

MARKER CODE				



STUDENT ENROLMENT NUMBER									

TONGA SCHOOL CERTIFICATE

2016

BIOLOGY

QUESTION AND ANSWER BOOKLET

Time Allowed: 2 Hours + 10 minutes reading time

INSTRUCTIONS

1. Answer **ALL** questions in the spaces provided in this booklet
2. This booklet consists of **FOUR PARTS**.

PART	Topics	Total Skill Level
A	Organisms and their environment	14
B	Introduction to human biology	35
C	Plant Processes	7
D	Cell and genetics	14
	TOTAL	70

3. Write your **Student Enrolment Number** on the right hand corner.
4. Use **BLUE** or **BLACK** ball point pen. **DO NOT** write in pencil.
5. If you need more space for any answer, ask the supervisor for extra paper.
6. Check that your booklet consists of **23** pages and that none of these pages is blank.

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

ANSWER ALL QUESTIONS IN THIS BOOKLET

Write your answers in the spaces provided.

PART A: ORGANISMS AND THEIR ENVIRONMENT

Question 1: ORGANISMS

Scientists classify and group living organisms based on how similar they are.

- a. Arrange the terms in the word list below to show the correct order of biological classification from **highest** (lowest degree of similarity) to **lowest** (greatest degree of similarity). **ONE** level has been done or you.

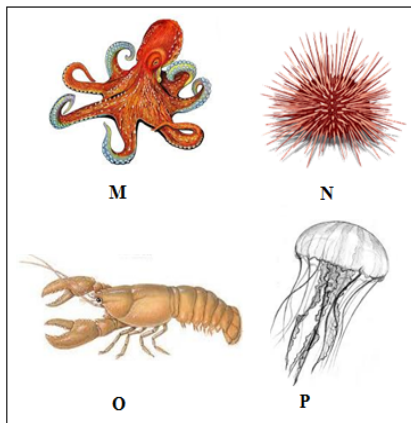
WORD LIST: Class, Organism, Kingdom, Family, Tissue, Genus, Cell, Phylum, Species.

- i. _____, ii. _____, iii. _____,
iv. Order, v. _____, vi. _____,
vii. _____,

Skill level 2	
2	
1	
0	
NR	

- b. Classify the following organisms (**M**, **N**, **O**, **P**) into their appropriate **phylum** given in i. and ii.

Figure A.1



- i. **Mollusca** : _____
ii. **Cnidaria** : _____

Skill level 2	
2	
1	
0	
NR	

- c. Using any **ONE** (1) of the organisms in **Figure A.1** (M – P), explain how **TWO** (2) **adaptive features** may assist in its survival.

Organism: _____

i. **Feature 1:** _____

Explanation: _____

ii. **Feature 2:** _____

Explanation: _____

Skill level 3	
3	
2	
1	
0	
NR	

Figure A.2 below shows an example of an **ecological relationship** between a honeybee and a flower.

Figure A.2



- d. Name the type of **ecological relationship** shown in **Figure A.2** and describe this each organism is affected in this type of interaction.

Ecological relationship: _____

Honeybee: _____

Flower: _____

Skill level 2	
2	
1	
0	
NR	

Question 2: POPULATIONS

- a. Define with an example the term **population**.

Example:

Skill level 1	
1	
0	
NR	

The gene pool of a population does not remain constant from generation to generation. It is continuously changing due to external forces (environmental factors) such as gene flow, mutation, non-random mating, genetic drift and natural selection. Use this information to answer parts b. and c.

- b. Define the term **gene pool**.

Skill level 1	
1	
0	
NR	

- c. Explain how any **THREE** (3) environmental factors **change** the gene pool of a population. In your explanation clearly state how a population's **allele frequency** is impacted.

i. **Environmental factor 1:**

Explanation:

ii. **Environmental factor 2:** _____

Explanation: _____

iii. **Environmental factor 3:** _____

Explanation: _____

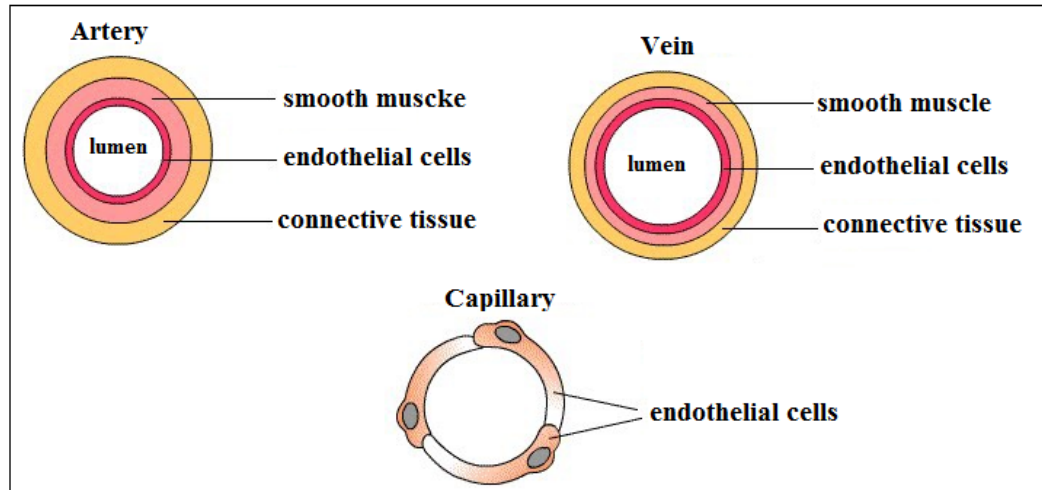
Skill level 3	
3	
2	
1	
0	
NR	

PART B: INTRODUCTION TO HUMAN BIOLOGY

Question 1: CIRCULATORY & RESPIRATORY SYSTEM

Figure B.1 illustrates cross sections of the **THREE** (3) types of blood vessels that can be found inside a human body.

Figure B.1



a. For each blood vessel shown, explain the relationship between its **structure** and **function**.

i. **Artery:** _____

ii. **Vein :** _____

iii. **Capillary :** _____

Skill level 3	
3	
2	
1	
0	
NR	

Many deaths in Tonga is linked to **cardiovascular disease** – which is caused by atherosclerosis.

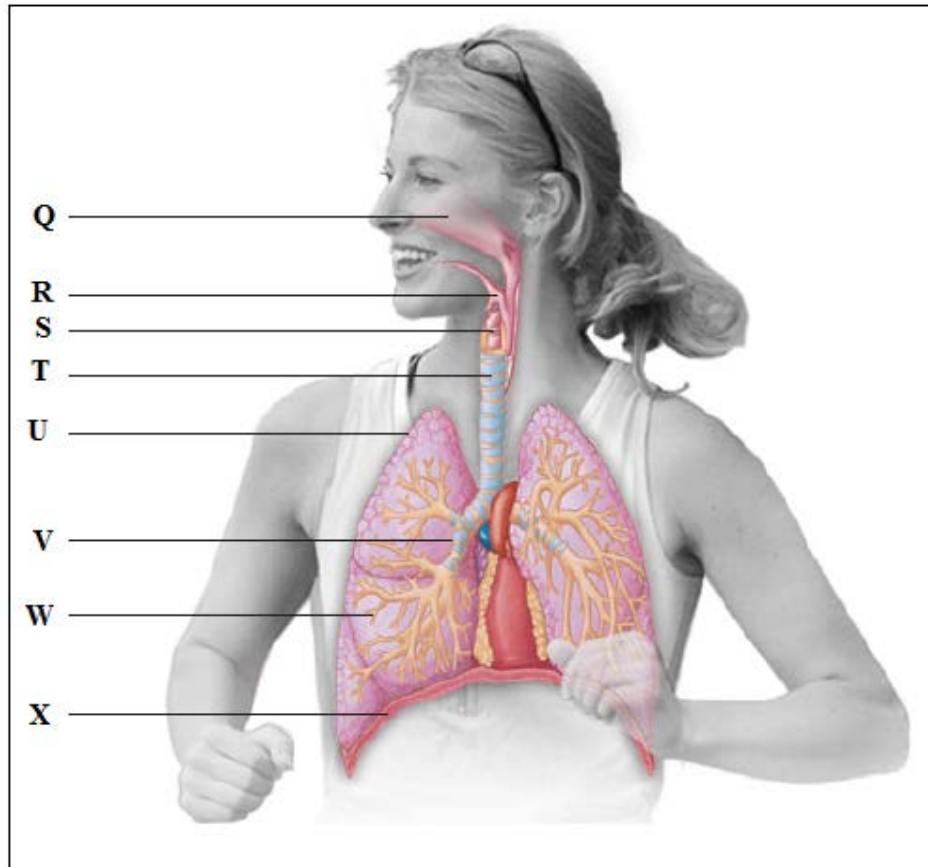
- b. Explain what **atherosclerosis** is and how it can lead to malfunction of the heart.

