

Multiple Choice Review – Life Sciences 11

Quiz outline:

- theories on start of life on earth: Abiogenesis, Pseudo-panspermia
- early experiments that created biological molecules
- Properties of water, including covalent bonds and hydrogen bonds
- organic and inorganic molecules (how to tell them apart)
- four biological molecules, their monomers, polymers and functions.
- LUCA and the three domains of life and 6 kingdoms
- eukaryotic and prokaryotic cells, including cell theory.
- cell organelles and functions of: nucleus, DNA, nucleolus, cell membrane, cell wall, mitochondria, chloroplasts, vesicles, Golgi body, endoplasmic reticulum (both smooth and rough), ribosomes, cytoplasm, vacuole (plants). Also know: cytoskeleton, lysosomes.
- Endosymbiotic theory
- energy uses: autotrophs versus heterotrophs

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| <p>1. The Abiogenesis theory suggests:</p> <ul style="list-style-type: none">A) Life began from non-living matter through natural processesB) Life was transported to Earth by meteorsC) Mitochondria originated from engulfed bacteriaD) Cells always come from pre-existing cells <p>2. Pseudo-panspermia suggests:</p> <ul style="list-style-type: none">A) Life began spontaneously in Earth's oceansB) Microbes arrived fully formed on asteroidsC) Organic building blocks came to Earth from space, later forming lifeD) LUCA existed on another planet <p>3. The Miller-Urey experiment (electricity into inorganic compounds) showed that:</p> <ul style="list-style-type: none">A) Oxygen was essential for early lifeB) DNA and proteins spontaneously assemble in cellsC) Hydrothermal vents are the only source of lifeD) Organic molecules could form from simple gases with energy input <p>4. Which combination of gases was used in the Miller-Urey experiment?</p> <ul style="list-style-type: none">A) Oxygen, nitrogen, carbon dioxideB) Methane, ammonia, hydrogen, water vaporC) Carbon monoxide, argon, heliumD) Oxygen, ozone, nitrogen | <p>5. What bond holds hydrogen and oxygen atoms together within a single water molecule?</p> <ul style="list-style-type: none">A) Ionic bondB) Hydrogen bondC) Metallic bondD) Covalent bond <p>6. Water molecules stick to each other due to:</p> <ul style="list-style-type: none">A) Ionic attractionB) Covalent bondsC) Cohesion through hydrogen bondingD) Adhesion to polar surfaces <p>7. Which of the following is an organic molecule?</p> <ul style="list-style-type: none">A) NaClB) CO₂C) GlucoseD) H₂O <p>8. Organic molecules are generally defined by the presence of:</p> <ul style="list-style-type: none">A) Carbon and hydrogenB) Nitrogen and sulfurC) Oxygen onlyD) Hydrogen bonds <p>9. Which monomer pairs correctly with its biological macromolecule (polymer)?</p> <ul style="list-style-type: none">A) Nucleotides → ProteinsB) Amino acids → CarbohydratesC) Monosaccharides → CarbohydratesD) Fatty acids → Nucleic acids |
