MARKER CODE		Student Personal Identification Number

Solomon Islands National Form Six School Certificate

BIOLOGY

2018

QUESTION AND ANSWER BOOKLET

TUESDAY 6th NOVEMBER 9:00 AM TIME: 3 Hours Plus 10 Minutes Reading Time.

INSTRUCTIONS

1. There are THREE (3) sections to the paper. **ALL SECTIONS ARE COMPULSORY**. Answer **ALL** questions.

   Recommended time allowances for each section:

Section A: Multiple Choice Questions	45 minutes	40 marks
Section B: Short Answer Questions	105 minutes	144 marks
Section C: Extended Response Questions	30 minutes	20 marks
	3 hours	**204 marks**

2. Write your answers to **Section A** on the Answer Sheet on the **FOLD-OUT FLAP** on the last page. Write your answers to **Sections B** and **C** in the spaces provided in this booklet.
3. Write your **Student Personal Identification Number (SPIN)** in the box on the top right-hand corner of this page and on the **fold-out flap** at the end of this booklet.
4. If you use extra sheets of paper(s), be sure to write clearly the number of the question being answered. Write your SPIN on the top right hand corner of each sheet, and tie it securely at the appropriate place in this booklet.
5. Do NOT use correction fluid.
6. Mobile phones are NOT allowed in the Examination room.

NOTE: 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 to the question(s).

Check that this booklet contains pages **2 - 32** in the correct order and that none of these pages are blank. Page **31** have been left blank deliberately.

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

SECTION A: MULTIPLE CHOICE (40 MARKS)

ANSWER ALL THE QUESTIONS IN THIS SECTION. Write the LETTER of the best answer in the boxes on the fold-out flap. If you change your answer, put a line through the first answer and write your new choice beside the box. Each question is worth TWO (2) marks.

1. Temperature as high as 60^{o}C to 100^{o}C interferes with enzyme activities because it;

   A. increases the kinetic energy of the enzyme.
   B. increases the energy of the substrate molecules.
   C. changes the shape of the active site of the enzyme.
   D. increases the concentration of the enzyme active site.

2. ONE (1) of the properties of an enzyme is that it is **specific.** This means that it;

   A. acts only to one type of cell.
   B. acts on to a particular organism only.
   C. is found only in certain part of the cell.
   D. speeds up only a particular biological reaction.

3. Which of the **sequence** below best illustrate photosynthesis in the chloroplast.

   A. Light energy → photosystem 1→ photosystem 2 → light reaction →glucose.
   B. Light energy → dark reaction →photosystem 2 → photosystem 1→ glucose.
   C. Glucose→ dark reaction → photosystem 2→ photosystem 1 → light reaction.
   D. Light energy → photosystem 2→ photosystem 1→ dark reaction → glucose.

4. The form of transport process in cells that require ATP input is?

   A. Diffusion.
   B. Osmosis.
   C. Active transport.
   D. Facilitated diffusion.

5. Which of the following organelle matches with its correct function?

   A. Nucleus – Photosynthesis.
   B. Chloroplast – Cellular respiration.
   C. Cell membrane – Protein synthesis.
   D. Rough endoplasmic reticulum – Protein synthesis.

6. "Back bone" of DNA molecule is made up of;

   A. nucleotides.
   B. amino-acids.
   C. sugar and phosphate.
   D. fatty acid and glycerol.

7. A lizard has 20 chromosomes in its skin cells, thus its egg cells will have;

   A. 10 chromosomes.
   B. 20 chromosomes.
   C. 30 chromosomes.
   D. 40 chromosomes.

8. Two or more organisms may show the same phenotype but different genotypes. In order to identify the correct genotypes, it is necessary to conduct a back cross test. The genotypes chosen for the back cross are;

   A. homozygous recessive.
   B. homozygous dominant.
   C. heterozygous recessive.
   D. heterozygous dominant.

9. The structure in plants that is responsible for the transportation of minerals up the leaves is the;

   A. xylem.
   B. cortex.
   C. phloem.
   D. cambium.

10. In the life cycle of angiosperms, a mango fruit represents;

A. haploid stage [n].
B. diploid stage [n].
C. haploid stage (2n].
D. diploid stage [2n].

11. Continuous eating of low fiber diet such as rice can lead to;

A. cancer.
B. bleeding.
C. constipation.
D. ulcer in the stomach.

12. Which of the following **(process)** is arranged in the correct order for food breakdown in the digestive system?

A. Digestion → Ingestion→ absorption → egestion.
B. Egestion → absorption →ingestion → digestion.
C. Ingestion → digestion → absorption → egestion.
D. Absorption → ingestion → egestion → digestion.

