

VU Learning HUB

BIO101 Quiz File

Chapter-wise Solved MCQs

vulearninghub.xyz

Lesson 1: Levels of Life

Q1. Which level of biological organization represents the smallest component of an element that retains all its properties? A) Cell B) Atom C) Molecule D) Tissue

Q2. What percentage of total living mass is composed of the six major bioelements (O, C, H, N, Ca, P)? A) 50% B) 75% C) 90% D) 99%

Q3. According to the source, which of the following is an essential characteristic of living organisms? A) Inability to alter genetic material B) Ability to acquire energy from the environment C) Static organization without reproduction D) Absence of subatomic particles

Q4. What is the correct hierarchical progression of life from lowest to highest level? A) Atom → Molecule → Cell → Tissue → Organ → Organ-system → Organism B) Biosphere → Ecosystem → Community → Population → Organism C) Cell → Organ → Tissue → Atom → Molecule D) Population → Organism → Ecosystem → Community → Biosphere

Answer Key

B) Atom — An atom is defined as the smallest component of an element retaining all of that element's properties

D) 99% — The six bioelements (Oxygen, Carbon, Hydrogen, Nitrogen, Calcium, and Phosphorus) make up 99% of total living mass

B) Ability to acquire energy from the environment — Acquiring energy from the environment (e.g., plants using sunlight/CO₂, animals eating plants) is a defining property of life

A) Atom → Molecule → Cell → Tissue → Organ → Organ-system → Organism — Life is organized hierarchically starting from atoms up to organisms and the biosphere

Lesson 2: Branches of Biology

Q1. Which branch of biology is defined as the study of life in water environments? A) Microbiology B) Hydrobiology C) Taxonomy D) Paleontology

Q2. Taxonomy is primarily concerned with which scientific process? A) Study of fossils and extinct remains B) Naming, describing, and classifying organisms C) Practical application of organisms for industry D) Microscopic study of animal tissues

Q3. Which branch deals specifically with the structures, functions, and divisions of cells? A) Physiology B) Histology C) Cell Biology D) Genetics

Q4. Paleontology is defined as the study of: A) Parasites and their host relationships B) Drugs and their effects on human body systems C) Fossils and remains of extinct organisms D) Transmission of inherited characters

Answer Key

B) Hydrobiology — Hydrobiology is the division of biology dealing with life in water environments

B) Naming, describing, and classifying organisms — Taxonomy is the science of naming, describing, and classifying plants, animals, and microorganisms

C) Cell Biology — Cell biology is the branch that deals with the study of structures, functions, and divisions of cells and cell organelles

C) Fossils and remains of extinct organisms — Paleontology focuses on the study of fossils, which are the preserved remains of extinct organisms

Lesson 3: Cell Organelles and Cell Division (Mitosis)

Q1. Which organelle is known as the 'post office of the cell' because it packages materials into vesicles? A) Mitochondria B) Golgi Apparatus C) Lysosome D) Endoplasmic Reticulum

Q2. Lysosomes act as the cell's 'garbage disposal' unit and are enclosed by how many layers of membrane? A) Double membrane B) Single layer membrane C) Triple membrane D) No membrane

Q3. According to modern cell theory, where do all new cells originate from? A) Spontaneous assembly from bioelements B) Division of pre-existing cells C) Non-living organic matter D) Extracellular protein matrices

Q4. During which interphase stage do cells increase in size and synthesize materials required for DNA replication? A) Gap 1 (G1) phase B) Synthesis (S) phase C) Gap 2 (G2) phase D) Mitosis (M) phase

Answer Key

B) Golgi Apparatus — The Golgi apparatus acts as the post office of the cell by packaging modified proteins into vesicles for transport

B) Single layer membrane — Lysosomes are spherical bag-like sac organelles bound by a single layer membrane

B) Division of pre-existing cells — Modern cell theory states that cells arise only by division in pre-existing cells

A) Gap 1 (G1) phase — In the Gap 1 (G1) phase, cells increase in size and prepare materials necessary for DNA synthesis

Lesson 4: Cell Division (Meiosis) & Bacterial Structure

Q1. What major structural substance is typically contained in the cell wall of bacteria? A) Cellulose B) Chitin C) Peptidoglycan D) Keratin

Q2. What is the primary function of the bacterial capsule composed of thick polysaccharides? A) Protein synthesis and translation B) Protection against dryness and chemicals C) Active cell locomotion D) Chromosomal condensation

Q3. Meiosis is termed reduction division because it ultimately produces: A) Two identical diploid daughter cells B) Four haploid daughter cells C) Two haploid daughter cells D) Four identical diploid daughter cells

Q4. During Prophase I of meiosis, the pairing of homologous chromosomes is called: A) Cytokinesis B) Synapsis C) Translocation D) Binary fission

Answer Key

C) Peptidoglycan — Bacterial cell walls typically contain peptidoglycan and bacteria reproduce by binary fission