[illegible]

Skill level 3	
3	
2	
1	
0	
NR	

Figure B.2 shows the human respiratory system.

Figure B.2



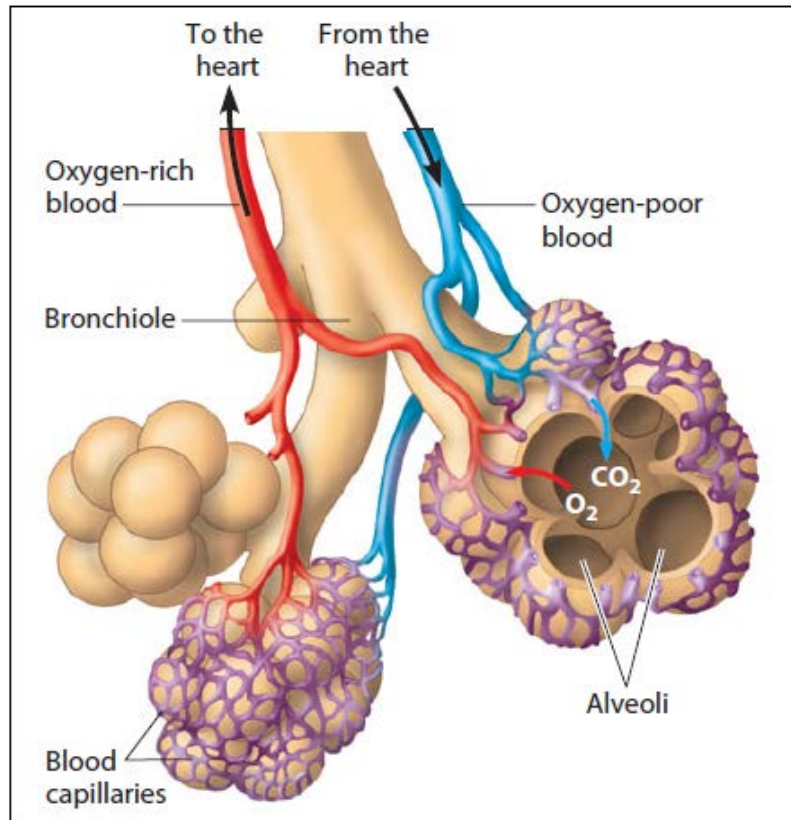
c. In the appropriate space below, write the **letter** of the given structure.

Letter	Structure
	Diaphragm

Skill level 1	
1	
0	
NR	

The diagram below shows alveolar sacs that is found in the human lungs.

