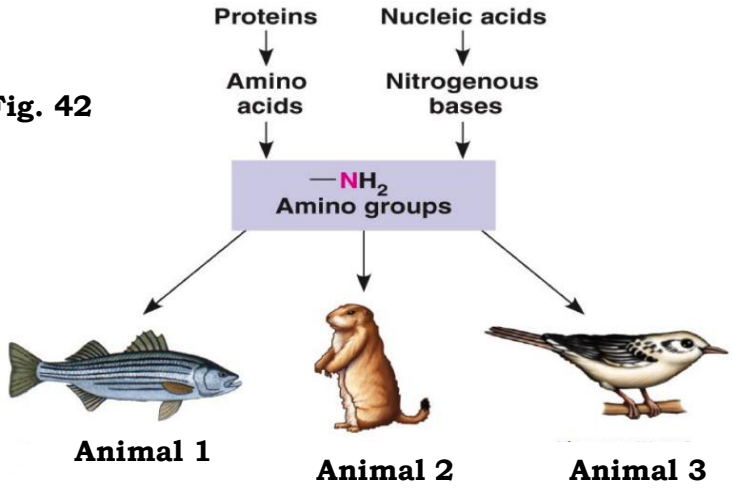
b. **Group 4** are 'specialists' in the environment. By giving the appropriate biological term for **Group 4**, explain its relationship to 'biodiversity and ecosystem'.

2 Marks	
2	
1	
0	
NR	

QUESTION 7 [20 MARKS]

1. **Fig.42** illustrates the nitrogenous wastes excreted by animals 1 -3. Use the diagram to answer the following questions.

Fig. 42



a. Give the names of the nitrogenous waste excreted by Animal 1, 2 & 3.

3 Marks	
3	
2	
1	
0	
NR	

b. By defining osmoregulation, explain how the process would regulate in freshwater fish and marine fish.

3 Marks	
3	
2	
1	
0	
NR	

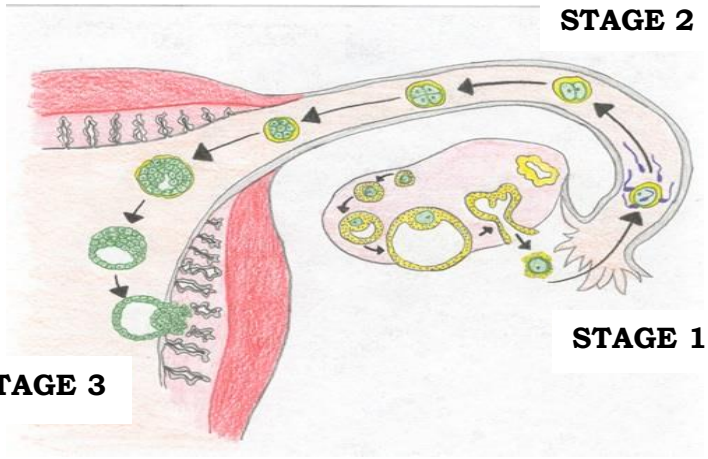
c. Sione was diagnosed to have 'GOUT' by you the family doctor.

Simply explain the cause of his gout and suggest TWO advice of what he should do to reduce the pain he's feeling due to gout.

3 Marks	
3	
2	
1	
0	
NR	

2. **Fig. 43** illustrates a section of the female reproductive organ.

Fig. 43



a. Explain using appropriate names the processes occurring in **Stages 1, 2 & 3.**

3 Marks	
3	
2	
1	
0	
NR	

2. **Fig. 44** illustrates the relationship between two living beings (mother and baby).

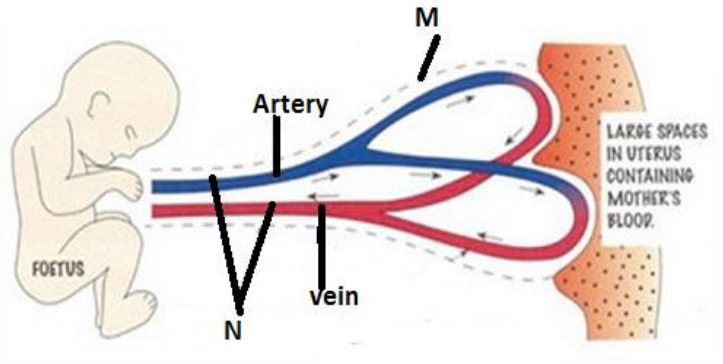


Fig. 44

a. Explain the importance of structures **M and N** for the development of the foetus.

2 Marks	
2	
1	
0	
NR	

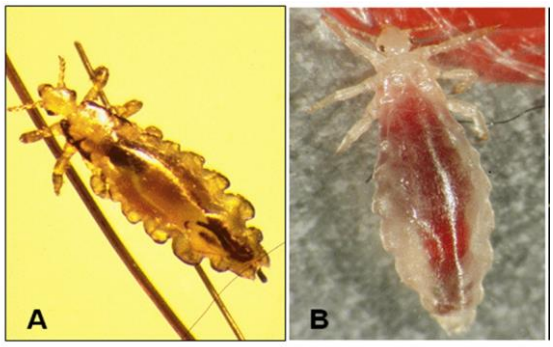
b. Explain how the substances in structure N- Blue and N – Red contributes to the development of the foetus.

