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NCERT Biology Quick Revision Guide

Class 11 & 12 - Complete Chapter Summaries

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Chapter 1: The Living World

- Biology is the science of life and living organisms
- Living organisms are classified into kingdom, phylum, class, order, family, genus, and species
- Biodiversity refers to the variety of all living organisms and their habitats
- Species is the basic unit of taxonomy
- Binomial nomenclature uses Genus and species names (e.g., Homo sapiens)

NEET Important Facts:

Linnaean classification system has 8 taxonomic ranks

The smallest unit of classification is species

Taxonomy helps in organizing the vast diversity of life on Earth

Remember: Create mnemonics for chapter concepts - the more creative, the better!

Chapter 2: Biological Classification

- Kingdom is the largest taxonomic unit (5 kingdoms: Monera, Protista, Fungi, Plantae, Animalia)
- Whittaker's classification is based on nutrition and habitat
- Archaebacteria live in extreme environments
- Eubacteria are common bacteria in soil and water
- Protists are unicellular organisms with nucleus (amoeba, paramecium)
- Fungi have a cell wall made of chitin

NEET Important Facts:

Monera have no true nucleus (prokaryotic)

Fungi are heterotrophic absorbers

Classification helps understand evolutionary relationships

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Chapter 3: Plant Kingdom

- Plants are divided into: Algae, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms
- Bryophytes (mosses, liverworts) have no roots, stems, or leaves
- Pteridophytes (ferns) have vascular tissue and reproduce by spores
- Gymnosperms (conifers, cycads) have naked seeds
- Angiosperms (flowering plants) have seeds enclosed in fruits

NEET Important Facts:

Bryophytes are called 'amphibians of plant kingdom' due to dependence on water

Pteridophytes showed first appearance of vascular tissue

Gymnosperms are heterosporous

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Chapter 4: Animal Kingdom

- Animals are multicellular, heterotrophic organisms
- Phylum Porifera: sponges with pores and canal system
- Phylum Cnidaria: jellyfish, corals with stinging cells (nematocysts)
- Phylum Platyhelminthes: flatworms with bilateral symmetry
- Phylum Nematoda: roundworms, mostly parasitic
- Phylum Annelida: earthworms with segmented bodies

NEET Important Facts:

Porifera lack true tissues and organs

Cnidarians have gastrovascular cavity

Annelids have true coelom

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Chapter 5: Morphology of Flowering Plants

- Root system: tap roots (dicots) or fibrous roots (monocots)
- Stem has nodes and internodes; buds are present at nodes
- Leaves have lamina (blade), petiole (stalk), and stipules
- Leaf venation can be parallel (monocots) or reticulate (dicots)
- Flowers are reproductive structures with sepals, petals, stamens, and carpels

NEET Important Facts:

Root hairs increase surface area for absorption

Stomata are found mainly on lower leaf surface

Compound leaves have leaflets while simple leaves have a single blade

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Chapter 6: Anatomy of Flowering Plants

- Tissue: group of similar cells performing same function
- Meristematic tissue: cells capable of dividing (apical, lateral, intercalary)
- Dermal tissue: epidermis with cuticle and stomata
- Ground tissue: parenchyma, collenchyma, sclerenchyma
- Vascular tissue: xylem (water transport) and phloem (food transport)

NEET Important Facts:

Xylem cells are dead and empty at maturity for efficient transport

Phloem cells are living with plasmodesmata

Sclerenchyma provides mechanical support

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Chapter 7: Structural Organisation in Animals

- Animal body organization: cells -> tissues -> organs -> organ systems
- Four main tissue types: epithelial, connective, muscular, nervous
- Epithelial tissue covers surfaces and lines cavities
- Connective tissue binds and supports other tissues
- Muscular tissue provides movement
- Nervous tissue transmits electrical signals

NEET Important Facts:

Epithelium can be simple (single layer) or stratified (multiple layers)

Blood and lymph are fluid connective tissues

Muscle types: skeletal (voluntary), cardiac (heart), smooth (involuntary)