Figure B.3



- d. With the support of **TWO (2) evidences** from **Figure B.3**, describe how alveolar sacs are **structurally adapted** to its function.

i. _____

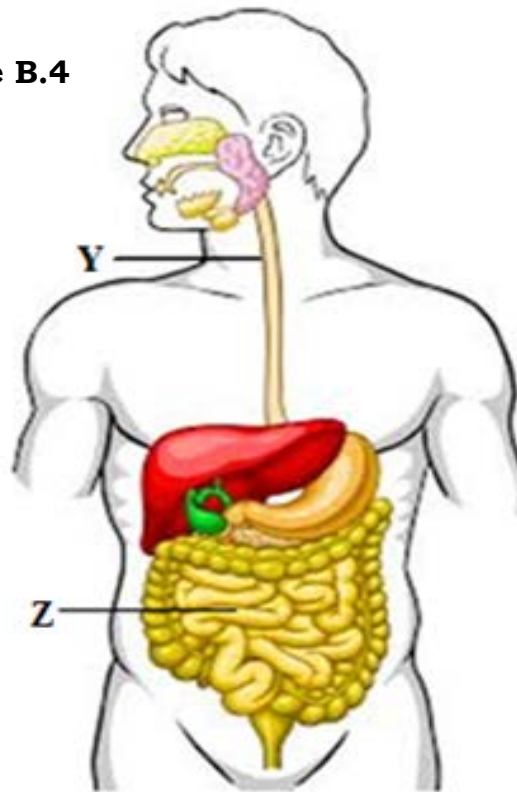
ii. _____

Skill level 2	
2	
1	
0	
NR	

Question 2: DIGESTIVE SYSTEM

Figure B.4 shows the human alimentary canal.

Figure B.4



- a. Name **structure Z** and explain any **TWO (2) structural adaptations** it possesses that make it ideal for its functions in the human alimentary canal.

Name: _____

- i. _____

- ii. _____

Skill level 3	
3	
2	
1	
0	
NR	

- b. In **Figure B.4** on page 10, use **labelled lines** ($\longrightarrow$) to clearly **label** any **THREE** (3) **accessory organs** of the alimentary canal and then describe the **function** of each organ.

i. _____
Function: _____

ii. _____
Function: _____

iii. _____
Function: _____

Skill level 3	
3	
2	
1	
0	
NR	

- c. Digested food moves along structures **Y** and **Z** by peristalsis. Define the term **peristalsis**.

Skill level 1	
1	
0	
NR	

Question 3: HOMEOSTASIS & EXCRETION

The nervous and endocrine systems of the human body are both involved in homeostasis.

- a. Define what **homeostasis** is.

Skill level 1	
1	
0	
NR	

- b. Type II diabetes (*suka*) is a serious **hormonal disease** that affects many Tongan adults. Describe the **hormonal imbalance** that occurs causing this debilitating disease.

Skill level 2	
2	
1	
0	
NR	

The human kidneys, lungs and our skin are very important organs of the excretory system.

- c. Describe the **need** for an excretory system in humans.

Skill level 2	
2	
1	
0	
NR	

- d. Define what **excretion** is.

Skill level 1	
1	
0	
NR	

- e. Describe the main **excretory products** released by any **TWO** (2) of the following excretory organs: kidneys, lungs or skin.

