TONGA GOVERNMENT
MINISTRY OF EDUCATION AND TRAINING

TONGA FORM SIX CERTIFICATE
2014
BIOLOGY

QUESTION AND ANSWER BOOKLET

Time allowed: 3 Hours

INSTRUCTIONS

1. Write your Student Personal Identification Number (SPIN) on the box on the right corner of this booklet and on page 35.
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. Recommended time allowances for each section:

<table>
<thead>
<tr>
<th>Section</th>
<th>Type</th>
<th>Marks</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td>Multiple Choice</td>
<td>40</td>
<td>1 hour</td>
</tr>
<tr>
<td>Section B</td>
<td>Short Answers</td>
<td>140</td>
<td>1 ½ hour</td>
</tr>
<tr>
<td>Section C</td>
<td>Extended Response</td>
<td>20</td>
<td>½ hour</td>
</tr>
</tbody>
</table>

6. Check that this booklet contains pages 1 - 35 in the correct order and that none of these pages is 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.

Study the food chain below and use it to answer Question 1 and 2:

From a seashore:

[Diagram: seaweed → periwinkle → fish → seagull]

1. A primary consumer in the food chains above would be ________________.
   A. blackberry  
   B. seaweed  
   C. periwinkle  
   D. tawny owl

2. Which organisms contain the least amount of energy?
   A. Seaweed  
   B. Blackberry  
   C. Owl  
   D. Seagull

Study the experimental setup below and use it to answer Questions 3 and 4:

[Diagram: green water plant with bubbles of gas, constant light for 24 hrs, water]

3. Which hypothesis would most likely be tested using this setup?
   A. Green water plants release a gas in the presence of light.  
   B. Roots of water plants absorb minerals in the absence of light.  
   C. Green plants need light for cell division.  
   D. Plants grow best in the absence of light.
4. The bubbles of gas was produced by the process of _________________.
   A. photosynthesis  
   B. respiration  
   C. photosynthesis and respiration  
   D. evaporation

5. Which of the following represents a balanced equation for photosynthesis?
   A. CO₂ + H₂O        ----------> C₆H₁₂O₆   +   O₂
   B. 6CO₂ + 12H₂O  ----------> C₆H₁₂O₆   +  12 O₂
   C. 4CO₂ + 6H₂O    ----------> C₆H₁₂O₆   +    O₂
   D. 6CO₂ + 6H₂O   ----------> C₆H₁₂O₆   + 6O₂

6. Which cellular organelle contains enzymes that are considered digestive?
   A. Nucleus  
   B. Lysosomes  
   C. Ribosomes  
   D. Golgi apparatus

The diagram below illustrates the countercurrent exchange in the fish gill:

7. This counter current system helps to maximize _________________.
   A. endocytosis  
   B. osmosis  
   C. active transport  
   D. diffusion

8. Circulatory systems have the primary benefit of overcoming the shortcomings of _________________.
   A. temperature differences between the lungs and the active tissue  
   B. the slow rate at which diffusion occurs across cells  
   C. communication systems involving only the nervous system  
   D. fetal organisms maintaining an optimal body temperature
9. Flying insects do all of the following except _________________________________.
   A. increase metabolism as much as 200-fold during flight
   B. switch from diffusion of tracheal gases to active transport during flight
   C. utilize high numbers of mitochondria in flight muscles
   D. produce water molecules from oxygen in mitochondria

10. A population of lizard is observed to have increased its population from the previous year. The most likely explanation for this observation is ________.
   A. reduction in dearth rate
   B. increase in immigration
   C. increase in emigration
   D. decrease in emigration

The diagram below shows an electron micrograph of mitochondria:

11. Which letter represents the part where electron transport chain occurs?
   A. W
   B. X
   C. Y
   D. Z

12. The function of the highly folded membranes found is to _________________.
   A. increase the surface area for chemical processes to occur
   B. protect the cell against physical damage
   C. make it possible to package large amounts of DNA within the cell
   D. assist with the movement of materials within the cell
Use this information to answer Question 13 and 14:

In kumala, Yellow root crop (Y) is dominant over white root crop (y). The shape of the kumala is Oval (O) and is dominant over spherical shaped kumala (o).