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Chapter 8: Cell: The Unit of Life

- Cell is the basic unit of life and all living organisms are made of cells
- Cell membrane controls what enters and exits the cell
- Nucleus contains DNA and controls cellular activities
- Mitochondria: powerhouse of the cell, produces ATP
- Chloroplasts: site of photosynthesis in plant cells
- Endoplasmic reticulum synthesizes proteins (RER) or lipids (SER)

NEET Important Facts:

Prokaryotic cells lack a nucleus (bacteria)

Eukaryotic cells have a true nucleus and organelles

Ribosomes synthesize proteins from mRNA

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Chapter 9: Biomolecules

- Carbohydrates: provide energy (glucose, sucrose, starch, cellulose)
- Proteins: structural and functional molecules made of amino acids
- Lipids: store energy and form cell membranes (fats, oils, phospholipids)
- Nucleic acids: DNA stores genetic information, RNA transfers it
- Enzymes: protein catalysts that speed up biochemical reactions
- pH and temperature affect enzyme activity

NEET Important Facts:

DNA has deoxyribose sugar; RNA has ribose sugar

Proteins have 20 different amino acids

ATP is the energy currency of the cell

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Chapter 10: Cell Cycle and Cell Division

- Cell cycle: interphase (G1, S, G2) and mitosis
- S phase: DNA replication, each chromosome becomes two sister chromatids
- Mitosis: nuclear division producing two identical daughter cells
- Meiosis: reduction division producing four haploid gametes
- Homologous chromosomes pair during prophase I of meiosis
- Crossing over increases genetic variation

NEET Important Facts:

Mitosis maintains chromosome number; meiosis halves it

Cytokinesis divides cytoplasm after nuclear division

Most human cells are diploid (2n=46)

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Chapter 11: Photosynthesis in Higher Plants

- Light-dependent reactions occur in thylakoid membranes: water is split, ATP and NADPH produced
- Light-independent reactions (Calvin cycle) occur in stroma: CO_2 is fixed into glucose
- Chlorophyll absorbs light energy
- C3 plants: normal photosynthesis, RuBP accepts CO_2
- C4 plants: PEP accepts CO_2, more efficient in hot/dry conditions
- CAM plants: open stomata at night to conserve water

NEET Important Facts:

Light reactions produce O_2 from water splitting

Dark reactions don't directly need light but depend on products of light reactions

Photosynthesis equation: $6CO_2 + 6H_2O$ + light yields $C_6H_{12}O_6 + 6O_2$

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Chapter 12: Respiration in Plants

- Respiration releases energy from organic molecules
- Glycolysis: glucose breaks down to pyruvate in cytoplasm, produces small ATP
- Krebs cycle: occurs in mitochondrial matrix, completes oxidation
- Electron transport chain: produces maximum ATP in inner mitochondrial membrane
- Anaerobic respiration: produces less ATP but occurs without oxygen
- Respiratory quotient (RQ) varies with substrate used

NEET Important Facts:

One glucose molecule can produce up to 38 ATP molecules

Fermentation produces ethanol (plants) or lactic acid (animals)

Respiration is the reverse of photosynthesis

Remember: Create mnemonics for chapter concepts - the more creative, the better!

Chapter 13: Plant Growth and Development

- Growth: irreversible increase in size and dry matter
- Development: differentiation and maturation of cells
- Apical dominance: main stem grows more than side branches
- Auxins: hormones promoting cell elongation
- Gibberellins: promote stem elongation and seed germination
- Cytokinins: promote cell division
- Abscisic acid: stress hormone, closes stomata

NEET Important Facts:

Ethylene promotes fruit ripening

Photoperiodism: flowering response to day length

Vernalization: cold treatment promoting flowering

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Chapter 14: Breathing and Exchange of Gases