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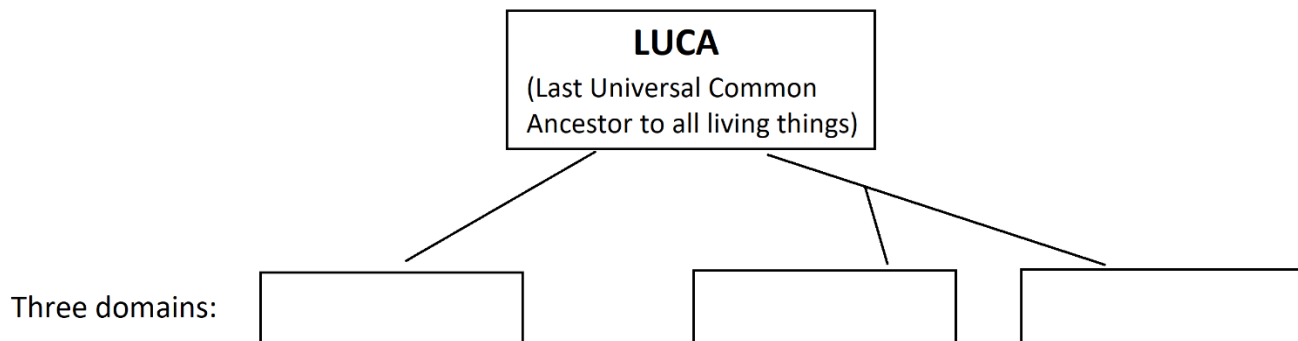
10. Which biomolecule primarily stores genetic information?
 - A) Proteins
 - B) Carbohydrates
 - C) Nucleic acids
 - D) Lipids
11. LUCA refers to:
 - A) The Last Universal Common Ancestor of all life
 - B) The first eukaryotic cell
 - C) The oldest fossilized plant
 - D) The kingdom Protista
12. Which kingdom includes multicellular autotrophs with cell walls made of cellulose?
 - A) Fungi
 - B) Animalia
 - C) Protista
 - D) Plantae
13. Which statement is part of the cell theory?
 - A) All cells contain a nucleus
 - B) Cells arise from pre-existing cells
 - C) All living things are eukaryotic
 - D) Prokaryotes lack DNA
14. Which feature is found only in prokaryotic cells?
 - A) Cytoplasm
 - B) Ribosomes
 - C) Plasma membrane
 - D) Circular DNA not enclosed in a nucleus
15. Which organelle packages and modifies proteins for transport?
 - A) Golgi body
 - B) Nucleolus
 - C) Ribosome
 - D) Vesicle
16. Which structure breaks down worn-out organelles and cellular waste?
 - A) Chloroplast
 - B) Lysosome
 - C) Mitochondrion
 - D) Smooth ER
17. Which organelle is the site of ATP production through cellular respiration?
 - A) Mitochondrion
 - B) Ribosome
 - C) Chloroplast
 - D) Cytoskeleton
18. Which organelle contains chlorophyll and carries out photosynthesis?
 - A) Nucleolus
 - B) Ribosome
 - C) Chloroplast
 - D) Golgi body
19. Which structure provides internal support and helps maintain cell shape?
 - A) Lysosome
 - B) Cytoskeleton
 - C) Smooth ER
 - D) Vacuole
20. The endosymbiotic theory explains the origin of:
 - A) Nucleus and cytoskeleton
 - B) Ribosomes and vacuoles
 - C) Golgi bodies and ER
 - D) Mitochondria and chloroplasts
21. Which evidence best supports the endosymbiotic theory?
 - A) Chloroplasts and mitochondria have circular DNA and double membranes
 - B) Lysosomes contain digestive enzymes
 - C) The nucleus has pores for RNA transport
 - D) Vacuoles are large in plant cells
22. Which statement best describes protists as a group?
 - A) Protists can be autotrophs, heterotrophs, or mixotrophs
 - B) All protists are autotrophs
 - C) All protists are heterotrophs
 - D) Protists do not need energy
23. Bacteria can be:
 - A) Only autotrophs
 - B) Only heterotrophs
 - C) Either autotrophs or heterotrophs, depending on the species
 - D) Neither autotrophs nor heterotrophs
24. Cells that contain chloroplasts are almost always:
 - A) Mixotrophs
 - B) Heterotrophs
 - C) Combination
 - D) Autotrophs