B) Protection against dryness and chemicals — The polysaccharide capsule sticks bacterial cells together, stores food, and protects against dryness and chemicals

B) Four haploid daughter cells — Meiosis reduces the chromosome number by half, resulting in four haploid daughter cells

B) Synapsis — Prophase I of meiosis is marked by synapsis, which is the pairing of homologous chromosomes

Lesson 5: Chromosomes, DNA and Genes & Bacterial Taxonomy

Q1. According to the Chromosome Theory of Heredity, where are genes located? A) Floating free in cytoplasm B) Bound inside the cell membrane C) On chromosomes D) Within Golgi cisternae

Q2. Biochemically, what is a gene defined as in the text? A) A sequence of lipids coding for fats B) A length of DNA coding for a peptide or protein C) A carbohydrate chain storing glycogen D) An amino acid sequence forming an enzyme

Q3. What modification is attached to the 5' end of eukaryotic mRNA during post-transcriptional processing? A) Poly A tail B) Peptidoglycan cap C) 7-methyl GTP cap D) Chitin ring

Q4. Non-coding DNA sequences in eukaryotes that are spliced out from precursor mRNA are termed: A) Exons B) Introns C) Codons D) Plasmids

Answer Key

C) On chromosomes — The Chromosome Theory of Heredity states that genes are carried on chromosomes

B) A length of DNA coding for a peptide or protein — A gene is physically a length or segment of DNA that codes for a specific peptide or protein

C) 7-methyl GTP cap — To protect eukaryotic mRNA from degradation, a 7-methyl GTP cap is added to its 5' end

B) Introns — Introns are non-coding DNA sequences in eukaryotes that must be removed prior to translation

Lesson 6: Digestive System & Structure of Viruses

Q1. Why are viruses able to replicate only inside living host cells? A) They possess independent digestive organelles B) They lack cell walls, membranes, cytoplasm, and metabolic machinery C) They are obligate photosynthetic autotrophs D) They divide exclusively by binary fission

Q2. Which enzyme in human saliva initiates chemical digestion of starches in the oral cavity? A) Pepsin B) Lipase C) Amylase D) Trypsin

Q3. Water absorption from undigested food mass in the human alimentary canal occurs primarily in the: A) Stomach B) Jejunum C) Colon D) Duodenum

Q4. Microscopic finger-like extensions of the epithelium that maximize surface area for absorption in the ileum are called: A) Alveoli B) Villi and microvilli C) Cilia D) Cisternae

Answer Key

B) They lack cell walls, membranes, cytoplasm, and metabolic machinery — Viruses lack cellular membranes, organelles, and metabolism, so they must use the host cell's machinery

C) Amylase — Saliva secreted into the oral cavity contains the enzyme amylase, which breaks down starches

C) Colon — The colon part of the large intestine absorbs water from undigested waste matter back into the bloodstream

B) Villi and microvilli — Epithelial projections called villi and microvilli dramatically increase the surface area of the ileum for absorption

Lesson 7: Transport System and Blood & Virology

Q1. Which of the following is classified as a 'living' feature of viruses? A) Complete absence of cytoplasm B) Absence of cellular organelles C) Possession of genetic material (DNA or RNA) D) Inability to grow outside a host

Q2. Which cellular component is missing in a virus? A) Protein coat (capsid) B) Genetic nucleic acid C) Cell membrane and cytoplasm D) Transmissible traits

Q3. What is the main purpose of a specialized internal transport system in complex organisms? A) Capturing light for photosynthesis B) Distributing nutrients/gases and eliminating waste products C) Constructing peptidoglycan cell walls D) Replicating viral capsids

Q4. Red blood cells in the human circulatory fluid function primarily to: A) Produce antibodies against foreign pathogens B) Transport oxygen and carbon dioxide C) Initiate blood clotting at wound sites D) Secrete digestive enzymes

Answer Key

C) Possession of genetic material (DNA or RNA) — Having genetic material (DNA or RNA) that can mutate and transmit traits is a living feature of viruses

C) Cell membrane and cytoplasm — Viruses lack cell walls, cell membranes, cytoplasm, and organelles

B) Distributing nutrients/gases and eliminating waste products — Transport systems exist to distribute nutrients, exchange gases, and remove toxic wastes within the body

B) Transport oxygen and carbon dioxide — Red blood cells carry out transport of respiratory gases throughout the body

Lesson 8: Circulatory System in Humans & Bacteriophages

Q1. Bacteriophages (or phages) are specialized viruses that specifically infect: A) Plant cells B) Human tissues C) Fungi D) Bacteria

Q2. Which blood vessels carry blood away from the heart toward the body tissues? A) Veins B) Capillaries C) Arteries D) Venules

Q3. What is the specific functional role of microscopic capillaries in the human circulatory system? A) Pumping blood under high pressure B) Exchange of materials between blood and body cells C) Returning unoxygenated blood to the heart D) Manufacturing blood plasma