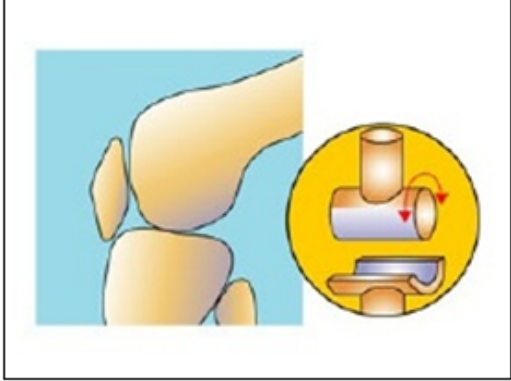
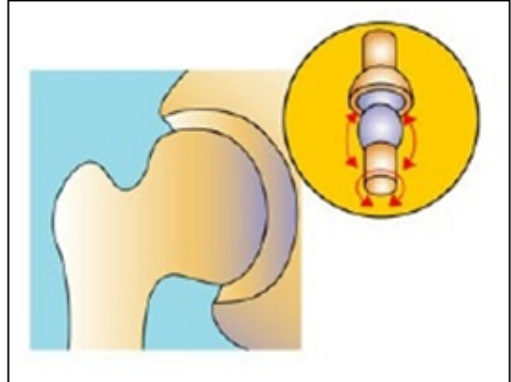
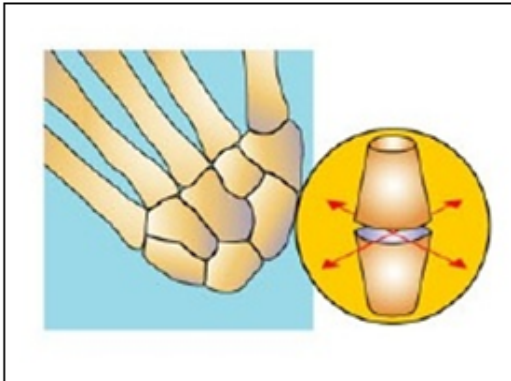
i.

ii.

Skill level 2	
2	
1	
0	
NR	

Question 4: SUPPORT

- a. Complete the following table to show the different types of synovial joints that are found inside a human body.

Joint type	Structure	Location/ Example
Hinge		i.
ii.		Shoulder and hip
iii.		Wrists and ankles

Skill level 1	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

Question 5: MALFUNCTIONS TO BODY SYSTEMS

- a. During the course of this subject, you had studied about many malfunctions associated with the human body. Discuss any **TWO** (2) of the following malfunctions:

- a. constipation,
- b. diarrhea,
- c. arthritis and/ or
- d. gout.

Include in your discussion the following details:

- i. brief description of malfunction including cause(s),
- ii. and its effect on the human body/ symptoms and
- iii. treatment(s) & prevention available.

- i. **Choice number 1:** _____

Cause(s): _____

Effect on the human body: _____

Treatment and prevention: _____

Skill level 4	
4	
3	
2	
1	
0	
NR	

ii. **Choice number 2:** _____

Cause(s): _____

Effect on the human body: _____

Treatment and prevention: _____

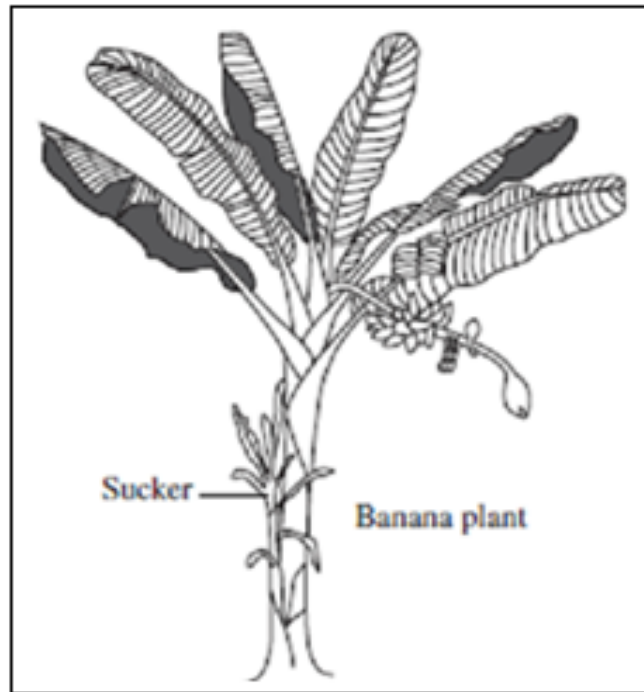
Skill level 4	
4	
3	
2	
1	
0	
NR	

PART C: PLANT PROCESSES

Question 1: REPRODUCTION IN FLOWERING PLANTS

Banana plants similar to the one shown in **Figure C.1** below are traditionally grown in Tonga by asexual methods such as planting of suckers from the parent plant.

