SURFIN’ THROUGH STAAR
Session 1: Biomolecules and Cells
1. The diagram below is the monomer of nucleic acids. What is this monomer?

   - a. amino acid
   - b. saccharide
   - c. 3 fatty acids & glycerol
   - d. nucleotide
2. The diagram below represents which of the following biomolecules?

a. carbohydrate  
B. PROTEIN  
C. LIPID  
D. NUCLEIC ACID
3. The diagram below represents which of the following biomolecules?

A. CARBOHYDRATE
B. PROTEIN
C. LIPID
D. NUCLEIC ACID
4. The diagram below represents which of the following biomolecules?

A. CARBOHYDRATE  
B. PROTEIN  
C. LIPID  
D. NUCLEIC ACID

The diagram shows a molecular structure consistent with that of a lipid.
Nitrogen (N) is used and reused by various organisms and processes as it cycles through the environment.

5. Study the statement above. Nitrogen is NOT a part of which of these biomolecules?

A. ENZYME
B. AMINO ACID
C. NUCLEIC ACID
D. CARBOHYDRATES
Nitrogen (N) is used and reused by various organisms and processes as it cycles through the environment.

6. Study the statement above. Why is nitrogen important to living things?

A. Nitrogen is a key component of all carbohydrates.
B. Nitrogen is a key component of proteins.
C. Nitrogen is a key component of cellulose.
D. Nitrogen is a key component of lipids.
Specific biomolecules serve various functions in the body.

7. Study the statement above. Identify the molecule, which is broken down during respiration forming water and carbon dioxide and releasing energy.

A. DEOXYRIBONUCLEIC ACID (DNA)
B. GLUCOSE
C. NICOTINAMIDE ADENINE DINUCLEOTIDE (NAD+)
D. HEMOGLOBIN
Specific biomolecules serve various functions in the body.

8. Study the statement above. Identify the molecule which forms when the chemical bond between two phosphate groups in an ATP molecule is broken.

A. HEMOGLOBIN
B. GLUCOSE
C. ADENOSINE DIPHOSPHATE (ADP)
D. NICOTINAMIDE ADENINE DINUCLEOTIDE (NAD+)
Specific biomolecules serve various functions in the body.

9. Study the statement above. Identify the molecule which stores energy in its chemical bonds for quick, easy use by cells.

A. NICOTINAMIDE ADENINE DINUCLEOTIDE (NAD+)
B. GLUCOSE
C. HEMOGLOBIN
D. ADENOSINE TRIPHOSPHATE (ATP)
Specific biomolecules serve various functions in the body.

10. Study the statement above. Identify the molecule which is found in red blood cells that binds to oxygen and carries oxygen from the lungs to the body’s cells.

A. GLUCOSE
B. DEOXYRIBONUCLEIC ACID (DNA)
C. NICOTINAMIDE ADENINE DINUCLEOTIDE (NAD+)
D. HEMOGLOBIN
Four major groups of organic compounds are particularly important to living things. Most life processes rely on molecules from one or more of these groups.

11. Refer to the information above. To which group do sugars belong?

A. NUCLEIC ACIDS
B. PROTEINS
C. LIPIDS
D. CARBOHYDRATES
Four major groups of organic compounds are particularly important to living things. Most life processes rely on molecules from one or more of these groups.

12. Refer to the information above. To which group do RNA molecules belong?

A. NUCLEIC ACIDS
B. PROTEINS
C. LIPIDS
D. CARBOHYDRATES
Four major groups of organic compounds are particularly important to living things. Most life processes rely on molecules from one or more of these groups.

13. Refer to the information above. To which group do enzymes belong?

A. LIPIDS
B. PROTEINS
C. CARBOHYDRATES
D. NUCLEIC ACIDS
Four major groups of organic compounds are particularly important to living things. Most life processes rely on molecules from one or more of these groups.

14. Refer to the information above. To which group do oils belong?

A. NUCLEIC ACIDS  
B. CARBOHYDRATES  
C. LIPIDS  
D. PROTEINS

(C. LIPIDS)
15. Study the diagram below which illustrates the cyclic nature of the formation and breakdown of the molecule adenosine triphosphate (ATP). What happens when the chemical bond, which attaches the third phosphate group to the molecule is broken?

A. **No energy is made available to the cell for cellular functions.**

B. **A molecule of adenosine monophosphate (AMP), with one phosphate group, is formed.**

C. **Energy is released, which can be used by the cell.**

D. **Energy is lost in the process.**
Nitrogen is found in a variety of forms in living things and in the environment. Molecules include $N_2$, a diatomic molecule, and $NH_3$, ammonia. Other forms include $NO_3^-$, or nitrate, and $-NH_2$, an amino group.

16. Refer to the information above. Which of these forms is a key component of an amino acid?

A. NITRATE
B. DIATOMIC MOLECULE
C. AMMONIA
D. AMINO GROUP
17. Certain types of biomolecules are crucial to a variety of life processes and body structures. One of these types of molecules are **proteins**, which are-

A. COMPOSED OF BUILDING BLOCKS CALLED AMINO ACIDS

B. INSOLUBLE IN WATER AND ARE USED BY THE BODY FOR ENERGY STORAGE AND INSULATION

C. COMPLEX BIOMOLECULES THAT STORE GENETIC INFORMATION

D. ORGANIC COMPOUNDS USED BY CELLS TO STORE AND RELEASE ENERGY
18. Which of these important chemicals forms the framework for carbohydrates, fats, and other molecules of life?

A. NITROGEN
B. OXYGEN
C. WATER
D. CARBON
19. Which of the following statements about enzymes is true?

A. Amylase, a digestive enzyme found in saliva, helps break down food molecules.

B. Enzymes do not play a role in metabolic processes of the body.

C. Enzymes are chemically altered during reactions in which they are involved.

D. Enzymes always slow the rate at which a chemical reaction occurs.
Guard cells are pairs of cells that surround stomata, which are small openings or pores in the leaf. Guard cells control the opening and closing of the stomatal pores.

20. Refer to the information and graphic above. **Guard cells** from a tomato plant are kidney-bean shaped. Which cell type would you expect to look most similar to tomato guard cells?

A. ROOT CELLS FROM A TOMATO PLANT

B. GUARD CELLS FROM A MARIGOLD PLANT

C. LEAF PALISADE CELLS FROM A TOMATO PLANT

D. STEM CELLS FROM A CORN PLANT
Guard cells are pairs of cells that surround stomata, which are small openings or pores in the leaf. Guard cells control the opening and closing of the stomatal pores.

21. Refer to the information and graphic above. The guard cells determine whether or not the stomatal pores are open. When guard cells absorb water, they swell, and the pores open. When guard cells lose water, they shrink, and the pores close. When stomata are open the plant loses water through the pores in a process known as transpiration. What is the most likely effect on the plant if the guard cells stay swollen on a hot day?

A. The plant will turn yellow.
B. The plant will wilt.
C. The plant will lose its leaves.
D. The plant’s roots will grow.
22. