



IDX G10 Biology S
Study Guide Issue #
By Gorden, Edited by [Editor]

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Table of contents: 8 properties of living things, Ch2, Ch7

1. Made up of cells

grow, respond, reproduce
complex, highly organized
unicellular or multicellular

2. Reproduce

sexual reproduction: 2 sex cells -> one cell
asexual reproduction: single parent produced identical offspring

3. Based on a universal genetic code

DNA: stores information organisms need to live, grow, and reproduce. Passed from parent to offspring

4. Grow and develop

Life cycle: particular pattern of growth and change over lifetime
Cells divide, cells differentiate to become different in structure & function

5. Obtain and use material and energy

metabolism: sum of chemical reactions in organisms, building up or breaking down materials
Autotroph: make their own food
Heterotroph: need to get food

6. Response to their own environment

stimuli: a signal to which an organism responds

7. Maintain a stable internal environment

Homeostasis: the process by which organisms keep their internal conditions stable

8. Evolve

change over time

individual doesn't evolve, population does.

Ch2

Macromolecules

giant molecules made from smaller molecules

Polymerization

large compounds built by joining smaller ones

many monomer connect to form polymer

can be identical or different

4 groups of macromolecules

1. Carbohydrates

main source of energy, structural purpose for plants and some animals

monosaccharides: single sugar molecules.

Ex: glucose, galactose, fructose

disaccharides: double sugar molecules

Ex: sucrose, lactose, maltose

Polysaccharides: formed from many monosaccharides

Ex: starch, cellulose, glycogen

2. Lipids

stores energy, biological membrane, waterproof coverings, chemical messengers

Simple lipids: fat and oil, formed by glycerol and fatty acids

saturated lipid: only c-c single bonds, contains max possible of H atoms

unsaturated lipid: at least one c-c double bond

3. Nucleic acids

monomer: nucleotides

store and transmit heredity/genetic info

RNA: contain sugar ribose

DNA: contain sugar deoxyribose

nucleotides: 5-carbon sugar, nitrogenous base

4. Proteins

Monomer: amino acids

functional groups: amino acids (NH₃), carboxyl group (COOH), side group (R)

control rate of reaction

regulate cell process

forms bones and muscles

transport substances

fight diseases

4 levels of organization:

sequence of amino acid in chain

folding, coiling within the chain

complete 3D arrangement of the chain

association of different chains

Chemical reactions

process that changes one set of chemicals into another

reactants: things that enter the reaction

products: things produced nu a chemical reaction

involve the breaking of bonds in reaction and formation of new bonds in products

energy can be released or absorbed

activation energy: lowest amount of energy need to start a reaction

Enzymes as catalysts

catalyst: substrate that speed up the rate of reaction by lowering the activation energy.

enzymes lowers the reaction energy to speed up chemicals

The enzyme substrate complex

substrate: reactants in an enzyme catalyzed reactions

active site: the region of an enzymes's surface that binds the substrate and reduces activation energy

active site and substrate have complementary shapes (lock and key hypotheses)

Ch 7

The cell theory

all living things are composed of cells

cells are the basic units of structure and function in living things

new cells are produced from existing cells

Exploring the cell

microscope: use lenses to magnify the image of an object by focusing light or electrons

resolution: the shortest distance between 2 points that can be distinguished

magnification: the times of the enlargement

Compound light microscope

max magnification: 1000 times

resolution $0.2 \mu\text{m}$

pass light through specimen

Electron microscope

magnification: 1000 times smaller than light microscope

resolution: 1nm

use beams of electron focused my magnetic field

specimen can't be alive

Transmission electron microscope

2D image of cell structure

inside objects

Scanning electron microscope

3D image of the specimen's surface

surface of objects

Prokaryotes

- smaller and simpler than eukaryotes
- unicellular
- no nuclei membrane bound organelles

Eukaryotes

- can be unicellular or multicellular
- Contain internal membrane/organelles

Nucleus

structure: a sphere with....

- double nuclear envelope
- chromatin/chromosomes
- nucleolus

function:

- control most cell process
- contain DNA

chromatin: DNA packed by protein

Chromosomes: condensed chromatin during cell division

Nucleolus

- Small dense region in nucleus
- rich of DNA
- the site of assembly of ribosomes

Nuclear envelope

- double membrane
- thousands of nuclear pores
- allows material to move in and out

Vacuoles

- structure: sac like, membrane enclosed
- function: store water, salt, protein, carbohydrates

contractile vacuoles: pump excess water out of the cell

Vesicles

structure: smaller membrane enclosed sac

function: store and move materials between organelles, and from the cell surface

Lysosomes

structure: small organelles filled with enzymes

function:

break down lipid, carbohydrates, proteins, and out lived organelles

remove waste and junk

Cytoskeleton

structures: network of thin protein fibers

microfilaments

structure: made of protein actins

function: movement and support of the cell

microtubules

structure: hollow tubes made up of proteins

function: serve as tracks to move vesicles

Ex: spindles, centrioles, flagellum

Ribosomes

structure: small particles made up of RNA and Proteins

function: make proteins

attached ribosomes

proteins that are to be released, or secreted out if the cell

membrane proteins

proteins designated for lysosomes and other specialized location within the cell

free ribosomes: make proteins to be used within the cell

Endoplasmic reticulum (ER)

structure: internal membrane system

functions:

rough ER

- with ribosomes attached
- protein synthesis
- smooth ER
 - no ribosomes attached
 - synthesis of membrane lipids, detoxification or drugs

Golgi apparatus (golgi body)

- structure: stack of flattened membranes
- function
 - modified, sorts, and packages proteins
 - for storage in the cell/release outside of the cell

Chloroplasts

- structure:
- double membrane
- inside, large stacks of photosynthetic membranes containing chlorophyll
- found in plants

function: Use solar energy to make energy rich food molecules by photosynthesis

Mitochondria

- structure: double membrane
 - smooth outer membrane
 - folded inner membrane
- function:
 - use energy from food to make high-energy compounds (ATP)
 - site of cellular respiration

Organelle DNA

- chloroplasts and mitochondria contain their own DNA
- supposed to be descended from prokaryotes (endosymbiotic theory)
- mitochondria DNA inherited only from mother

Cell wall

- in plants, fungi, most prokaryotes
- not in animal cells

lie outside of cell membrane

structure: porous wall allows all substance to pass through

function: support, shape, and protect the cell

Cell membrane

function

selectively permeable: regulate what goes in and out

protects and supports the cell

properties of phospholipids:

hydrophobic tail and hydrophilic head

forms a bilipid in water: head face outside, tail face tail

a fluid mosaic model, of cell membrane

phospholipid bilayer

proteins embedded and move along the lipids

carbohydrates attached to many proteins