Figure C.1



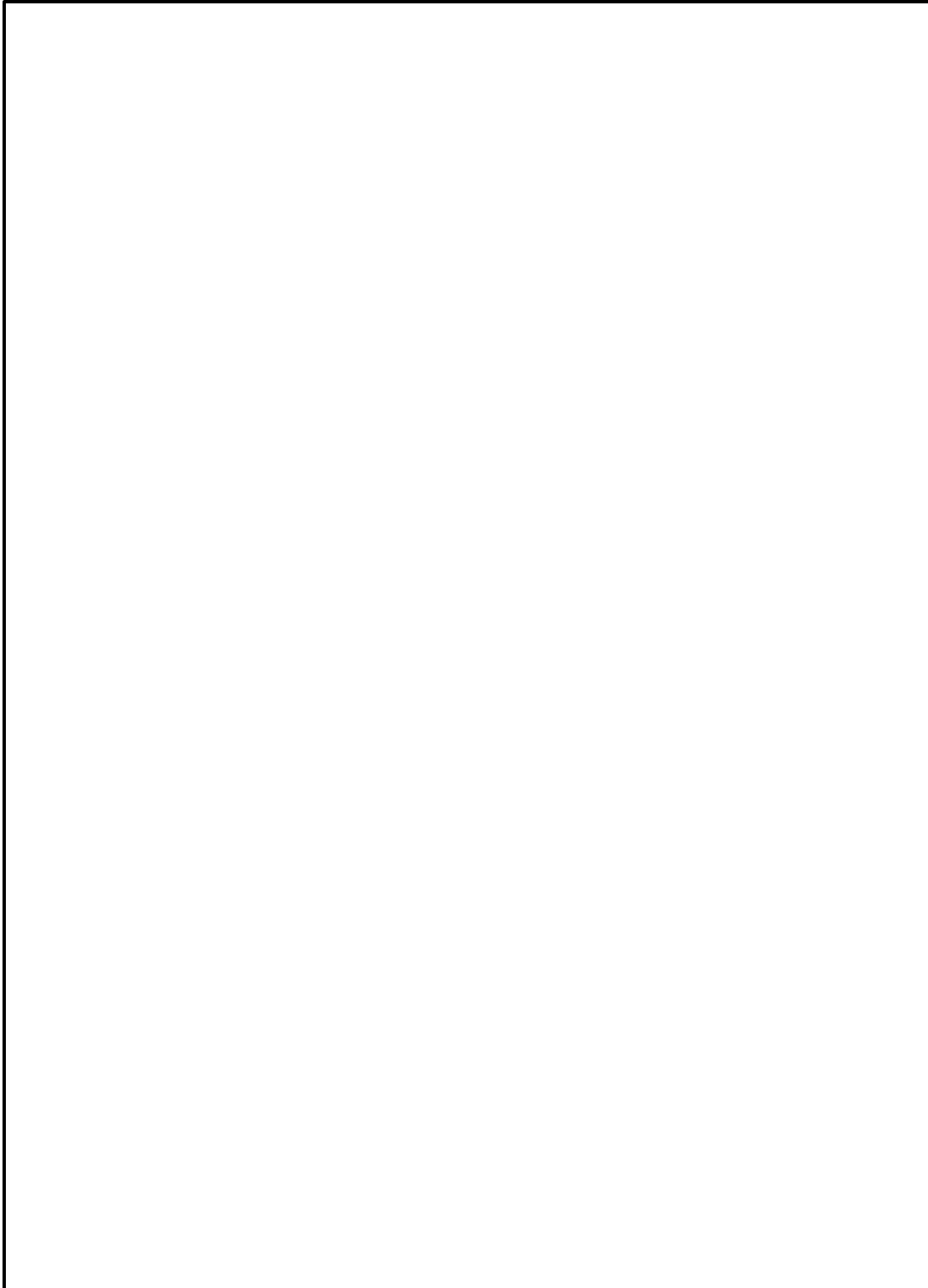
- a. Describe **TWO** (2) **advantages** of planting banana trees using the above shown method.