Answer Key for MC:

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|------|-------|--------|
| 1. A | 9. C | 17. A |
| 2. C | 10. C | 18. C |
| 3. D | 11. A | 19. B |
| 4. B | 12. D | 20. D |
| 5. D | 13. B | 21. A |
| 6. C | 14. D | 22. A. |
| 7. C | 15. A | 23. C |
| 8. A | 16. B | 24. D |

Open ended questions:

1. Fill in the blanks:

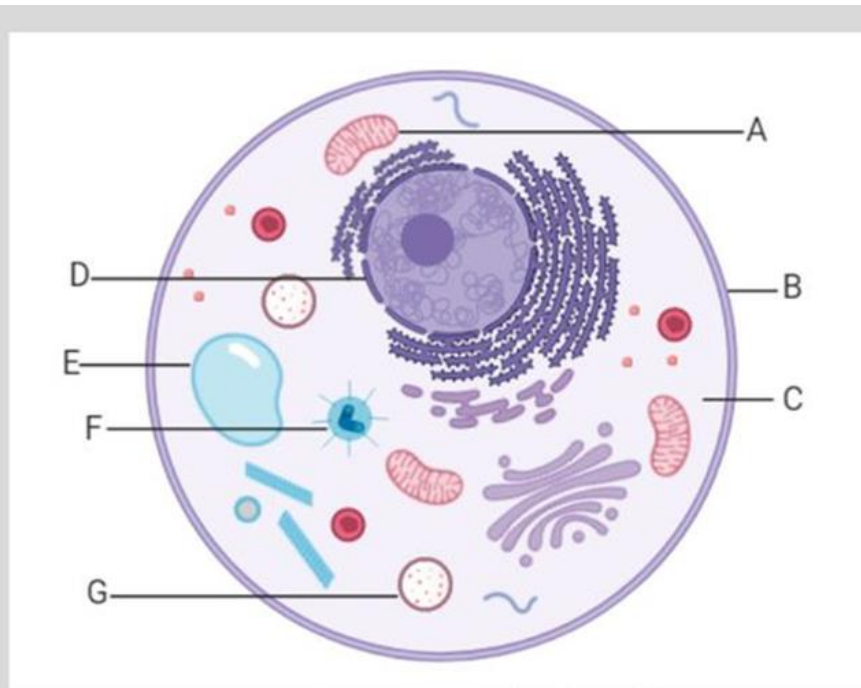


2. What are the six kingdoms of life? What type of energy use is found in each kingdom?

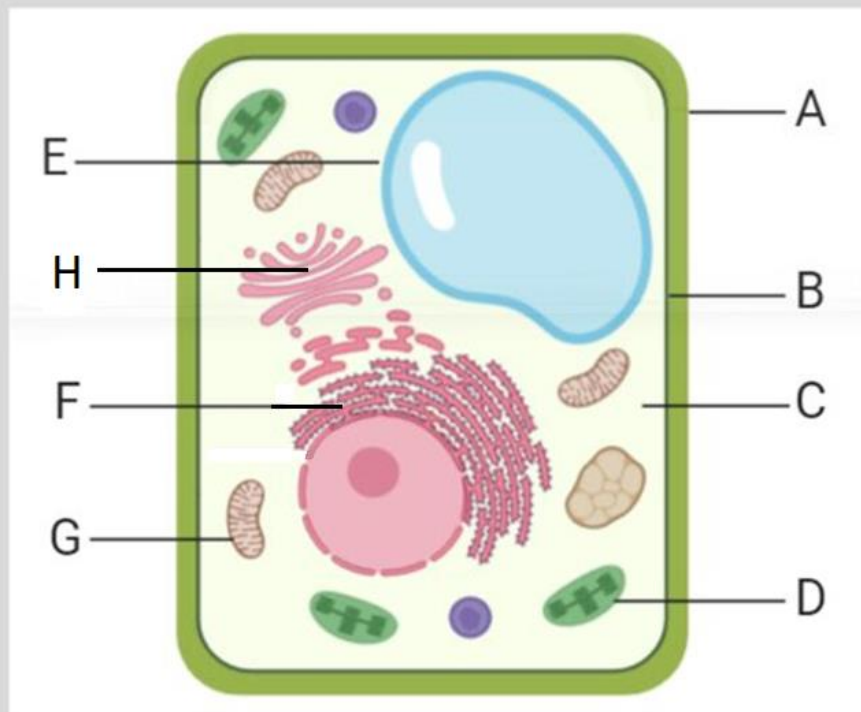
3. Plants have both chloroplasts and mitochondria. Why are both necessary?

4. What three organelles are only in plant cells?

5. Label the cells below: Not all organelles are included for labelling in these images!



Animal Cell



Plant Cell

Plant cell: A. Cell wall B. Cell membrane C. Cytoplasm D. Chloroplast E. Central vacuole F. Rough Endoplasmic Reticulum (RER) G. Mitochondria (singular mitochondrion) H. Golgi body (AKA Golgi apparatus)	
Animal cell: A. Mitochondria B. Cell membrane (AKA plasma membrane) C. Cytoplasm D. Nucleus / nuclear membrane (inside nucleus, DNA is in the form of chromatin) E. Vacuole F. Centrosome (made of two centrioles) G. Lysosome	