13. If a kumala plant that is true-breeding for yellow and oval shape root is crossed with a kumala that is true-breeding for white spherical root, what is the genotype for the F1 generation?
   A. YYOO
   B. YyOo
   C. yyOO
   D. yyoo

14. What will be the phenotype of the F1 generation?
   A. Yellow and spherical
   B. White and oval
   C. White and spherical
   D. Yellow and oval

15. An experiment was conducted to demonstrate osmosis to Form 6 students. The experiment was set up as shown in the diagram below:

Which cell organelle is represented by the dialysis tubing?
   A. Chloroplast
   B. Cell membrane
   C. Mitochondria
   D. Cell Wall
Study the carbon cycle below and use it to answer Questions 16 and 17:

![Carbon Cycle Diagram]

16. Which process best describes X in the Carbon cycle?
   A. Photosynthesis  
   B. Combustion  
   C. Respiration  
   D. Perspiration

17. All living thing undergo the process labeled _____.
   A. W  
   B. X  
   C. Y  
   D. Z

18. Which statement about the placenta and its interaction with the developing human fetus is FALSE?
   A. It allows O2 to diffuse from the maternal blood into the fetal blood and CO2 to diffuse out.  
   B. It is composed of both fetal and maternal tissue.  
   C. It provides connections to allow maternal blood to enter the fetal circulation system.  
   D. It stops some harmful substances in the maternal blood from reaching the fetal circulation, but cannot provide absolute protection.
The diagrams below show the arrangement of vascular tissues in monocot and dicot stems:

19. Which of the following statements is TRUE about the above diagrams?
   A. **Stem A** is from a dicot and **stem B** is from a monocot plant.
   B. The part labeled X are the vascular bundles.
   C. The pith consists of soft wood with few lignin.
   D. Layer X forms the annual rings on stems of monocots.

20. Which one of these tables correctly identifies the names and forms of the nitrogenous waste product produced by insects and fish?

<table>
<thead>
<tr>
<th></th>
<th>Insect</th>
<th>Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Ammonia</td>
<td>Urea</td>
</tr>
<tr>
<td>B.</td>
<td>Urea</td>
<td>Uric Acid</td>
</tr>
<tr>
<td>C.</td>
<td>Uric Acid</td>
<td>Ammonia</td>
</tr>
<tr>
<td>D.</td>
<td>Ammonia</td>
<td>Water</td>
</tr>
</tbody>
</table>
1. Study the diagrams below and use it to answer the questions that follow:

a. State TWO (2) similarities between plant cells and animal as shown in the diagram.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

(2 marks)

b. State TWO (2) differences between the plant cell and the animal cells as shown in the diagram.

___________________________________________________________________________
___________________________________________________________________________

(2 marks)
2. The diagram represents a cross section of a leaf:

   a. Which structure contains the largest amount of carbohydrates?

      ________________________________________________________________

      (1 mark)

   b. Name the opening labeled E.

      ________________________________________________________________

      (1 mark)

   c. Explain how the amount of water in the leaves control the opening and the closing of part labeled E?

      ________________________________________________________________

      ________________________________________________________________

      ________________________________________________________________

      (2 marks)

   d. Water is essential for photosynthesis. Briefly outline how water from the soil reaches the leaf.

      ________________________________________________________________

      ________________________________________________________________

      ________________________________________________________________

      (2 marks)

   e. Describe the functions of structures labeled C and D.

      ________________________________________________________________

      ________________________________________________________________

      ________________________________________________________________

      (2 marks)
3. The diagram below shows the amount of energy in different trophic levels of a food chain:

```
<table>
<thead>
<tr>
<th>Trophic Level</th>
<th>Energy (KJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Plants</td>
<td>6000</td>
</tr>
<tr>
<td>Herbivores</td>
<td>........</td>
</tr>
<tr>
<td>Carnivores</td>
<td>60</td>
</tr>
<tr>
<td>Top Carnivores</td>
<td>........</td>
</tr>
</tbody>
</table>
```

a. Calculate the amount of energy available for:
   
   i. Herbivores
      
      .................................................................
      .................................................................
      .................................................................
      .................................................................
      .................................................................
   
   (2 marks)

   ii. Top carnivores
   
      .................................................................
      .................................................................
      .................................................................
      .................................................................
      .................................................................
   