13. Carbon dioxide diffuses out from the blood vessels into the lungs then out through the nose, during exhalation. This is made possible by;

A. active transport.
B. active osmosis.
C. concentration gradient.
D. osmoregulation of gases.

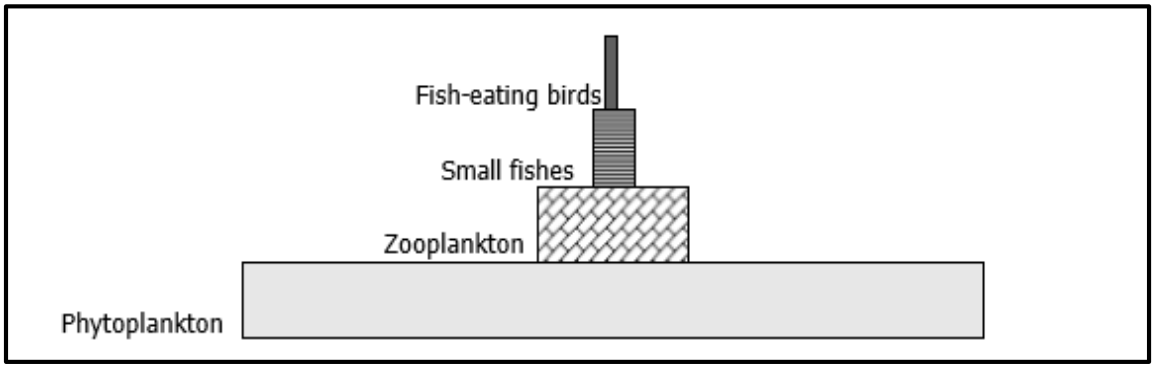
14. An example of an animal that uses open circulatory system is;

A. frogs.
B. dogs.
C. bird.
D. grasshopper.

15. Uric acid is nitrogenous waste that is produced by the;

A. butter flies.
B. cane toads.
C. parrot fish.
D. Frigate birds.

Refer to the diagram below for question 16. The diagram below shows an ecological pyramid.



16. Which of the above organisms will be **more** poisonous, if a long lasting pesticide was found in the ocean where the organisms leave?

A. Small fishes.
B. Zooplanktons.
C. Phytoplankton.
D. Fish eating birds.

17. **Spider spinning a web** to catch its food, is an example of;

A. structural adaptation.
B. historical adaptation.
C. behavioral adaptation.
D. physiological adaptation.

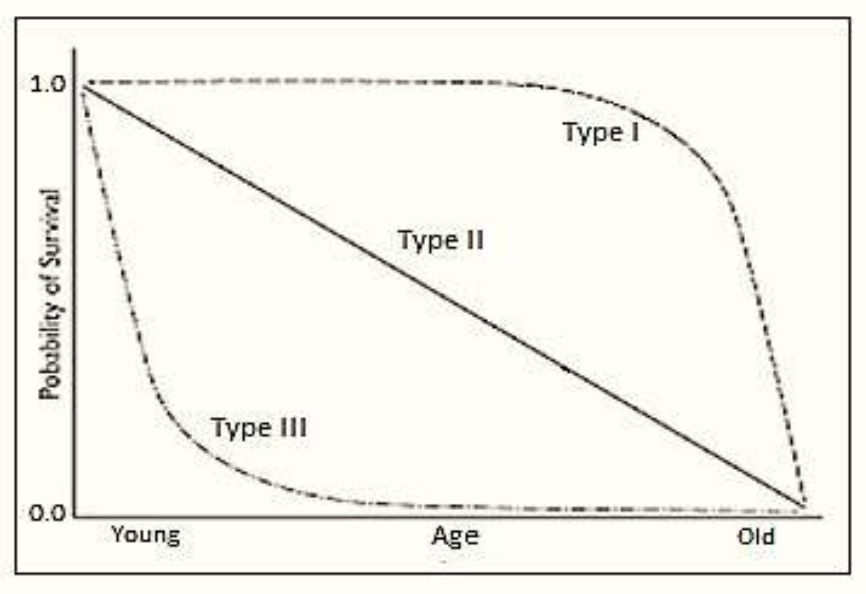
Refer to the table below for question 18. The table shows different levels of classification of marine cray fish.