- Breathing brings air in (inspiration) and out (expiration)
- Diaphragm contracts to increase thoracic cavity volume
- Tidal volume: normal breath volume is about 500 mL
- Vital capacity: maximum air lungs can hold
- Alveoli: site of gas exchange in lungs
- Oxygen diffuses into blood; CO_2 diffuses out

NEET Important Facts:

Breathing rate is controlled by CO_2 levels and pH

Hemoglobin carries oxygen in red blood cells

Normal respiratory rate in humans: 12-16 breaths per minute

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Chapter 15: Body Fluids and Circulation

- Blood: plasma (liquid) + cells (RBC, WBC, platelets)
- Arteries carry blood away from heart; veins carry blood toward heart
- Capillaries: exchange of nutrients and waste occurs here
- Heart has 4 chambers: two atria (receive blood), two ventricles (pump blood)
- Systolic pressure: when heart contracts; diastolic pressure: when heart relaxes
- Lymphatic system: drains excess fluid from tissues

NEET Important Facts:

Normal blood pressure: 120/80 mmHg

Blood groups determined by antigens on RBC surface

Clotting prevents blood loss from wounds

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Chapter 16: Excretory Products and their Elimination

- Kidney: filters blood to produce urine
- Nephron: functional unit of kidney with glomerulus and tubule
- Filtration: small molecules filtered from blood into Bowman's capsule
- Reabsorption: useful substances absorbed back into blood
- Secretion: additional waste substances added to filtrate
- Urea: main nitrogenous waste in mammals

NEET Important Facts:

Each kidney has about 1 million nephrons

ADH hormone controls water reabsorption

Normal urine production: 1-1.5 liters per day

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Chapter 17: Locomotion and Movement

- Skeletal system: bones (rigid, support) and cartilage (flexible)
- Joints: where bones meet, allow movement (hinge, ball-and-socket)
- Muscle: contracts to pull on bones, causing movement
- Muscle contraction: sliding filament theory (actin and myosin)
- Motor neuron stimulates muscle fiber at neuromuscular junction
- Muscle fatigue: accumulation of lactate and depletion of ATP

NEET Important Facts:

Adults have 206 bones

Skeletal muscles are attached to bones by tendons

Muscle pairs work antagonistically (flexor-extensor)

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Chapter 18: Neural Control and Coordination

- Nervous system divided into: central (brain, spinal cord) and peripheral (somatic, autonomic)
- Neuron: nerve cell that transmits electrical signals
- Synapse: junction where neurons communicate via neurotransmitters
- Reflex arc: sensory input -> spinal cord -> motor output (quick response)
- Cerebrum: controls voluntary actions and consciousness
- Cerebellum: coordinates movement and balance

NEET Important Facts:

Brain has about 100 billion neurons

Action potential: electrical signal traveling along neuron

Neurotransmitters: chemical messengers between neurons

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Chapter 19: Chemical Coordination and Integration

- Endocrine glands: produce hormones that regulate body functions
- Pituitary gland: master gland controlling other glands
- Thyroid: controls metabolic rate
- Pancreas: insulin controls blood glucose
- Adrenal: produces adrenaline for fight-or-flight response
- Hormone receptors on cell surface or inside cells

NEET Important Facts:

Hormones are chemical messengers traveling in blood

Negative feedback: high hormone levels inhibit further release

Estrogen and testosterone: sex hormones

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Chapter 1: Reproduction in Organisms

- Reproduction: process creating new organisms
- Asexual reproduction: one parent, genetically identical offspring
- Sexual reproduction: two parents, genetic variation in offspring
- Budding: offspring grows from parent (hydra)
- Fission: cell splits into two (amoeba)
- Fragmentation: parent breaks into fragments, each becomes new organism

NEET Important Facts:

Hermaphrodites have both male and female organs

Monoecious plants have both male and female flowers

Dioecious plants have separate male and female plants

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Chapter 2: Sexual Reproduction in Flowering Plants

