Biology Ch 1: Quiz Solution

Class 9 Biology: The Science of Biology (FBISE pattern) | Al Amal Learning Center | 50 Marks

Tip: the boxed option is correct. Read why, then try the question again yourself.

SECTION A (MCQS)

Q	Question	A	B	C	D
1.	Biology is considered a subset of natural sciences because it studies:	non-living matter only	**living organisms and their relationship with their surroundings**	only the history of the Earth	only the physical properties of matter

Why B? Biology studies living things and their interaction with nature.

2.	The Greek word *logos* means:	life	cell	plant	**thought, reasoning and study**

Why D? *Bios* = life, *logos* = thought/reasoning/study.

3.	The Quranic verse "We made every living thing from water" suggests that living things have:	different origins	**a common origin**	only a plant origin	no water content

Why B? All living things were made from water.

4.	Which one is **NOT** a main division of biology?	Botany	Zoology	**Anatomy**	Microbiology

Why C? Main divisions: Botany, Zoology, Microbiology; anatomy is a branch.

5.	The study of the size, shape and structure of animals, plants and micro-organisms is called:	**Morphology**	Physiology	Histology	Taxonomy

Why A? Study of size, shape and structure.

6.	Which of the following correctly matches a branch with its example?	Anatomy – digestion and respiration	Physiology – structure of muscles and heart	Anatomy – muscles, heart, brain and kidneys	Physiology – dental structure in humans

Why C? Anatomy = structure; physiology = functions.

7.	Epithelial tissue forming a continuous layer over the body surface is studied in:	Cytology	Histology	Embryology	Ecology

Why B? Histology is the study of tissues.

8.	The study of the structure and functions of the cell is called cytology. It is also called:	molecular biology	internal morphology	cell biology	environmental biology

Why C? Cytology = cell biology.

9.	The study of genes and heredity in organisms is called:	Embryology	Taxonomy	Physiology	Genetics

Why D? Study of genes and heredity.

10.	The development of an organism from a fertilized egg is studied in:	Genetics	Embryology	Paleontology	Pathology

Why B? Embryology studies development from a fertilized egg.

11.	The history of life on Earth based on fossils is studied in:	Ecology	Taxonomy	Paleontology	Morphology

Why C? Study of fossils.

12.	The scientific name of humans, *Homo sapiens*, is an example of:	Taxonomy	Anatomy	Cytology	Physiology

Why A? Naming and classification.

13.	The study of the interrelationship of organisms and their environment, also known as environmental biology, is:	Marine biology	Ecology	Embryology	Molecular biology

Why B? Ecology = organisms and environment.

14.	Which branch of biology deals with the study and diagnosis of diseases?	Pharmacology	Immunology	**Pathology**	Physiology

Why C? Pathology = study and diagnosis of diseases.

15.	Immunization of a person against polio through vaccination is related to:	**Immunology**	Pharmacology	Genetics	Pathology

Why A? Vaccination builds the body's defense.

16.	Aspirin, morphine, insulin and penicillin are studied in:	Pathology	**Pharmacology**	Immunology	Histology

Why B? Pharmacology = drugs and their effects.

17.	Limbs of the human body working like levers is an example of:	Biochemistry	**Biophysics**	Biogeography	Biostatistics

Why B? Physics applied to the body.

18.	The study of chemical reactions such as digestion, respiration and photosynthesis in living organisms is:	Biophysics	Biogeography	**Biochemistry**	Bio-economics

Why C? Chemical reactions in living organisms.

19.	Locating fragments of DNA on chromosomes is an example of:	Biochemistry	Bio-economics	Biogeography	**Computational biology**

Why D? Computers are used to locate DNA fragments.

20.	Another name for biostatistics is:	**Biometry**	Biotechnology	Bio-economics	Biogeography

Why A? Biostatistics = biometry.

21.	The production of wheat, fish and rice and the study of their export value is an example of:	Biophysics	Biochemistry	**Bio-economics**	Biometry

Why C? Economic aspect of organisms.

22.	A scientist inserts the human insulin gene into bacteria. Which branch of biology is this?	Anatomy	**Biotechnology**	Physiology	Pharmacy

Why B? Genetic engineering is part of biotechnology.

23.	The science of improving farming methods is called:	Forestry	**Agriculture**	Farming	Fisheries

Why B? Farming is the practice; agriculture is the science of improving it.