Kingdom	Animalia
Phylum	Arthropoda
Class	Crustecea
Order	Decapoda
Family	Palinuridae
Genus	Jasus

18. Using the binominal system of nomenclature the correct species name for the marine cray fish is;

    A. *Janus lalendai.*
    B. Arthroda *lalendai.*
    C. Crustecea *lalendai.*
    D. Palinuridae *lalendai.*

The graph below shows survivorship curve of organisms from birth to old age.



19. **Type 1** curve represents that of a;

    A. dog population.
    B. cat population.
    C. fish population.
    D. flying fox population.

20. Which of the following best illustrates **ecological succession**?

    A. A mouse eats seeds, and an owl eats the mouse.
    B. Overgrazing cause loss of nutrients from the soil.
    C. Decomposition in soil release nitrogen that plants can use.
    D. Grass grows in a deserted field, followed by shrubs, and then trees.

Score	
Total Marks for Section A.	**40**

SECTION B: SHORT ANSWER QUESTIONS (144 MARKS)

Answer All Questions In This Section. Write You Answer In the Space Provided.

21. Photosynthesis is an important process in all green plants.

i. Explain the rate of photosynthesis during the **day** and at **night**.

_____

_____

_____

2 marks

ii. Write down the correct balance chemical equation for the process of photosynthesis.

_____

_____

2 marks

iii. Explain the process of light reaction in the chloroplast.

_____

_____

_____

2 marks

iv. Explain the importance of **light reaction** to **dark reaction**.

_____

_____

_____

2 marks

22. Respiration process is an essential process where food is broken down to provide energy for cell metabolism.

i. Describe the TWO (2) initial stages of cellular respiration.

Stage 1

_____

_____

2 marks

Stage 2

_____

_____

2 marks

ii. Explain the role of NADH in the process of electron transport chain.

_____

_____

_____

2 marks

iii. Explain ONE (1) major difference between cellular respirations of pyruvate in human muscles cells and in yeast cells.

_____

_____

_____

2 marks

23. Five equal length (20cm) were cut from a fresh potato. Each was placed in one of the five solutions containing a different amount of sugar solution. After two hours the potato were removed from the solutions, gently dried and their lengths were measured again. The results of the experiment are shown in the table below.

Solutions	Original length	Final length
A	20	15
B	20	25
C	20	17
D	20	23
E	20	20

i. From the above results **explain** what happened to the **potato cells** in;

1. Solution A

_____

_____

_____

2 marks

2. Solution B

_____

_____

_____

2 marks

3. Solution E

_____

_____

_____

2 marks

ii. Explain the rate of osmosis in **Solution C,** if the size of the potato was cut into 2 pieces.

_____

_____

_____

2 marks

24. A. Cells are the basic unit of all living things.

i. Describe TWO (2) main difference between a plant and animal cells.

a._____

_____

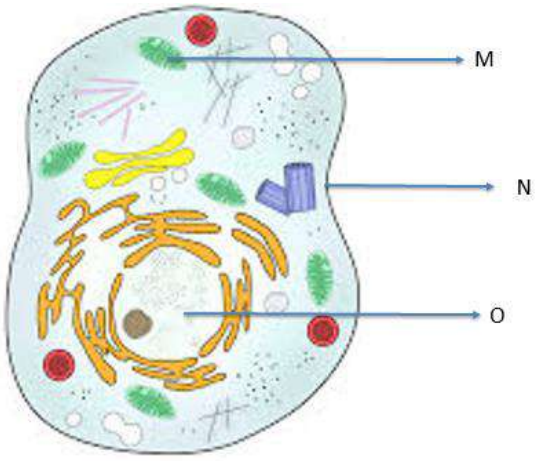
2 marks

b._____

_____

2 marks

B. **Diagram below shows the structure of a typical cell.**



i. Explain if the cell above is a plant or animal cell.

_____

_____

_____

2 marks

ii. Describe the function of organelle label **'M'**

_____

_____

2 marks

iii. Deduce a relationship between organelle labeled N and O in the above diagram.