- Flower: reproductive structure with calyx, corolla, androecium, gynoecium
- Stamen: male organ producing pollen
- Carpel: female organ containing ovules
- Pollination: transfer of pollen from stamen to stigma
- Self-pollination: pollen from same flower
- Cross-pollination: pollen from different flowers (more genetic variation)

NEET Important Facts:

Double fertilization in angiosperms: one sperm fertilizes egg, other fuses with polar nuclei

Endosperm: provides nutrition to developing seed

Fruit: developed ovary protecting seeds

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Chapter 3: Human Reproduction

- Male: testes produce sperm, stored in seminal vesicles
- Female: ovaries produce eggs, released monthly
- Menstrual cycle: 28 days, controlled by hormones
- Fertilization: sperm meets egg in fallopian tube
- Implantation: embryo attaches to uterine wall
- Gestation: 9 months of fetal development

NEET Important Facts:

Spermatogenesis: 74 days to produce sperm

Oogenesis: begins before birth, completes after fertilization

Fetus has separate blood circulation from mother

Remember: Create mnemonics for chapter concepts - the more creative, the better!

Chapter 4: Reproductive Health

- Contraception: prevents unwanted pregnancy (condoms, pills, IUD)
- STIs: sexually transmitted infections (gonorrhea, syphilis, HIV)
- Infertility: inability to conceive, can be treated
- Prenatal care: ensures healthy fetal development
- Safe sex practices reduce disease transmission
- Sex education improves reproductive health awareness

NEET Important Facts:

Barrier methods prevent disease transmission

Hormonal contraceptives prevent ovulation

In vitro fertilization (IVF) for infertility treatment

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Chapter 5: Principles of Inheritance and Variation

- Mendel's law of segregation: alleles separate during gamete formation
- Mendel's law of independent assortment: different traits assort independently
- Dominant: expressed trait; recessive: hidden trait
- Genotype: genetic makeup; phenotype: observable appearance
- Test cross: cross with homozygous recessive to determine genotype
- Multiple alleles: more than two forms of a gene (blood type)

NEET Important Facts:

Punnett square predicts offspring ratios

Monohybrid cross: 3:1 ratio (dominant:recessive)

Dihybrid cross: 9:3:3:1 ratio

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Chapter 6: Molecular Basis of Inheritance

- DNA: double helix with bases (A, T, G, C)
- Complementary base pairing: A-T, G-C
- Semi-conservative replication: original strands separate, new strands synthesized
- Central dogma: DNA -> RNA -> Protein
- Transcription: DNA to mRNA in nucleus
- Translation: mRNA to protein at ribosomes

NEET Important Facts:

Codon: 3 bases code for one amino acid

There are 64 codons for 20 amino acids

Stop codons terminate translation

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Chapter 7: Evolution

- Evolution: gradual change of organisms over time
- Natural selection: survival of fittest, advantageous traits increase
- Adaptation: inherited trait that increases survival
- Fossils: evidence of past life, show transitional forms
- Homologous structures: similar structures from common ancestor
- Vestigial structures: reduced, non-functional organs (human tailbone)

NEET Important Facts:

Darwin's finches: beak shape adapted to available food

Peppered moths: Industrial melanism showed rapid evolution

Speciation: formation of new species through isolation

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Chapter 8: Human Health and Disease

- Health: state of complete physical, mental, social well-being
- Infectious diseases: caused by pathogens (bacteria, virus, fungi)
- Non-infectious diseases: not transmitted between organisms (cancer, diabetes)
- Immune system: protects against pathogens with antibodies
- Vaccination: provides immunity without actual disease
- Antibiotic resistance: when bacteria survive antibiotic treatment

NEET Important Facts:

Inflammation: response to injury or infection

Lymphocytes: B cells (antibodies), T cells (cell-mediated immunity)

Phagocytes: white blood cells that engulf pathogens

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Chapter 9: Strategies for Enhancement in Food Production

- Fertilizers: supply nitrogen, phosphorus, potassium
- Pesticides: control crop pests
- Crop rotation: prevents soil depletion and pest buildup
- Irrigation: provides adequate water to crops
- Selective breeding: choose organisms with desirable traits
- Polyploidy: increase chromosome number for larger fruits