Q4. The inner core of a bacteriophage is composed of: A) Peptidoglycan and cellulose B) Nucleic acid (DNA or RNA) C) A thick polysaccharide capsule D) Steroid lipids

Answer Key

D) Bacteria — Bacteriophages are viruses that require a bacterial host in order to replicate

C) Arteries — Arteries carry blood away from the heart to the body, whereas veins return blood to the heart

B) Exchange of materials between blood and body cells — Capillaries connect arteries to veins and function specifically as the sites of material exchange

B) Nucleic acid (DNA or RNA) — Bacteriophages consist of a protein outer coat surrounding an inner core of nucleic acid (DNA or RNA)

Lesson 9: Respiratory System & Viral Replication

Q1. What are the microscopic functional units of human lungs where gas exchange occurs? A) Bronchi B) Trachea C) Alveoli D) Nephrons

Q2. What is the concentration of carbon dioxide in exhaled human air compared to 0.04% in inhaled air? A) 0.04% B) 16% C) 4% D) 79%

Q3. What happens to the concentration of oxygen when atmospheric air is exhaled from human lungs? A) Increases from 16% to 21% B) Decreases from 21% in inhaled air to 16% in exhaled air C) Remains unchanged at 79% D) Drops to 0.04%

Q4. From the perspective of a virus, what is the ultimate purpose of viral replication inside host cells? A) To nourish the host cell B) To allow production and survival of the virus C) To build host tissue structures D) To convert host DNA into proteins

Answer Key

C) Alveoli — Air sacs consisting of microscopic alveoli covered by capillaries are the functional units of lungs

C) 4% — Exhaled air contains 4% carbon dioxide compared to 0.04% present in inhaled air

B) Decreases from 21% in inhaled air to 16% in exhaled air — Inhaled air contains 21% oxygen, which decreases to 16% in exhaled air

B) To allow production and survival of the virus — The purpose of viral replication from the virus's perspective is to enable its production and survival

Lesson 10: Excretory System & Hormones

Q1. Hormones are defined as chemical messengers that are secreted directly into the: A) Digestive tract B) Lymphatic ducts C) Bloodstream D) Coelomic fluid

Q2. The metabolic process of breaking down complex organic compounds (e.g., glucose, lipids) to produce energy is called: A) Anabolism B) Catabolism C) Osmoregulation D) Assimilation

Q3. What primary role do human kidneys play in body fluid balance? A) Gas exchange and oxygenation B) Osmoregulation and waste excretion C) Enzyme secretion for digestion D) Hormone breakdown in liver

Q4. How are hormones carried throughout the body to exert their functions on target organs? A) Via nerve impulses across synapses B) Secreted directly into the blood C) Through direct cytoplasmic bridges D) By diffusion across outer skin layers

Answer Key

C) Bloodstream — Hormones are chemical messengers secreted directly into the blood to exert functions on target organs

B) Catabolism — Catabolism involves the breakdown of compounds (glucose, proteins, lipids) to produce biological energy

B) Osmoregulation and waste excretion — Kidneys filter catabolic nitrogenous wastes and perform osmoregulation to maintain water-salt balance

B) Secreted directly into the blood — Blood carries secreted hormones directly to distant target organs and tissues

Lesson 11: Reproductive System & Steroids

Q1. Which organic molecule acts as the starting material/precursor for steroid hormones? A) Glucose B) Peptidoglycan C) Cholesterol D) Amino acids

Q2. What is a key evolutionary advantage of sexual reproduction over asexual reproduction? A) Produces genetically identical clones B) Requires no gamete formation C) Increases genetic variability and adaptability D) Occurs rapidly by simple cell division

Q3. Gametes in sexual reproduction are produced through which process of cell division? A) Mitosis B) Meiosis C) Binary fission D) Budding

Q4. In human female reproduction, the release of an ovum from the ovary is termed: A) Spermatogenesis B) Fertilization C) Ovulation D) Cleavage

Answer Key

C) Cholesterol — Cholesterol serves as the starting material for synthesizing steroid hormones

C) Increases genetic variability and adaptability — Sexual reproduction involves gamete mixing via meiosis, increasing genetic variability and adaptability to environments

B) Meiosis — Gametes involved in sexual reproduction are formed by meiosis, which introduces genetic variations

C) Ovulation — The release of a mature ovum from an ovary is called ovulation

Lesson 12: Ecology I (Biotic & Abiotic Components)

Q1. Ecology is defined as the study of: A) Cell organelles and cell division B) Interactions among organisms and their physical environment C) Synthetic drug mechanisms D) Fossilized remains of dinosaurs

Q2. Which of the following is classified as an abiotic component of an environment? A) Fungi B) Bacteria C) Air, water, and soil D) Algae