_____

_____

2 marks

25. A small gene in bacteria has the following bases, '**ATTGCCACG'**

i. Study the above bases and rewrite its corresponding **mRNA** strand.

_____

2 marks

ii. Explain the main difference between **mRNA** and **tRNA.**

_____

_____

_____

2 marks

iii. In your own words describe the process of **transcription** and **translation** in protein synthesis.

1. Transcription.

_____

_____

2 marks

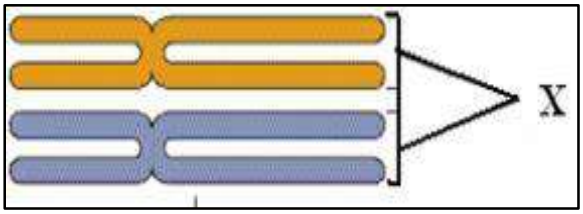
2. Translation

_____

_____

2 marks

26. **The diagram below represent a pair of chromosomes.**



i. In the space below sketch a diagram to show that crossing over occurs between the pair of chromosome X.

2 marks

ii. Explain how **Crossing Over** can affect the genes of an offspring.

_____

_____

_____

2 marks

iii. Describe the term **independent assortment**.

_____

_____

2 marks

iv. Explain the role of **meiosis** in the life cycle of an organism.

_____

_____

_____

2 marks

27. Blood group is an example of trait with multiple alleles.
A woman has blood **type A** was married to a man with blood **type B** and they have a child with **blood type O.**

i. Use the space in the box below, **draw** a punnet square to show how it is possible to have a child with blood type **O.**

4 marks

ii. From the above cross, predict the percentage of having child with blood group A and AB

_____

_____

2 marks

iii. Explain why a person with "O" blood type will NOT have a child with "O" blood type, if he marries to a person with "AB" blood type.

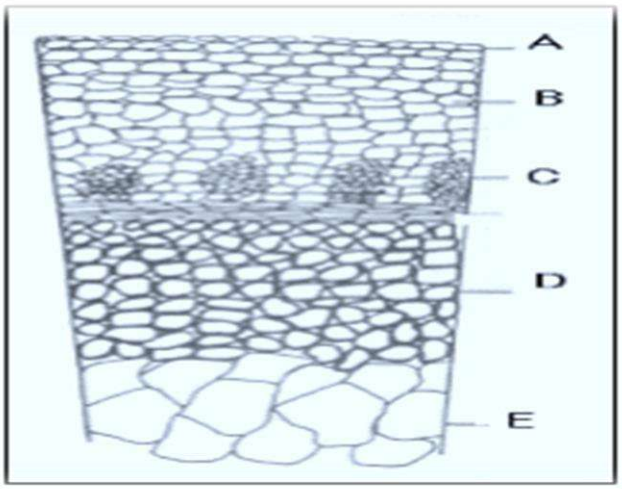
_____

_____

_____

2 marks

28. **Below is a diagram that shows the cross section of stem of dicotyledonous plant. Study the diagram and answer the following questions (i, ii and iii);**



i. Describe the function of part label **C** and **D**

Part C _____

_____

Part D _____

_____

4 marks

ii. Explain why ring barking of trees causes the tree to die?

_____

_____

_____

2 marks

iii. Explain how transpiration help to increase the **rate of water movemen**t in plants.

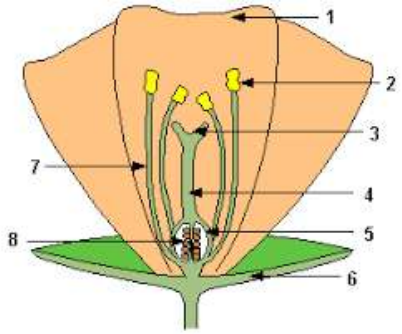
_____

_____

_____

2 marks

29. **Plants life cycle depends on both sporophyte and gametophyte generations. The diagram below shows structure of a flower.**



i. Explain the process at structure labeled "**3"** that enable fertilization to take place.

_____

_____

_____

2 marks

ii. Explain the function of part labelled **"8".**

_____

_____

_____

2 marks

iii. Explain why the flower above is said to be **insect pollinated** plant.

_____

_____

_____

2 marks

iv. Explain why sexual reproduction in plants gives rise to variation in the population.

_____

_____

_____

2 marks

30. The evolution of digestive system allows different organisms to breakdown food eaten to obtain nutrients needed for their metabolism.

i. Explain the process of chemical digestion of starch in the stomach of mammals.

_____

_____

_____

2 marks

ii. Describe the structure of the small intestine that allows effective **absorption** of nutrients.

_____

_____

2 marks

iii. In the table below, state the products of **Carbohydrate and Fat digestion** in the human intestine.

Main food types in Diet	**Name of products after digestion in the intestine**
1. Carbohydrate	a.
2. Fat	b.

2 marks

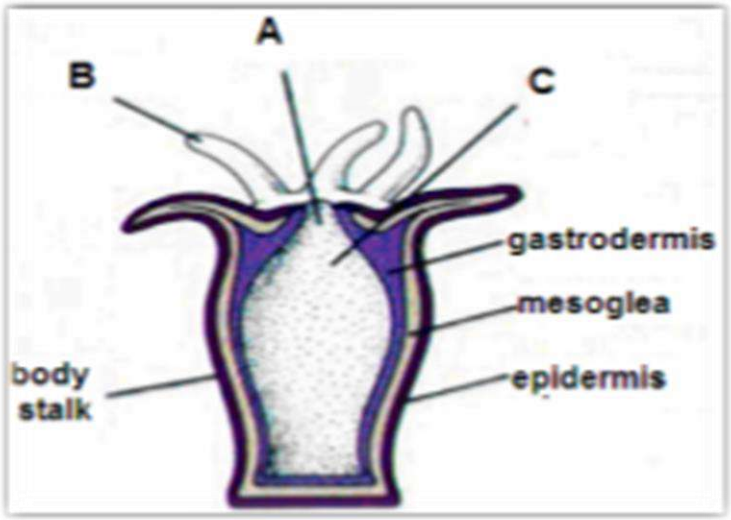
iv. Describe how excess glucose is stored in the body after eating a meal with plenty of carbohydrates.

_____

_____

2 marks

31. **The diagram below show a picture of a sea anemone.**



i. Describe the structure of **sea anemone** with respect to its way of life.

_____

_____

2 marks

ii. Describe the function of the part label "C" in the above diagram.

Part C. _____

_____

2 marks

iii. Explain how food is being processed in the gut of sea anemone above by extracellular and intracellular digestion.

_____

_____

_____

2 marks

iv. Explain why it is possible for hydra to use diffusion as the main transport systems in their bodies.

_____

_____

_____

2 marks

32. A. Animals used different mechanisms to exchange gas in their bodies.

i. Describe the gas exchange surfaces for the following organisms with reference to their way of life.

a. Earthworm _____

_____

2 marks

b. Fish _____

_____

2 marks

B. A student did an experiment by, collecting data on the percentage of gas inhaled and exhaled for human beings. The results are shown in the table below. Study the results and answer the questions that follows.

Gas	**Inhaled air**	**Exhaled air**
Nitrogen	79.0	79.0%
Oxygen	20.7%	14.5%
Carbon-dioxide	0.04%	6.2 %
Water	Varied	Saturated

i. Explain why the percentage of carbon dioxide and oxygen changes with different amounts for exhale and inhale gases.

_____

_____

_____

2 marks

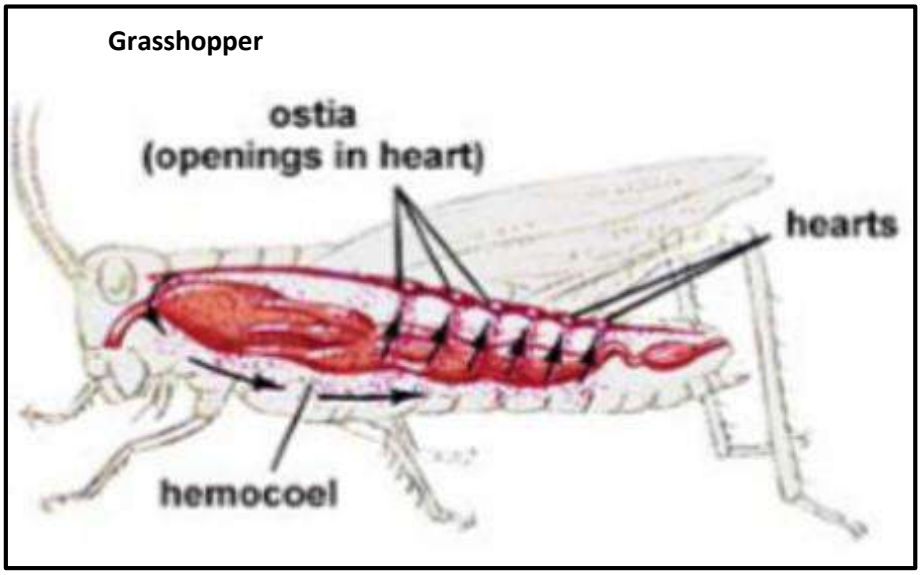
ii. Describe TWO (2) main factors about an alveoli which make it efficient for gas exchange.