   (2 marks)

b. Explain how energy flow in an ecosystem as illustrated in the diagram.
   
   .................................................................
   .................................................................
   .................................................................
   .................................................................
   .................................................................
   
   (2 marks)

c. Explain why only 10% of the energy in herbivores is transferrable to carnivores.
   
   .................................................................
   .................................................................
   .................................................................
   .................................................................
   .................................................................
   
   (2 marks)
1. Study the Pyramids of Biomass below and use it to answer the questions that follow:

**Pyramid A**

- **top carnivore**
- **primary carnivore**
- **herbivores**
- **producers**

**Pyramid B**

- **carnivore**
- **herbivores**
- **producers**

a. Define ‘Biomass’.

b. Describe how the biomass of the organisms was obtained.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

(2 marks)

c. Compare the biomass of organisms in each trophic level in Pyramids A and B.

____________________________________________________________________________
____________________________________________________________________________

(2 marks)

d. Explain why Pyramid A has an upright shape whereas Pyramid B shows an inverted shape.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

(2 marks)
2. The diagram below shows the induced fit model of enzyme action:

![Diagram showing enzyme action with labeled parts W, X, Y, and Z.]

a. What are enzymes?  
____________________________________________________________________________  
(1 mark)

b. Explain why enzymes are important for living things?  
____________________________________________________________________________  
____________________________________________________________________________  
(2 marks)

c. Explain what the ‘induced fit model’ of enzyme implies.  
____________________________________________________________________________  
____________________________________________________________________________  
(2 marks)

d. Identify the three parts labeled W, X and Y.  
X: _________________________________________________________________________  
Y: _________________________________________________________________________  
Z: _________________________________________________________________________  
(3 marks)

e. Explain why enzymatic action is highly specific?  
____________________________________________________________________________  
____________________________________________________________________________  
____________________________________________________________________________  
(1 mark)
f. Sketch a graph to illustrate how enzymes are affected by temperature.

(2 marks)

g. Explain the effect of temperature on enzyme action.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

(2 marks)
QUESTION THREE          (20 MARKS)

1. The diagrams below represent the circulatory systems of some animals. Use it to answer the questions that follow:

   ![Blood circulation diagrams]

   **Blood circulation Type A**   **Blood Circulation Type B**

   a. Describe the main purposes of the circulatory system?

   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

   (2 marks)

   b. Name the type of blood circulation represented by **Type A** and **Type B**.

   **Type A:** __________________________________________________________________
   **Type B:** __________________________________________________________________

   (2 marks)

   c. Describe TWO (2) differences in the types of blood circulations shown in the diagrams above.

   Difference 1: __________________________________________________________________
   Difference 2: __________________________________________________________________

   (2 marks)

   d. Give ONE (1) advantage and ONE (1) disadvantages of the **Type A** blood circulation in relations to the organisms’ size and mobility.

   Advantage: ___________________________________________________________________
   ____________________________________________________________________________

   Disadvantage: __________________________________________________________________
   ____________________________________________________________________________

   (2 marks)
e. Give ONE (1) advantage and ONE (1) disadvantage of the **Type B** blood circulation in relations to the organisms’ size and mobility.

**Advantage:**
____________________________________________________________________________
____________________________________________________________________________

**Disadvantage:**
____________________________________________________________________________
____________________________________________________________________________

(2 marks)

2. The pictures below show two types of species interaction. Use it to answer the questions that follow:

| Picture A: Clown fish and sea anemone | Picture B: Butterfly and Hibiscus |

a. Name the type of species interaction that is shown in each **Picture A** and **B**:

**Picture A:** ____________________________  **Picture B:** ____________________________

(2 marks)

b. Explain how the species are affected from the association shown in **Picture A** and **Picture B**.

**Picture A:**
____________________________________________________________________________
____________________________________________________________________________

**Picture B:**
____________________________________________________________________________
____________________________________________________________________________

(2 marks)

c. Describe the physiological adaptations that enable the fish to become immune to the sting of the sea anemone.

____________________________________________________________________________
____________________________________________________________________________

(1 mark)
3. The diagram below shows the sea anemone and its digestive system:

| Picture of a Sea anemone | Anatomy of a sea anemone |

a. The sea anemone is considered to be the flower of the ocean. Comment on the accuracy of this statement.