Q3. Organisms that produce glucose and oxygen from carbon dioxide, water, and sunlight are called: A) Heterotrophs B) Autotrophs (Producers) C) Decomposers D) Carnivores

Q4. Biotic factors in an ecosystem include: A) Air and temperature B) Animals, plants, fungi, algae, and bacteria C) Soil moisture and minerals D) Solar radiation

Answer Key

B) Interactions among organisms and their physical environment — Ecology is the study of interactions between living organisms and their environment

C) Air, water, and soil — Abiotic components are non-living physical factors like air, water, and soil

B) Autotrophs (Producers) — Autotrophs (producers) convert carbon dioxide and water into glucose and oxygen using sunlight

B) Animals, plants, fungi, algae, and bacteria — Biotic factors comprise all living organisms present in an ecosystem

Lesson 13: Ecology II - Ecosystems & Food Webs

Q1. A complex network of interconnected feeding relationships in an ecosystem is called a: A) Linear food chain B) Food web C) Trophic pyramid D) Monohybrid cross

Q2. Ecosystems are broadly categorized based on physical surroundings into terrestrial and: A) Aquatic B) Atmospheric C) Synthetic D) Microscopic

Q3. Why are feeding relationships in natural ecosystems depicted as webs rather than single lines? A) Organisms only eat a single food source B) Diversity of organisms means one species may be eaten by multiple others C) Energy increases at higher trophic levels D) Decomposers are absent in nature

Q4. What is the ultimate primary source of energy driving almost all ecosystems on Earth? A) Geothermal vents B) Chemical bonds in glucose C) Sunlight D) Wind currents

Answer Key

B) Food web — A food web is a network of eating and being eaten representing diverse feeding relationships

A) Aquatic — Ecosystems are broadly divided into aquatic (freshwater/marine) and terrestrial categories

B) Diversity of organisms means one species may be eaten by multiple others — Feeding relationships are complex networks because an organism can consume or be consumed by multiple species

C) Sunlight — Sunlight is the primary source of energy in ecosystems, captured by autotrophs during photosynthesis

Lesson 14: Food Chains and Food Webs

Q1. An area where organisms live and interact with each other and their physical surroundings is called: A) A habitat B) An ecosystem C) A biome D) A niche

Q2. Chemotrophs differ from autotrophs because they: A) Use sunlight as an energy source B) Use inorganic chemicals as an energy source and live in deep oceans where there is no light C) Feed on other organisms for food D) Decompose dead organic matter

Q3. In the grassland food chain described in the handout (Sunlight → Grass → Rat/Mole → Snake → Hawk), the tertiary consumer is: A) Rat B) Snake C) Hawk D) Grass

Q4. A food web differs from a food chain because it is: A) A one-way flow of energy B) A network of eating and being eaten in which one organism may be eaten by more than one other organism C) Limited to producers only D) A diagram excluding decomposers

Answer Key

B) An ecosystem — An ecosystem is an area where organisms live and interact with each other and their physical surroundings

B) Use inorganic chemicals as an energy source and live in deep oceans where there is no light — Chemotrophs use inorganic chemicals as energy source and live in deep oceans where there is no light, e.g. some bacteria and deep sea worms

C) Hawk — In the grassland food chain, the hawk is the tertiary (secondary carnivore) consumer feeding on the snake

B) A network of eating and being eaten in which one organism may be eaten by more than one other organism — Feeding relationships are not as simple as food chains; one organism may be eaten by more than one other organism

Lesson 15: Algae and Fungi & Molecular Central Dogma

Q1. The cell wall of fungi is distinctively composed of which substance? A) Cellulose B) Peptidoglycan C) Chitin D) Silica

Q2. Filamentous threads that make up the body of a fungus are called: A) Villi B) Hyphae C) Cilia D) Flagella

Q3. Who first proposed the 'Central Dogma' of molecular biology in 1958? A) Gregor Mendel B) Camillo Golgi C) Francis Crick D) Charles Darwin

Q4. Which group of organisms serves as major oxygen producers and a primary source of agar for microbial media? A) Fungi B) Algae C) Protozoa D) Viruses

Answer Key

C) Chitin — Fungal cell walls are composed of chitin

B) Hyphae — The body of a fungus consists of long filaments called hyphae, which collectively form a mycelium

C) Francis Crick — Francis Crick first proposed the 'Central Dogma' of molecular biology in 1958

B) Algae — Algae are major producers of oxygen and the source of valuable materials including biofuels and agar media

Lesson 16: Animals & Their Importance

Q1. Which set of characteristics applies to all members of Kingdom Animalia? A) Unicellular, prokaryotic, autotrophic B) Multicellular, eukaryotic, heterotrophic, lacking cell walls C) Eukaryotic, photosynthetic, having cellulose cell walls D) Non-cellular, parasitic, replicating inside host cells

Q2. Sponges belong to Phylum Porifera and are characterized by: A) Stinging cells with paralyzing poison B) A porous body with simple cellular organization C) Jointed appendages and chitinous exoskeletons D) A true coelom lined with mesoderm

Q3. Amphibians represent an evolutionary transition between: A) Microscopic algae and land plants B) Aquatic environments and land habitats C) Invertebrates and non-vascular plants D) Reptiles and warm-blooded birds

Q4. Organisms whose body temperature depends on external environmental heat sources are termed: A) Endotherms B) Ectotherms C) Autotrophs D) Homeotherms

Answer Key

B) Multicellular, eukaryotic, heterotrophic, lacking cell walls — Animals are multicellular, eukaryotic, heterotrophic organisms that lack cell walls

B) A porous body with simple cellular organization — Porifera (sponges) are simple aquatic animals with two cell layers, porous bodies, and no distinct organs

B) Aquatic environments and land habitats — Amphibians represent a transition between aquatic and land animal life

B) Ectotherms — Ectotherms (such as amphibians and reptiles) rely on external environmental conditions for body temperature regulation

Lesson 17: Applications of Biology

Q1. The commercial culturing and farming of aquatic animals such as fish and prawns is known as: A) Sericulture B) Apiculture C) Aquaculture D) Horticulture

Q2. Sericulture is the specialized branch of applied biology dealing with the production of: A) Pearls from oysters B) Honey from bees C) Silk from silkworms D) Milk from dairy cattle

Q3. How does biological knowledge benefit the dairy and poultry industries? A) By replacing all animal feeds with synthetic chemicals B) Through improved breeding techniques and disease diagnosis C) By eliminating the need for farm hygiene D) By preventing genetic variations in livestock

Q4. Biological control (biocontrol) in agriculture refers to: A) Using natural living organisms to control pest populations B) Applying synthetic chemical pesticides C) Flooding fields with salt water D) Eradicating all soil bacteria

Answer Key

C) Aquaculture — Culturing animals in water (such as fish farming and prawn culture) is called aquaculture

C) Silk from silkworms — Sericulture deals with silkworm moths and cocoons for the production of silk

B) Through improved breeding techniques and disease diagnosis — Biology supports dairy and poultry industries via cross-breeding, disease diagnosis, and balanced nutrition

A) Using natural living organisms to control pest populations — Biocontrol utilizes biological organisms to naturally manage pest populations

Lesson 26: Introduction to Animal Biology

Q1. A true coelom (eucoelom) in animals is defined as a body cavity completely lined by: A) Ectoderm B) Endoderm C) Peritoneum derived from mesoderm D) Cellulose cell wall

Q2. Why do animal cells differ structurally from plant and fungal cells? A) Animal cells contain large central vacuoles B) Animal cells lack a rigid cell wall C) Animal cells lack plasma membranes D) Animal cells contain chloroplasts

Q3. Animals obtain organic energy and nutrients by taking in plant or animal matter, making them: A) Autotrophs B) Heterotrophs C) Chemoautotrophs D) Saprophytes

Q4. Which embryonic germ layer gives rise to the peritoneal lining of a true coelomic cavity? A) Mesoderm B) Ectoderm C) Epidermis D) Cuticle

Answer Key

C) Peritoneum derived from mesoderm — Eucoelomates have a fluid-filled body cavity with a complete lining called peritoneum derived from mesoderm

B) Animal cells lack a rigid cell wall — Animal cells contain only a plasma membrane and lack cell walls

B) Heterotrophs — Animals are heterotrophic because they cannot manufacture their own food and must ingest organic matter

A) Mesoderm — Mesoderm is the primary tissue layer that forms the peritoneal lining of the coelom

Lesson 27: Cephalopoda and Arthropoda

Q1. In Phylum Cephalopoda, the evolutionary modification of the molluscan foot forms: A) A single muscular crawling sole B) A series of tentacles and a head C) A jointed chitinous leg D) A bivalve hinged shell

Q2. Which characteristic is shared by all cephalopods (e.g., squids, octopuses)? A) They are exclusively freshwater organisms B) They are exclusively marine organisms C) They possess thick outer cellulose walls D) They lack a central nervous system

Q3. Arthropods are distinguished from other invertebrates by having jointed appendages and an exoskeleton composed of: A) Peptidoglycan B) Chitin C) Silica D) Calcium carbonate

Q4. Which group of molluscs is considered anatomically and behaviorally the most advanced? A) Gastropods B) Bivalves C) Cephalopods D) Polyplacophorans

Answer Key

B) A series of tentacles and a head — In cephalopods, the foot is modified to form a head and a series of tentacles

B) They are exclusively marine organisms — Cephalopods are all marine organisms

B) Chitin — Arthropods feature jointed appendages and a hard chitinous exoskeleton

C) Cephalopods — Cephalopods are considered the most highly advanced of all molluscs

Lesson 28: Echinodermata and Chordata

Q1. Echinoderms (such as seastars and sea urchins) are exclusively found in which environment? A) Freshwater lakes B) Marine (ocean) habitats C) Terrestrial moist soils D) Desert sands

Q2. Which phylum is considered the closest living evolutionary relative of Phylum Chordata? A) Arthropoda B) Mollusca C) Echinodermata D) Annelida

Q3. Which structure in chordates is a longitudinal supportive rod located below the nerve cord? A) Notochord B) Vertebral column C) Nerve net D) Chitinous spine

Q4. In terrestrial adult vertebrates, embryonic pharyngeal slits typically modify into structures such as the: A) Trachea B) Eustachian tube C) Esophagus D) Spinal cord

Answer Key

B) Marine (ocean) habitats — Echinoderms are exclusively marine, mostly benthic animals

C) Echinodermata — Echinoderms' closest living evolutionary relatives are members of Phylum Chordata

A) Notochord — The notochord is a dorsal supportive rod present in chordates

B) Eustachian tube — Pharyngeal slits disappear in terrestrial adult animals except for forming structures like the Eustachian tube

Lesson 29: Introduction to Kingdom Plantae

Q1. Plant cell walls are primarily constructed from which complex carbohydrate? A) Chitin B) Peptidoglycan C) Cellulose D) Glycogen

Q2. Plants synthesize their own organic food using solar energy absorbed by which pigment?

A) Hemoglobin B) Chlorophyll C) Carotenoid D) Antagonists

Q3. The evolutionary progression of land plants began from which aquatic ancestral group? A)

Fungi B) Green algae C) Cyanobacteria D) Sponges

Q4. Unlike animal cells, typical plant cells possess: A) No plasma membrane B) A rigid cellulose cell wall outside the plasma membrane C) Centrioles in all cell types D) Variable non-fixed shapes without vacuoles

Answer Key

C) Cellulose — Plant cell walls are comprised of cellulose

B) Chlorophyll — Plants are chlorophyll-containing eukaryotic organisms capable of photosynthesis

B) Green algae — Evolutionary cladograms show plants evolved from green algal ancestors

B) A rigid cellulose cell wall outside the plasma membrane — Plant cells feature a protective cellulose cell wall outside their plasma membrane

Lesson 30: Gymnosperms and Angiosperms

Q1. The term 'Gymnosperm' literally translates to: A) Enclosed seed B) Naked seed C) Flowering plant D) Seedless vascular plant

Q2. Which of the following is an example of a Gymnosperm? A) Oak tree B) Conifer (Pine) C) Rose plant D) Wheat

Q3. Angiosperms differ from gymnosperms because their seeds develop inside an enclosed structure called a: A) Seed coat B) Fruit (ovary) C) Pollen grain D) Conifer cone

Q4. Flowering plants that attract pollinators to effect sexual reproduction belong to which plant division? A) Bryophyta B) Gymnospermae C) Angiosperms (Magnoliophyta) D) Pteridophyta

Answer Key

B) Naked seed — Gymnosperm means "naked seed" because their seeds do not develop within an enclosed structure

B) Conifer (Pine) — Examples of gymnosperms include conifers, cycads, Ginkgo, and Gnetales

B) Fruit (ovary) — Angiosperms produce seeds enclosed within floral ovaries that mature into fruits

C) Angiosperms (Magnoliophyta) — Flowering plants belong to division Magnoliophyta (Angiosperms)

Lesson 33-34: Biotechnology & Genetic Engineering

Q1. Recombinant DNA technology involves combining DNA fragments from: A) The same identical cell only B) Different sources or species C) Inorganic mineral compounds D) Non-living viral capsids

Q2. Small circular DNA molecules in bacteria that are widely used as vectors in gene cloning are: A) Chromosomes B) Plasmids C) Ribosomes D) Introns

Q3. What is a primary environmental concern associated with Genetically Modified (GM) crops? A) Inability to produce seeds B) Potential transfer of herbicide-resistance genes to wild weeds C) Total destruction of soil minerals D) Lack of photosynthetic activity

Q4. Introducing foreign genes into an animal genome creates an organism referred to as: A) Polyploid B) Transgenic C) Haploid D) Heterozygous

Answer Key

- B) Different sources or species — Recombinant DNA technology combines DNA molecules from different biological sources
- B) Plasmids — Plasmids are extra circular DNA molecules in bacteria used as vectors in biotechnology
- B) Potential transfer of herbicide-resistance genes to wild weeds — A major concern is the accidental transfer of GM crop traits (like herbicide resistance) to wild weed relatives
- B) Transgenic — Animals modified by inserting foreign genes into their genome are termed transgenic animals

Lesson 35: Transgenic Animals

Q1. Transgenic animals are most commonly created by: A) Feeding animals genetically modified food B) Micro-injection of DNA into the pronuclei of a fertilized egg C) Cloning adult body cells D) Exposing animals to radiation