_____

_____

2 marks

33. A. **Below is a diagram of a grasshopper's circulatory system. Study the diagram of the grasshopper and answer the following questions.**



i. With the help of the above diagram describe how the circulatory system of grasshopper works.

_____

_____

2 marks

ii. Describe a limitation of the circulatory system of grasshoppers in its way of life.

_____

_____

2 marks

iii. Explain why the circulatory system of mammals is very efficient for large animals.

_____

_____

_____

2 marks

B. Smoking can cause problems to the heart.

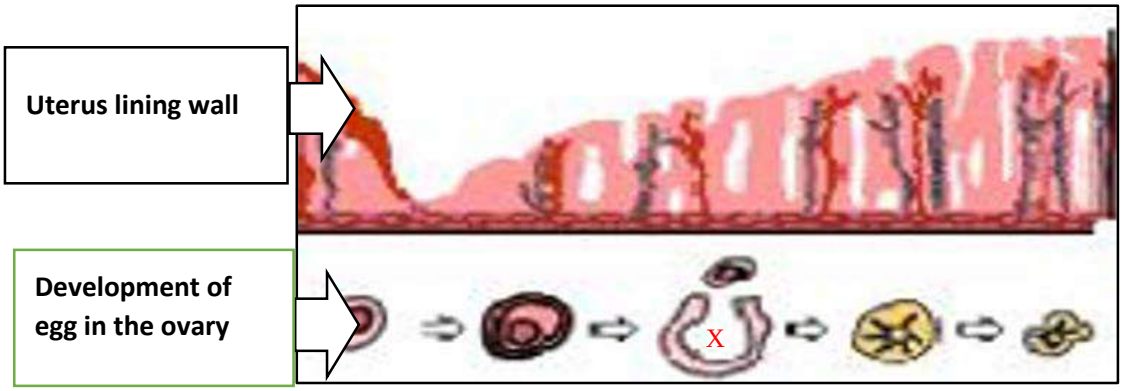
i. Describe how smoking can cause coronary disease.

_____

_____

2 marks

34. **Diagram below shows the lining of the uterus wall of human female reproduction system and the development of the egg inside the ovary.**



i. Explain the major role of estrogen hormone with respect to the lining of the uterus wall.

_____

_____

_____

2 marks

ii. Describe the process that takes place in the structure label **X** in the diagram.

_____

_____

2 marks

iii. Explain the purpose of **implantation**.