____________________________________________________________________________

(1 mark)

b. Describe TWO (2) limitations of this type of digestive that the sea anemone has.

Limitation 1: _________________________________________________________________
____________________________________________________________________________

Limitation 2: _________________________________________________________________
____________________________________________________________________________

(2 marks)

c. Comparing to earthworm, explain how an earthworm’s digestive system is more efficient than the sea anemone’s digestive system.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

(2 marks)
QUESTION FOUR

1. The diagrams below show the mantle cavity of a mollusc with its internal structures:

<table>
<thead>
<tr>
<th>Half shell of a mollusc</th>
<th>Internal structures of a mollusc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Name the structure labeled A and explain how it is adapted to facilitate gas exchange.

Structure A: _______________________________________________________
Explaination: _______________________________________________________
__________________________________________________________________

(2 marks)

b. Describe how an earthworm’s gas exchange system is different from the mollusc’s gas exchange system.

__________________________________________________________________
__________________________________________________________________

(1 mark)

c. Explain why the mollusc’s gas exchange system will not be efficient for larger terrestrial animals.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

(2 marks)
2. The diagram below illustrates the process of nitrogen cycle:

![Diagram of nitrogen cycle]

a. Identify processes D and E:

D: _______________________________________________________________________
E: _______________________________________________________________________

(2 marks)

b. Describe the roles of bacteria in processes D.

___________________________________________________________________________
___________________________________________________________________________

(1 mark)

c. Legume plants have mutualistic associations with Rhizobium bacteria in the nitrogen cycle. Describe the process that involved this bacteria.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

(1 mark)

d. Describe what happens in Process A.

___________________________________________________________________________
___________________________________________________________________________

(1 mark)
e. *Mychorrhizae* fungi are also involved in the nitrogen cycle. Describe how the plants benefit from this association.

____________________________________________________________________________
____________________________________________________________________________

(1 mark)

f. State TWO (2) ways in which farmers can increase the nitrates in soil for farming.

____________________________________________________________________________
____________________________________________________________________________

(2 marks)

3. Study the diagram below which represents the two phases of Photosynthesis:

![Diagram of Photosynthesis](image)

a. Name the substances labeled (i) and (ii) which goes into the light reaction
   (i): _____________________________________________________________________
   (ii): _____________________________________________________________________

(2 marks)

b. Photosynthesis occurs in the cell organelle shown below. Name this cell organelle.

![Cell Organelle Diagram](image)

(1 mark)
c. Identify which reaction occurs in **Part Y** and **Part Z**.

**Part Y:**
____________________________________________________________________________
____________________________________________________________________________

**Part Z:**
____________________________________________________________________________
____________________________________________________________________________

(2 marks)

d. The TWO (2) products (e) and (f) produced in the Dark Reaction are used in Cellular Respiration. Write a balanced chemical reaction to show how these two products of photosynthesis are used in the process of Respiration.

____________________________________________________________________________
____________________________________________________________________________

(2 marks)
QUESTION FIVE  

(20 MARKS)

1. Study the types of cell transport illustrated in the diagrams below:

   ![Facilitated Diffusion and Active Transport Diagrams]

   a. Compare the process of facilitated diffusion and active transport.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

   (2 marks)

   b. Which cell transport above would be suitable for moving glucose across the membranes of:

      i. Red Blood Cell

      __________________________________________________________

      ii. Small Intestines

      __________________________________________________________

      (2 marks)

   c. Give a reason to justify each of your answer in i. and ii. above.

      i.: _______________________________________________________
      _______________________________________________________
      _______________________________________________________

      ii.: _______________________________________________________
      _______________________________________________________
      _______________________________________________________

      (2 marks)
2. The diagram below shows the changes in levels of hormones X and Z during the menstrual cycle:

![Diagram of hormonal changes during the menstrual cycle]

a. Name the hormones X and Z?

____________________________________________________________________________
____________________________________________________________________________
(2 marks)

b. Name the process that releases structure Y.