Q2. In embryonic stem cell-mediated gene transfer, the foreign DNA is inserted into the stem cells by: A) Natural mating B) Homologous recombination C) Photosynthesis D) Binary fission

Q3. A 'knockout' animal is produced when: A) An animal is sterilized B) A target gene is removed or 'knocked out' from its genome C) Two different species are crossed D) An animal is put into hibernation

Q4. In 2001, scientists at Nexia Biotechnologies in Canada spliced spider genes into lactating goats so that the goats: A) Produced more milk with less lactose B) Manufactured silk along with their milk C) Grew larger horns D) Became resistant to all diseases

Answer Key

- B) Micro-injection of DNA into the pronuclei of a fertilized egg — Transgenic animals are most commonly created by micro-injection of DNA into the pronuclei of a fertilized egg implanted into a pseudopregnant surrogate mother
- B) Homologous recombination — In this technique the foreign DNA is inserted into embryonic stem cells cultured in vitro by homologous recombination
- B) A target gene is removed or 'knocked out' from its genome — Infecting an embryo with viruses carrying DNA of interest is commonly used to remove or 'knock out' a target gene
- B) Manufactured silk along with their milk — The goats manufactured silk along with their milk, used to create light, tough material for uniforms, microsutures and racket strings

Lesson 37: Tools in Molecular Biology

Q1. Gel electrophoresis separates mixtures of DNA, RNA, or proteins according to their: A) Chemical color B) Molecular size and electric charge C) Solubility in lipid solvents D) Temperature stability

Q2. During gel electrophoresis, DNA fragments migrate toward which electrode? A) Negative electrode (cathode) B) Positive electrode (anode) C) Neutral buffer zone D) Centromere

Q3. Why do DNA molecules migrate toward the positive electrode in an electric field? A) DNA is basic in nature B) DNA carries a negative electrical charge C) DNA is uncharged and light D)

DNA binds positively charged lipids

Q4. Which molecular biology technique is used to amplify millions of copies of a specific DNA segment? A) Southern Blotting B) Polymerase Chain Reaction (PCR) C) Northern Blotting D) Gram Staining

Answer Key

B) Molecular size and electric charge — Gel electrophoresis separates mixtures of nucleic acids or proteins based on molecular size

B) Positive electrode (anode) — Negatively charged DNA bands migrate toward the positive electrode during electrophoresis

B) DNA carries a negative electrical charge — Chemical analysis shows DNA is acidic in nature and negatively charged, causing it to move toward the positive electrode

B) Polymerase Chain Reaction (PCR) — PCR is a laboratory tool used to rapidly amplify target DNA sequences

Lesson 38 & 39: Basic Genetics and Mendelian Inheritance

Q1. Alternative forms of a gene located at a specific position on a chromosome are called: A) Genotypes B) Alleles C) Phenotypes D) Codons

Q2. The physical, observable characteristics of an organism determined by genes and environment are its: A) Genotype B) Phenotype C) Karyotype D) Genome

Q3. Mendel's Principle of Segregation states that during gamete formation, the two alleles of a gene pair: A) Fuse permanently together B) Separate so that each gamete receives only one allele C) Mutate into new genes D) Duplicate into four pairs

Q4. Human somatic cells contain how many total chromosomes packaged in homologous pairs? A) 23 total chromosomes B) 46 chromosomes (23 pairs) C) 92 chromosomes (46 pairs) D) 12 chromosomes

Answer Key

B) Alleles — An allele is an alternative form of a gene located at a specific locus on a chromosome

B) Phenotype — Phenotype refers to the observable physical or biochemical characteristics of an organism

B) Separate so that each gamete receives only one allele — The principle of segregation states that allele pairs separate during gamete formation, with half the gametes carrying one allele and half carrying the other

B) 46 chromosomes (23 pairs) — Human cells package their genetic material into 46 chromosomes occurring in 23 homologous pairs

Lesson 40: Role of Biology in Medicine

Q1. Medical entomology is the specialized branch of public health dealing with: A) Fungal infections of human skin B) Arthropods and insects that vector diseases or parasitize humans C) Bacterial culture techniques in hospital laboratories D) Synthetic chemical drug development

Q2. Which of the following personal pests serves as a vector for human pathogens? A) Earthworms B) Lice and Fleas C) Honeybees D) Silkworms

Q3. Plant-derived chemical compounds such as alkaloids and steroids are important in medicine for: A) Manufacturing synthetic plastics B) Formulating pharmaceutical drugs and treatments C) Preserving food products in cold storage D) Eradicating beneficial soil microbes

Q4. Pathogens transmitted to humans by insect vectors include: A) Non-infectious genetic disorders B) Microscopic viruses, bacteria, and parasites C) Vitamin deficiency conditions D) Autoimmune responses

Answer Key

B) Arthropods and insects that vector diseases or parasitize humans — Medical entomologists deal with insects and arthropods that parasitize, sting, or vector human pathogens