24.	Which field is correctly matched with its career?	Horticulture – veterinary science	Forestry – plant breeding	**Animal husbandry – animal training**	Fisheries – environmental engineering

Why C? Animal trainer is an animal husbandry career; the other pairings are wrong.

25.	Bioinformatics is a combination of biology and:	Geography	Economics	Chemistry	**Information technology**

Why D? Biology + IT.

26.	Which of the following represents the correct sequence of the biological method?	observation, hypothesis, experiment, deduction, theory	hypothesis, observation, deduction, experiment, theory	**observation, hypothesis, deduction, experiment, theory**	observation, deduction, hypothesis, theory, experiment

Why C? Correct order of the biological method.

27.	Which of the following is ***NOT*** a characteristic of a good hypothesis?	It is a tentative idea	It is a general statement	It is testable and falsifiable	**It is proven true before experiments**

Why D? A hypothesis is tested, not proven beforehand.

28.	Deductions in the biological method are drawn using the logic of:	either ... or	**if ... then**	because ... so	and ... or

Why B? Deductions are "if... then" predictions.

Scenario for MCQ# 29 to 32: To find the cause of malaria, the blood of 100 malarial patients was examined under a microscope. The blood of 100 healthy persons was also examined. Almost all patients had *Plasmodium* ***in their blood. Only 7 out of 100 healthy persons had*** *Plasmodium*, ***and these 7 became ill after a few days. The other 93 had none.***

29.	The 100 healthy persons served as the:	experimental group	control group	hypothesis	deduction

Why B? Healthy persons are the comparison group.

30.	The hypothesis tested in this experiment, formulated by Laveran in 1882, was:	Marsh water causes malaria	Quinine causes malaria	*Plasmodium* is the cause of malaria	Mosquitoes spread malaria

Why C? Laveran's hypothesis.

31.	Which deduction was tested in this experiment?	All healthy persons should be ill	If *Plasmodium* is the cause of malaria, all persons ill with malaria should have it in their blood	*Plasmodium* cannot be seen in blood	Quinine should be given to all persons

Why B? Deduction tested by blood examination.

32.	The 7 healthy persons had *Plasmodium* because they were in the:	recovery period	immunity period	drug resistance period	incubation period

Why D? Parasite present, symptoms not yet shown.

Scenario for MCQ# 33 to 36: A. F. A. King listed 20 observations about the spread of malaria. People who slept outdoors were more likely to get malaria, those under fine nets were less likely, and those near a smoky fire usually did not get it. On this basis he suggested a hypothesis. In 1897 Ronald Ross let a female *Anopheles* ***mosquito bite a malarial patient and later found*** *Plasmodium* ***multiplying inside it. He also let female*** *Culex* ***mosquitoes bite sick sparrows and then healthy sparrows, which became ill.***

33.	The hypothesis suggested by King was:	Marsh water carries *Plasmodium*	**Mosquitoes transmit *Plasmodium* and are involved in the spread of malaria**	Smoke causes malaria	Fine nets cause malaria

Why B? King's hypothesis.

34.	The word "vector" means:	a drug used against a parasite	a symptom of a disease	**an organism that carries a parasite and transfers it from one organism to another**	a type of vaccine

Why C? Definition of vector.

35.	Which row correctly names the mosquito for malaria in humans, malaria in birds and dengue fever?	*Culex*, *Anopheles*, *Aedes*	**_Anopheles_, _Culex_, _Aedes_**	*Aedes*, *Culex*, *Anopheles*	*Anopheles*, *Aedes*, *Culex*

Why B? Humans: *Anopheles*; birds: *Culex*; dengue: *Aedes*.

36.	In Ross's first experiment, *Plasmodium* was found multiplying in the mosquito's:	**stomach**	salivary gland	wings	legs

Why A? Found in the stomach wall of the mosquito.

Scenario for MCQ# 37 to 40: A student observes two plants of the same kind. Plant 1 grows in bright sunlight: dark green leaves, 12 leaves, height 30 cm. Plant 2 grows in shade: pale green leaves, 7 leaves, height 18 cm. She suggests, "Light affects the amount of chlorophyll in leaves." She thinks, "If light affects chlorophyll, then plants kept in the dark should have paler leaves."