i. _____

ii. _____

Skill level 2	
2	
1	
0	
NR	

- b. In the space below, **draw** and **label** a simple cross section diagram of a **typical flower**. Include the following structures (at least): anther, filament, stigma, ovary, petals, and sepals.



Skill level 2	
2	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

PART D: CELLS AND GENETICS

Question 1: CELLS

Figure D.1 shows a view through an animal cell.

Figure D.1



Skill level 1	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

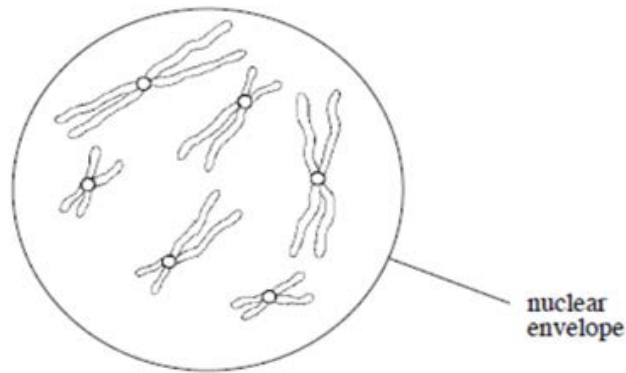
- a. In the **above diagram**, use **labelled lines** (———→) to **clearly label** the following structures: i. golgi bodies, ii. endoplasmic reticulum and iii. mitochondria.

- b. State the **function** of the **cell membrane**.

Skill level 1	
1	
0	
NR	

The following diagram represents the nucleus of a diploid cell at an early stage of meiosis.

Figure D.2



Skill level 1	
1	
0	
NR	

- c. On the diagram above, **shade ONE** (1) pair of homologous chromosomes.
- d. Homologous chromosomes often undergo crossing over during meiotic cell division. Define the term **crossing over**.

Skill level 1	
1	
0	
NR	

- e. Compare the **main features** (other than crossing over) of the two types of cell division: mitosis and meiosis.