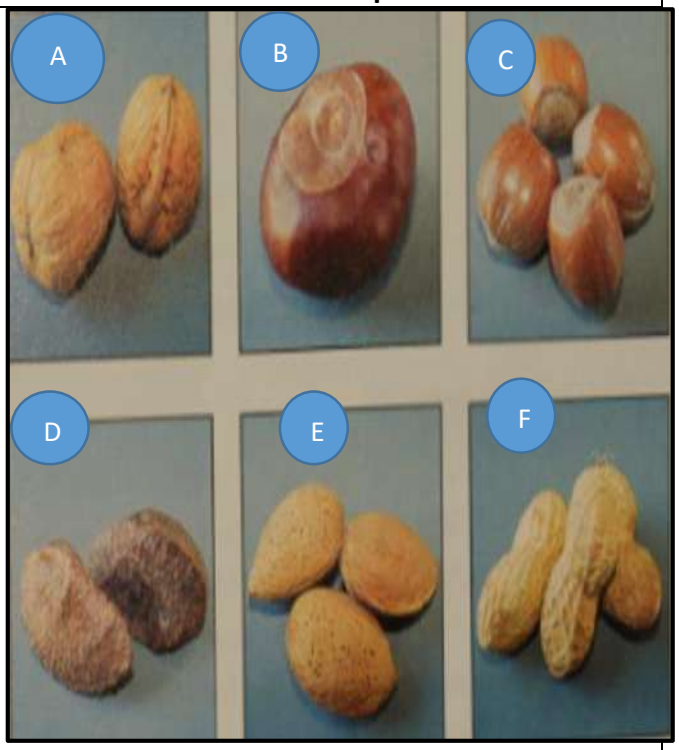
_____

_____

_____

2 marks

35. **Use the information in the table to answer questions (A, B, C and D) below.**

A Key To The Seed Plants	Seed Plants Species
1. a. Seeds smooth and shiny.....go to 2 b. Seeds rough..... go to 3 2. a. Seeds large.....*Henna tora* b. Seeds small.....*Piraru nutous* 3. a. Seeds long.....*Miranda pynut* b. Seed round oval.....go to 4 4. a. Seeds slightly color black....*Miranda sonut* b. Seed yellow …….. go to 5 5. a. Seeds end pointed…Miranda *pontous* b. Seeds end round……Naranda *pilotous*	

A. Study the key above and give the scientific names for seed plant "**A**" and **"B"**

i. Seed Plant A: _____

ii. Seed Plant B:_____

iii. Seed Plant C:_____

3 marks

B. Which genus is seed plant **"D"** belong to?

_____

1 mark

C. Describe the similarities or difference in the term **genus** of these three (3) seed plants, ***pynut, sonut*** **and** ***pilotous.***

_____

_____

2 marks

D. Physical features have been used above to classify and name the seed plants. State 2 other criteria used today to classify organisms.

a. _____

b. _____

2 marks

36. **Below is a diagram that shows picture of mangrove tree grow in salt water along the shore line. Study the picture and answer the following questions (i and ii).**

i. Explain the **structural, physiological** and **behavioral** adaptation of the mangrove to survive in the environment.

A. Structural adaptation:

_____

_____

_____

2 marks

B. Physiological adaptation:

_____

_____

_____

2 marks

C. Behavioral adaptation

_____

_____

_____

2 marks

ii. Describe the **fundamental niche** of the mangrove tree.

_____

_____

2 marks

37. To estimate the population of species in an area, scientist often used quadrates.

i. Explain why it is important that quadrates are randomly placed to obtain data to determine size of a population in the area surveyed.

_____

_____

_____

2 marks

ii. Explain why it is important that sufficient quadrate sample size are taken.

_____

_____

_____

2 marks

iii. Explain why using quadrate will NOT be a suitable method to estimate population of the butterflies.

_____

_____

_____

2 marks

iv. Explain the effect of genetic isolation on the population of a species.

_____

_____

_____

2 marks

38. A student was studying the species **diversity** and **abundance** on a rocky shoreline and obtained the following data**.** Study the table and answer the following questions (i, ii and iii).

		Species		
High tide water mark	**Sites**	**Barnacles**	**Mussels**	**Cats'eye**
	Site 1	10	0	0
	Site 2	8	2	0
	Site 3	3	5	4
	Site 4	0	12	8
	Site 5	0	4	15
Low tide water mark	**Total**	**21**	**23**	**27**

i. Which species is well adapted to cope with high tide water mark? Give reason for your answer.