NEET Important Facts:

Green Revolution: increased food production through modern techniques

Hybrid crops: vigor and higher yield

Organic farming: reduced chemical use

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Chapter 10: Microbes in Human Welfare

- Fermentation: microbes break down sugars anaerobically (bread, yogurt, beer)
- Antibiotics: produced by microbes to kill bacteria (penicillin from Penicillium)
- Vaccines: contain weakened/inactivated pathogens
- Probiotics: beneficial bacteria in gut
- Biogas: produced by bacteria breaking down organic matter
- Biofertilizers: nitrogen-fixing bacteria enhance soil

NEET Important Facts:

Saccharomyces: yeast used in fermentation

Lactobacillus: produces lactic acid in yogurt

Streptomyces: source of many antibiotics

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Chapter 11: Biotechnology: Principles and Processes

- Biotechnology: using living organisms for practical applications
- Recombinant DNA: DNA from different sources combined
- PCR: amplifies specific DNA sequences
- Restriction enzymes: cut DNA at specific sequences
- DNA ligase: joins DNA fragments
- Vectors: carry foreign DNA into cells (plasmids, viruses)

NEET Important Facts:

Gel electrophoresis: separates DNA by size

Cloning: creating genetically identical copies

Transgenic organisms: contain genes from different species

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Chapter 12: Biotechnology and its Applications

- Gene therapy: replacing faulty genes with functional ones
- GMOs: genetically modified organisms for improved traits
- Pharming: using plants/animals to produce pharmaceuticals
- DNA fingerprinting: identifies individuals using DNA patterns
- Stem cell research: potential for treating diseases
- Regenerative medicine: restoring damaged tissues

NEET Important Facts:

Golden rice: fortified with vitamin A

Insulin production: using genetically modified bacteria

CRISPR: gene editing technology

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Chapter 13: Organisms and Populations

- Population: group of same species in same area
- Birth rate: number of births per population per time
- Death rate: number of deaths per population per time
- Population growth: birth rate - death rate
- Carrying capacity: maximum population size environment supports
- Age structure: proportions of different age groups

NEET Important Facts:

Exponential growth: J-shaped curve when resources unlimited

Logistic growth: S-shaped curve approaches carrying capacity

Density-dependent factors: affect population based on density

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Chapter 14: Ecosystem

- Ecosystem: community of organisms and physical environment
- Biotic: living components (producers, consumers, decomposers)
- Abiotic: non-living components (temperature, water, light)
- Energy flow: enters as light, exits as heat
- Food chain: linear energy transfer (grass -> rabbit -> fox)
- Food web: interconnected food chains

NEET Important Facts:

Trophic level: position in food chain

Energy loss: 10% of energy available to next level

Pyramid of energy: decreases at higher trophic levels

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Chapter 15: Biodiversity and Conservation

- Biodiversity: variety of species and genetic variation
- Endemic species: found only in specific location
- Endangered species: at risk of extinction
- Extinction: permanent loss of species
- Protected areas: national parks, reserves conserve biodiversity
- Ex-situ conservation: zoos, botanical gardens protect species

NEET Important Facts:

Hotspots: areas with high biodiversity and endemic species

Habitat loss: major cause of extinction

Conservation breeding: reproduces endangered species in captivity

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Chapter 16: Environmental Issues

- Air pollution: smoke, gases damage respiratory system
- Water pollution: industrial waste, sewage contaminate water
- Soil erosion: loss of topsoil reduces fertility
- Ozone depletion: CFCs release chlorine destroying ozone
- Global warming: greenhouse gases trap heat, increase temperature
- Sustainable development: meets present needs without harming future

NEET Important Facts:

Greenhouse gases: CO_2, CH_4, N_2O trap heat

Acid rain: sulfur oxides lower pH of rain

Recycling: reduces waste and conserves resources

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