____________________________________________________________________________
(1 mark)

c. Describe the roles of Hormone X in the menstrual cycle.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
(2 marks)
3. The diagrams below show the TWO (2) types of Nucleic acids formed by three structural units.

a. State TWO (2) functions of nucleic acids.
____________________________________________________________________________
____________________________________________________________________________
(2 marks)

b. Name the nucleic acids represented by Structures B and C.
Structure B : _______________________________________________________________  
Structure C : _______________________________________________________________  
(2 marks)

c. Compare and contrast the structures of B and C.
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
(2 marks)
4. Tomatoes were one of the first commercially available genetically modified (GM) crops. Earlier forms of this GM crop included the transgenic tomato (*FlavrSavr*) which had a “deactivated” gene. This meant that the tomato plant was no longer able to produce poly-galacturonase, an enzyme involved in fruit softening.

<table>
<thead>
<tr>
<th>Tomatoes</th>
<th>Organic Tomato</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMO</td>
<td>Organic</td>
</tr>
</tbody>
</table>

a. Describe the advantage of the GMO tomato over the organic tomato.

____________________________________________________________________________
____________________________________________________________________________

(1 mark)

b. Explain some ethical issues with labeling the tomato as ‘GMO’?

____________________________________________________________________________
____________________________________________________________________________

(2 marks)
QUESTION SIX  
(20 MARKS)

1. In a field trip to Toloa rainforest, several vertical layers of plants were observed. Each layer has its own biotic and abiotic factors.

   a. Name the community pattern shown in this picture.

   ____________________________________________________________
   (1 mark)

   b. Name the most important abiotic factor which causes the community distribution pattern shown above.

   ____________________________________________________________
   (1 mark)

   c. The vegetal stratification creates vertical layers with peculiar abiotic and biotic factors. Compare these micro environments at the top and the bottom of the forest.

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   (2 marks)

   d. Explain how does the vegetal stratification of an ecosystem influence the biological diversity?

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   (2 marks)
e. Explain why the leaf-litter is important to the existence of the other layers above it.

(1 mark)

2. The diagram below shows the nephron in a mammalian kidney:

a. Name the parts labeled A and B.

A: ____________________________________________

B: ____________________________________________

(2 marks)

b. Name the process that occurs at the glomerulus.

______________________________________________

(1 mark)

c. Label the loop of Henle on the diagram above.

(1 mark)

d. Explain how the loop of Henle is an adaptation to organisms living in desert environments.

______________________________________________

______________________________________________

(2 marks)
3. Study the survivorship curve below and use it to answer the questions that follow:

![Survivorship Curve Image]

a. What does a survivorship curve show?

____________________________________________________________________________

(1 mark)

b. Explain what the survivorship curve I, II, and III shows about the population.

Type I: ______________________________________________________________________

Type II: _____________________________________________________________________

Type III: ____________________________________________________________________

(3 marks)

c. Fish exhibit a Type III survivorship curve. Explain how fish compensate for the high mortality rate at birth.

____________________________________________________________________________

____________________________________________________________________________

(1 mark)

3. In the inheritance of ABO blood type, A and B genes are co-dominant, and O is recessive to both. A woman heterozygous for type A blood and a man heterozygous for type B blood have a family. What is the genotypic ratio of their possible children?

____________________________________________________________________________

____________________________________________________________________________

(1 mark)

4. Red and white genes are co-dominant in rose flowers. Have two beautiful plants of cosmos flowers, one red and the other white. If the red rose and the white rose are cross-pollinated, what colors are expected from their seeds?

____________________________________________________________________________

____________________________________________________________________________

(1 mark)
1. The diagram below illustrates how protein is synthesized in the cells:

![Diagram of protein synthesis]

a. Identify **Process A** and **Process B**.
   - **Process A**: __________________________________________________________
   - **Process B**: __________________________________________________________
   (2 marks)

b. Where in the cell does **Process A** and **Process B** occur?
   - **Process A**: __________________________________________________________
   - **Process B**: __________________________________________________________
   (2 marks)

c. Describe the roles of the following in the formation of proteins:
   
   i. DNA
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
      (1 mark)

   ii. messenger RNA
      __________________________________________________________
      (1 mark)
iii. transfer RNA

____________________________________________________________________________
____________________________________________________________________________

(1 mark)

iv. ribosomes

____________________________________________________________________________
____________________________________________________________________________

(1 mark)

d. The genetic information is translated into an amino acids specified by each codon sequence on mRNA are shown in the table below:

<table>
<thead>
<tr>
<th>1st base in codon</th>
<th>2nd base in codon</th>
<th>3rd base in codon</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>C</td>
<td>A</td>
</tr>
<tr>
<td>Phe</td>
<td>Ser</td>
<td>Tyr</td>
</tr>
<tr>
<td>Leu</td>
<td>Ser</td>
<td>STOP</td>
</tr>
<tr>
<td>Leu</td>
<td>Cys</td>
<td>STOP</td>
</tr>
<tr>
<td>U</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Leu</td>
<td>Pro</td>
<td>His</td>
</tr>
<tr>
<td>Leu</td>
<td>His</td>
<td></td>
</tr>
<tr>
<td>Leu</td>
<td>Arg</td>
<td></td>
</tr>
<tr>
<td>Leu</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Leu</td>
<td>C</td>
<td></td>
</tr>
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<td>Leu</td>
<td>A</td>
<td></td>
</tr>
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<td>Leu</td>
<td>Arg</td>
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<td>U</td>
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<td>Ser</td>
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<td>Met</td>
<td>Arg</td>
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</tr>
<tr>
<td>U</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Val</td>
<td>Ala</td>
<td>Asp</td>
</tr>
<tr>
<td>Val</td>
<td>Gly</td>
<td></td>
</tr>
<tr>
<td>Val</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Key for the amino acids in the above table:

| Ala: Alanine    | Cys: Cysteine     | Asp: Aspartic acid | Glu: Glutamic acid |
| Phe: Phenylalanine | Gly: Glycine    | His: Histidine     | Ile: Isoleucine    |
| Lys: Lysine     | Leu: Leucine     | Met: Methionine    | Asn: Asparagine    |
| Pro: Proline    | Gln: Glutamine   | Arg: Arginine      | Ser: Serine        |
| Thr: Threonine  | Val: Valine      | Trp: Tryptophane   | Tyr: Tyrosine      |

i. Using the table above, identify the amino acids that correspond to the codons in the protein synthesis diagram.
ii. Give the code that will stop the synthesis of protein.  

____________________________________________________________________________  

(1 mark)

2. A pot plant was watered and the pot was enclosed in a plastic bag and tied securely round the base of the stem. The plant was weighed at 9 a.m. and 4 p.m. During this time, it lost 32g in weight.

a. From these results, calculate the plant’s rate of transpiration.  

____________________________________________________________________________  

____________________________________________________________________________  

(2 marks)

b. Why might this calculated rate be slightly different in daylight and in darkness?  

____________________________________________________________________________  

____________________________________________________________________________  

(1 mark)

c. If the pot plant was put in the window exposed to the sun and wind, do you expect the rate of transpiration to be higher or lower. Explain your answer.  

____________________________________________________________________________  

____________________________________________________________________________  

____________________________________________________________________________  

(2 marks)

3. Differentiate between the following paired terms:

i. Transpiration and Translocation  

____________________________________________________________________________  

____________________________________________________________________________  

(2 marks)

ii. Population and Ecosystem  

____________________________________________________________________________  

____________________________________________________________________________  

(2 marks)
SECTION C  EXTENDED RESPONSE  (20 MARKS)

**Topic One** – Discuss the role of meiosis in the life cycle of an organism.
<table>
<thead>
<tr>
<th>Marking Criteria</th>
<th>Mark allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define meiosis</td>
<td>1</td>
</tr>
<tr>
<td>List the stages of meiosis and the major events happening in each stage.</td>
<td>4</td>
</tr>
<tr>
<td>Identify when the diploid to haploid change happens.</td>
<td>2</td>
</tr>
<tr>
<td>Explain the function of synapsis.</td>
<td>2</td>
</tr>
<tr>
<td>Name the function of meiosis.</td>
<td>1</td>
</tr>
</tbody>
</table>
**Topic Two** – Identify three ways that sexual reproduction increases genetic variability. For each, explain how it increases genetic diversity among the offspring.
### Marking Criteria

<table>
<thead>
<tr>
<th>Marking Criteria</th>
<th>Marks Allocated</th>
<th>Marks Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Identifies and explains one way clearly.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Identifies and explains two ways clearly.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Identifies and three ways clearly.</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
ANSWER SHEET - Section A
Write the letter of the correct answer only.

MULTIPLE CHOICE

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

Correct Number \( \times 2 = \) \[ 40 \]