37.	Which of her observations is quantitative?	Dark green colour of Plant 1	Pale green colour of Plant 2	Shade as a growing condition	**Height of 30 cm and 18 cm**

Why D? Quantitative = measured in numbers.

38.	The statement "Light affects the amount of chlorophyll in leaves" is a:	deduction	law	hypothesis	result

Why C? Tentative explanation from observation.

39.	The statement "If light affects chlorophyll, then plants kept in the dark should have paler leaves" is a:	observation	deduction	theory	law

Why B? "If... then" prediction.

40.	A theory that has been verified and has wide application may become a biological:	observation	hypothesis	deduction	law

Why D? Verified theory with wide application becomes a law.

SHORT QUESTIONS (3 × 6 = 18 MARKS)

Q1. Define biology. Write the three main divisions of biology and what each studies. [1+2]

Biology: The scientific study of living organisms, including their structure, functions, growth, origin, evolution and relationship with their surroundings (from Greek *bios* = life, *logos* = study).

Main divisions:

- **Botany:** Study of plants.
- **Zoology:** Study of animals.
- **Microbiology:** Study of microorganisms such as bacteria, viruses and fungi.

OR: Quranic instructions [1.5+1.5]

- **(a) Origin of life:** The Quran says that Allah made every living thing from water (Surah Al-Anbiya, 21:30), which indicates a common origin of life.
- **(b) Creation of man:** The Quran says that man was created from clay (earth), and that his offspring were then created from a drop of fluid.

Q2. Morphology, Cytology and Taxonomy [1+1+1]

- **Morphology:** Study of the size, shape and structure of organisms. *Example:* Shape of leaves in different plants.
- **Cytology:** Study of the structure and functions of cells (cell biology). *Example:* Study of cell organelles such as the nucleus and mitochondria.
- **Taxonomy:** Naming and classification of organisms. *Example:* Humans are named *Homo sapiens*.

OR: Immunology, Pharmacology and Paleontology [1+1+1]

- **Immunology:** Study of the body's defense against disease-causing organisms. *Example:* Vaccination against polio.
- **Pharmacology:** Study of drugs and their effects on the body. *Example:* Aspirin, penicillin, insulin.
- **Paleontology:** Study of fossils and the history of life on Earth. *Example:* Study of dinosaur fossils.

Q3. Biophysics vs Biochemistry [1.5+1.5]

	Biophysics	**Biochemistry**
Meaning	Application of physics principles to living organisms	Study of chemical substances and reactions in living organisms
Example	Limbs of the human body work like levers	Digestion, respiration and photosynthesis

OR: Biometry and Biogeography [1.5+1.5]

- **Biometry (Biostatistics):** Use of statistics to analyze biological data. *Example:* Comparing average height or yield of plants grown with different fertilizers.
- **Biogeography:** Study of the distribution of organisms in different geographic regions. *Example:* Kangaroos are found in Australia; polar bears in the Arctic.

Q4. Three characteristics of a good hypothesis [3]

1. It is a **tentative** idea, and a **general** statement that explains the observations.
2. It is **testable** by experiments or further observation.
3. It is **falsifiable**, i.e., it can be proved wrong, and it is based on observations.

OR: Three observations of A. F. A. King on the spread of malaria [1+1+1]

1. People who slept outdoors were more likely to get malaria.
2. People who slept under fine nets were less likely to get malaria.
3. People near a smoky fire usually did not get malaria.

(He recorded 20 observations in all; any three are acceptable.)

Q5. Horticulture and animal husbandry [1.5+1.5]

- **Horticulture:** Science and art of growing fruits, vegetables, flowers and ornamental plants. *Careers:* gardener, nursery owner, landscape designer.
- **Animal husbandry:** Breeding, feeding and care of domestic animals. *Careers:* veterinary doctor, dairy farmer, poultry farmer.

OR: Medicine and surgery, and fisheries [1.5+1.5]

- **Medicine and surgery:** Diagnosis, treatment and prevention of diseases using medicines (medicine) and operations (surgery). *Careers:* physician, pediatrician, surgeon.
- **Fisheries:** Catching, rearing and conserving fish and other aquatic animals. *Careers:* fish farmer, fisheries officer, marine biologist.