Feature	Mitosis	Meiosis

Skill level 3	
3	
2	
1	
0	
NR	

Question 2: GENETICS

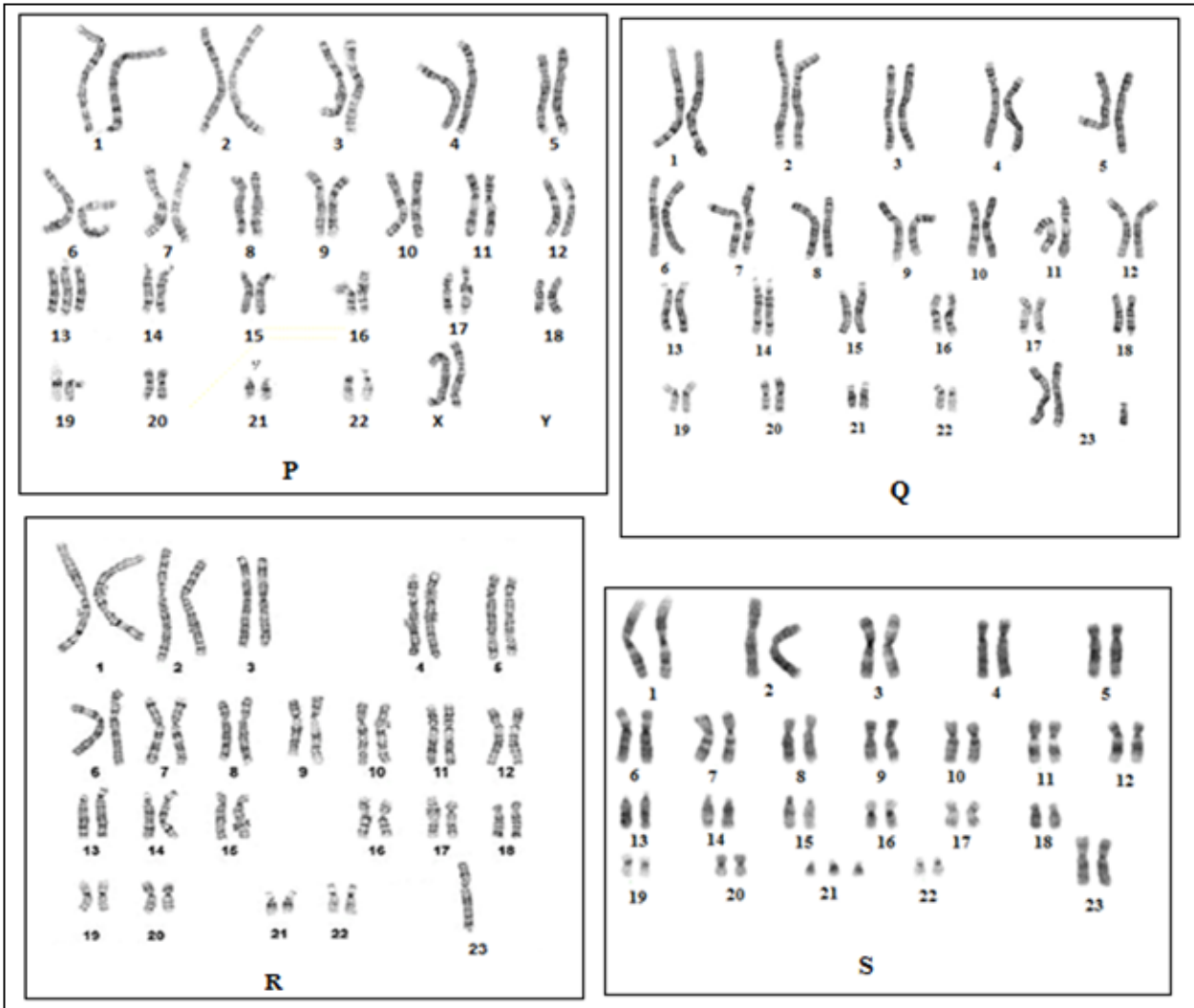
During cell division a mutation may occur.

- a. Define the term **mutation**.

Skill level 1	
1	
0	
NR	

Figure D.3 shows karyotypes of **FOUR** (4) individuals with chromosomal mutations resulting in an abnormal number of chromosomes in human cells. Study it carefully and then answer the question that follow.

Figure D.3



- b. Use **letters (P, Q, R or S)** from **Figure D.3** on page 22 to complete the following table. Each letter may only be used **ONCE**.

Syndrome	Letter	Skill level 2	
Down's Syndrome	i.	2	
Klinefelter's Syndrome	ii.	1	
		0	
		NR	

Lactose is a sugar found in milk. Some people can digest lactose, while other people cannot digest lactose. People who cannot digest lactose are described as lactose intolerant.

The recessive allele for lactose intolerance is represented by the symbol **d**.

The dominant allele for digestion of lactose is represented by the symbol **D**.

Siaosi who is **heterozygous** for lactose digestion has children with Siale who has **lactose intolerance**.

- c. Complete the Punnet Square below to show the **phenotypic ratio** of their children. Show **ALL** working.

Genotype: Siaosi: _____

Siale: _____

Gametes: Siaosi: _____

Siale: _____

Phenotypic ratio of children: _____

Skill level 2	
2	
1	
0	
NR	