(a)Species: _____ 1 mark

(b)Reason: _____

1 mark

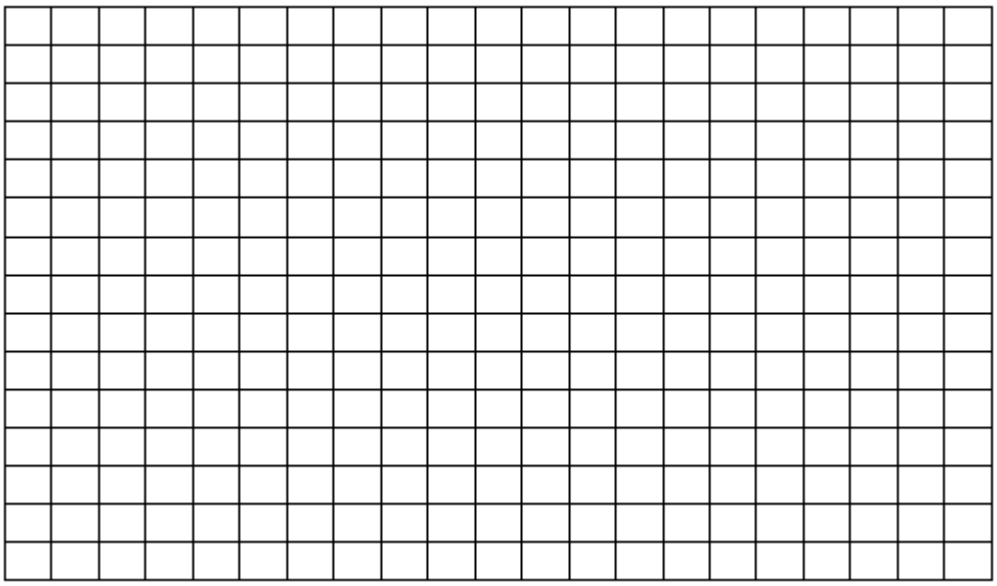
ii. Which TWO (2) species might be competing for the same resources? Give a reason for your answer.

(a) Species: _____ and _____ 1 mark

(b) Reason: _____

2 marks

iii. Use the data above (question 38), sketch or draw a kite diagram to show the abundance and distribution of mussels from high tide water mark to low tide water mark on the grid line below.



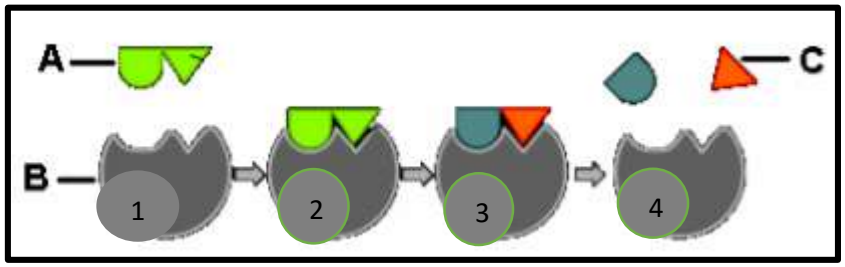
3 marks

Score	
Total Marks for Section B.	**144**

SECTION C: APPLICATION AND ADVANCED SKILLS (20 MARKS)

Answer Question C in the spaces provided. The amount of space provided is a guide to the length of response needed. Marks will be given for answers that show clear, accurate expressions of ideas and the ability to develop a discussion or an argument in a logical and cohesive manner.

39. Below is a diagram that illustrate **induced fit model** of an enzyme's action on a substrate.



i. Study the diagram above and discuss stages (1 – 4) on how enzymes act on a substrate with reference to induce fit model.

6 marks

40. Production of Genetic Modified Organism (GMO) is at a very high rate today in industrialized countries.

i. Discuss below the advantages and disadvantages of the Genetically Modified Organisms.

4 marks

41. Excretion is a process where organisms get rid of waste in the body.

Study the table below and answer the questions (i, ii and iii) that follow.

Animal Species	Filtration Rate ML/kg body weight/h	Urine flow ML/kg body weight/h	Proportion absorbed %
A	14	6	57
B	24	16	33
C	40	10	75
D	156	3	98

i. Which of the FOUR (4) species is likely to live in desert condition? Give a reason for your answer.

(a) Species: _____ 1 mark

(b) Reason: _____ 1 mark

ii. Protein metabolism produces very **toxic byproduct that** must be excreted immediate or converted into other compounds that are less toxic for cells to store prior to excretion.
Discuss how **fish and birds** manage and discharge the toxic byproducts from their bodies.

_____
_____
_____
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4 marks

42. Deforestation or cutting down of trees in virgin forest has been going on in the Solomon Islands for many years.

i. Discuss the effect of deforestation on both biotic and abiotic systems.

4 marks

Score	
Total Marks for Section C.	**20**

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SINF6 BIOLOGY 2018

Student Personal Identification Number

ANSWER SHEET – Section A
Write the letter of the correct answer only.

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

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Section	Mark	Marker	Script Checker
Section A. 1 – 20	40		
Section B. 21 – 38	144		
Section C. 39 - 42	20		
TOTAL	204		
MARKER / CHERCKER INITIALS			

Number Correct ( ) X 2 = [ ] 40