Q6. Qualitative and quantitative observations [1+2]

Qualitative (described in words, not measured)	Quantitative (measured in numbers)
Colour of a cat	Height of a giraffe
Shape of leaves	Weight of mango fruits
Song of a bird	Body temperature of birds
	Speed of a tiger

OR: Theory vs law [1.5+1.5]

- **Theory:** A well-tested explanation of a natural phenomenon, supported by a large amount of evidence but open to revision. *Example:* Cell theory, Theory of evolution.
- **Law:** A verified statement with wide application that holds true under all conditions without exception. *Example:* Mendel's law of segregation.

LONG QUESTIONS (2 × 6 = 12 MARKS)

Q7. (a) Biotechnology, Computational biology, Bio-economics [1+1+1]

- ***Biotechnology:*** Use of living organisms or their parts to make useful products. *Example:* Making human insulin by inserting the insulin gene into bacteria.
- ***Computational biology:*** Use of computers and mathematical models to analyze biological data. *Example:* Locating fragments of DNA on chromosomes.
- ***Bio-economics:*** Economic study of the production and use of organisms and their products. *Example:* Production of wheat, fish and rice and their export value.

(b) Biology with Physics and Chemistry [1.5+1.5]

- ***Physics (Biophysics):*** Physical laws explain life processes. *Examples:* Limbs work like levers; blood flow and nerve impulses; instruments like the microscope, X-rays and ECG.
- ***Chemistry (Biochemistry):*** Life processes are chemical reactions. *Examples:* Digestion, respiration and photosynthesis; structure of carbohydrates, proteins and enzymes.

OR: (a) Farming vs agriculture [1.5]

- ***Farming*** is the practice of growing crops and raising animals.
- ***Agriculture*** is the science and art of improving farming methods (better seeds, soil management, pest control and higher production).
- *Career in agriculture:* agricultural scientist (agronomist).

(b) Science is a collaborative field [1.5+1.5]

1. ***Malaria research:*** Laveran found *Plasmodium*, King made observations and the mosquito hypothesis, and Ross experimentally proved transmission. Each scientist built on the others' work.
2. ***Vaccine development:*** Biologists, chemists, doctors and computer scientists work together, and the results are reviewed and criticised by other scientists to improve accuracy.

Q8. Biological method [2+2+2]

(a) Recognition of the problem and observations

A biologist notices a problem or event and asks a clear question about it. Careful observations are made using the senses and instruments. They may be *qualitative* (colour, shape) or *quantitative* (measurements such as height or temperature), and all are recorded.

(b) Hypothesis and deductions

- A ***hypothesis*** is a tentative, testable and falsifiable explanation based on the observations.

- **Deductions** are logical predictions in "if... then" form that must be true if the hypothesis is correct.

(c) Experimentation and summarization of results

Experiments are designed to test the deductions, using a **control group** and an **experimental group**, controlling variables and repeating the experiment. Results are recorded in tables and graphs and summarized. If supported, the hypothesis is accepted and may become a **theory**, and after wide verification, a **law**. If not supported, it is modified or rejected. Findings are reported for review by other scientists.

OR: Biological method applied to the spread of malaria [2+2+2]

(a) Problem, King's observations and hypothesis

- *Problem:* Malaria caused heavy illness and death, and the cause of its spread was unknown.
- *King's observations:* People sleeping outdoors were more likely to get malaria, those under fine nets less likely, and those near a smoky fire usually did not get it.
- *Hypothesis:* Mosquitoes transmit *Plasmodium* and are involved in the spread of malaria.

(b) Deductions

- If mosquitoes spread malaria, then a female *Anopheles* mosquito that bites a malarial patient should carry *Plasmodium*.
- If such a mosquito then bites a healthy person (or animal), that person should become ill with malaria.
- Preventing mosquito bites should reduce the number of malaria cases.

(c) Experiments of Ronald Ross and result

- In 1897, Ross let a female *Anopheles* mosquito bite a malarial patient and later found *Plasmodium* multiplying in the stomach of the mosquito.
- In bird (sparrow) malaria, female *Culex* mosquitoes were allowed to bite sick sparrows and then healthy sparrows; the healthy sparrows became ill.
- *Result:* Mosquitoes act as **vectors** that carry *Plasmodium* from one host to another. The hypothesis was accepted and malaria control now focuses on controlling mosquitoes.

Marks Summary

Section	Questions	Marks
A: MCQs (28 + 12 stimulus based)	40 × 0.5	20
B: Short Questions	6 × 3	18
C: Long Questions	2 × 6	12
Total		**50**