2 Marks	
2	
1	
0	
NR	

3. There are two varieties of lice which live mainly on human skin and hair.

Fig. 45 illustrates the two lice with evidence of belonging to the same ancestors.

A : Head louse *Pediculus humanus capitis*



B : Body louse : *Pediculus humanus corporis*

Fig. 45

a. To which phylum does the two lice belong to?

_____

1 Mark	
1	
0	
NR	

b. Justify your answer in **'a'** with evidence from **Fig.45**.

_____

_____

_____

_____

1 Mark	
1	
0	
NR	

c. With reference to **Fig.45,** select ONE organism and explain TWO adaptive features that may help the organism survive in human hair.

_____

_____

_____

_____

_____

_____

2 Marks	
2	
1	
0	
NR	

SECTION C: EXTENDED RESPOSNSE QUESTIONS [20 MARKS]

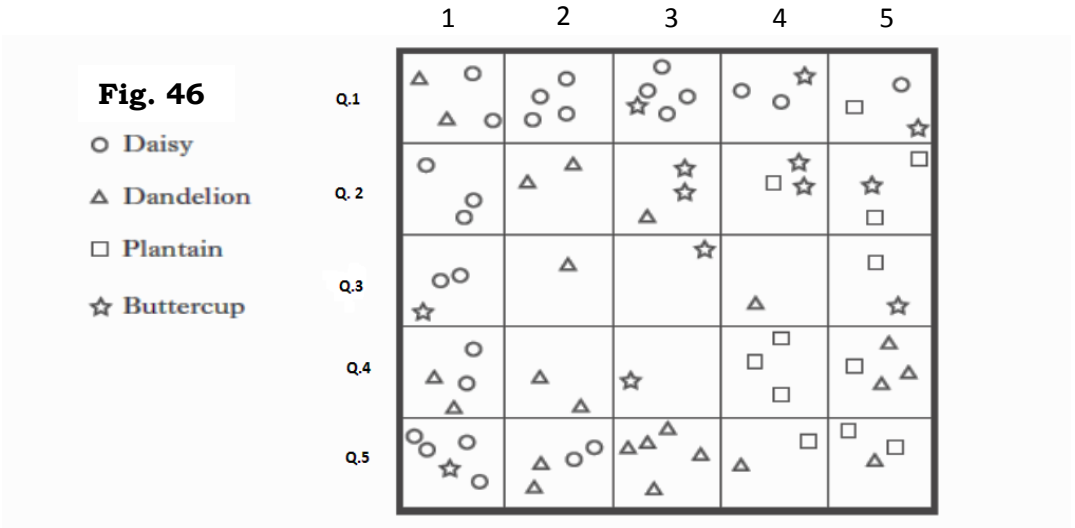
This section consists of **TWO** compulsory questions. Each question is worth **10 marks**. Answer Section C in the spaces provided.

Marks will be given to answers that show clear, accurate expressions of ideas in a logical and cohesive manner. Marking criteria is provided at the end of the questions.

QUESTION 1: [10 marks]

An experiment was set up by Form 6 Biology students out at the backyard of their school.

The following table in **Fig. 46** below shows the study area and the species distributed in the field.



Quadrat size = $1m^2$

Total size of area = $100\ m^2$

Formula

Population Size =

$$\frac{\textbf{P = Total Area X Total Sample}}{\textbf{Area of Quadrat}}$$

With reference to the above information, **WRITE** a formal lab report of this experiment. **USE** the guidelines provided in the marking criteria (*refer to page 45*) to assist your discussion in this question.

Name	**Quadrat 1.3**	**Quadrat 2.5**	**Quadrat 3.1**	**Quadrat 4.2**	**Quadrat 5.4**
Daisy					
Dandelion					
Plantain					
Buttercup					
Total					

Aspect	**Mark Allocated**	**Marks Awarded**
Aim	1 mark	
Method	2 marks (at least four steps listed)	
Completion of Table	2 marks (2 marks for accuracy of all rows)	
Correct Calculation of Population Size	2 marks	
Complete conclusion	3 marks	
Total	**10 marks**	

QUESTION 2 [10 marks]

Compare the role of mitosis and meiosis in the life cycle of an organism and sketch a concept map to show the flow of the process in human.

Criteria	**Mark Allocated**	**Mark Awarded**
Define the role of Mitosis and Meiosis	2	
Where cells are they found with supportive Examples. Include a **concept map** is to show the flow of N and 2N chromosomes occur in human	2 2	
Comparison of the two Process in relation to : - Number of chromosomes in parent cell - Number of chromosome in meiosis & mitosis cell division - Number of chromosomes after fertilization & after birth of baby - Number of daughter cells -	1 1 1 1	
Total	**10 marks**	

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ANSWER SHEET

WRITE THE LETTER OF THE CORRECT ANSWER ONLY.

Student Personal Identification Number					

MULTIPLE CHOICE ANSWER BOXES

1.		11.	
2.		12.	
3.		13.	
4.		14.	
5.		15.	
6.		16.	
7.		17.	
8.		18.	
9.		19.	
10.		20.	

2 X _____ = _____ / 40

FOR OFFICIAL ONLY

BIOLOGY 2015: SECTION TOTALS

Marker	Sections	Check Marker
40	A	40
20	B1	20
20	B2	20
20	B3	20
20	B4	20
20	B5	20
20	B6	20
20	B7	20
10	C1	10
10	C2	10
200		200