B) Lice and Fleas — Lice, fleas, bedbugs, ticks, and scabies mites are personal pests that vector human pathogens

B) Formulating pharmaceutical drugs and treatments — Naturally occurring alkaloids and steroids from plants serve as major sources for drug development

B) Microscopic viruses, bacteria, and parasites — Arthropods vector biological pathogens including viruses, bacteria, and parasites

Lesson 41 & 42: Pharmacology & Properties of Drugs

Q1. Pharmacokinetics is the branch of pharmacology that studies how the body: A) Responds to toxic poisons B) Absorbs, distributes, metabolizes, and eliminates a drug C) Synthesizes new bacterial proteins D) Forms antibodies against viral antigens

Q2. The measure of drug activity expressed in terms of the amount or concentration required to produce a specific effect intensity is called: A) Efficacy B) Potency C) Affinity D) Clearance

Q3. The specific ability of a drug molecule to bind to its cellular receptor is termed: A) Efficacy B) Affinity C) Metabolism D) Half-life

Q4. Pharmacodynamics focuses on the study of: A) Drug absorption through the stomach lining B) Biochemical and physiological effects of drugs on the body and their mechanisms C) Chemical synthesis of crude plant extracts D) Excretion of metabolic wastes by the kidneys

Answer Key

B) Absorbs, distributes, metabolizes, and eliminates a drug — Pharmacokinetics is the process by which a drug is absorbed, distributed, metabolized, and eliminated (ADME) by the body

B) Potency — Potency measures drug activity in terms of the dose or concentration required to produce a given intensity of effect

B) Affinity — Affinity is defined as the ability of a drug molecule to bind to its specific receptor

B) Biochemical and physiological effects of drugs on the body and their mechanisms — Pharmacodynamics deals with what a drug does to the body and its mechanism of action

Lesson 43: Evolution & Natural Selection

Q1. Natural selection is best described as: A) Equal survival and reproduction of all organisms regardless of traits B) Differential survival and reproduction of individuals due to phenotypic differences C) Inheritance of acquired physical injuries D) Spontaneous creation of new species in one generation

Q2. Which key breakthrough property of RNA helped solve the 'chicken and egg' origin of life problem? A) RNA forms rigid cellulose cell walls B) Some RNA molecules can catalyze chemical reactions and store genetic information C) RNA contains peptidoglycan bonds D) RNA is present only in warm-blooded mammals

Q3. The 'Tree of Life' diagram constructed by evolutionary biologists depicts: A) The anatomical layout of plant roots B) Historical common ancestry and evolutionary descent of living organisms C) Linear food chains in aquatic ecosystems D) Chemical structures of steroid hormones

Q4. Genetic variation within a population arises primarily from: A) Random mutations in the genome B) Mitotic division of somatic cells C) Static non-changing environments D) Accumulation of inorganic bioelements

Answer Key

B) Differential survival and reproduction of individuals due to phenotypic differences — Natural selection is the differential survival and reproduction of individuals owing to variations in phenotype

B) Some RNA molecules can catalyze chemical reactions and store genetic information — The discovery that RNA can catalyze chemical reactions solved the origin-of-life puzzle, showing RNA came before DNA and proteins

B) Historical common ancestry and evolutionary descent of living organisms — The Tree of Life illustrates common ancestry and evolutionary descent from a common root

A) Random mutations in the genome — Genetic variation occurs partly because random mutations arise in the genome and are passed to offspring

Lesson 45: Study of Flowers

Q1. What is the primary biological function of a flower in angiosperms? A) Photosynthesis and gas exchange B) Effecting sexual reproduction through seed and fruit production C) Absorbing water and minerals from soil D) Storing starch reserves in tap roots

Q2. An inflorescence where pedicels originate from a single common point to form a flat-topped or rounded flower cluster is called a(n): A) Raceme B) Umbel C) Spike D) Solitary bloom

Q3. Flowers are specialized reproductive structures characteristic of which major plant division? A) Bryophyta B) Angiosperms (Magnoliophyta) C) Gymnospermae D) Pteridophyta

Q4. A dense, vertically compressed inflorescence bearing sessile flowers on a common receptacle is termed a: A) Capitulum (head) B) Compound umbel C) Corymb D) Panicle

Answer Key

B) Effecting sexual reproduction through seed and fruit production — The biological function of a flower is to effect reproduction by providing a mechanism for uniting sperm and egg

B) Umbel — An umbel is a flat-topped or rounded inflorescence with pedicels originating from a single common point

B) Angiosperms (Magnoliophyta) — Flowers are the reproductive structures found specifically in flowering plants (angiosperms / Magnoliophyta)

A) Capitulum (head) — A capitulum (or head) is a dense, vertically compressed inflorescence bearing sessile flowers on a common base

End of Quiz

BIO101 — 120 solved MCQs
Prepared by VU Learning HUB
vulearninghub.xyz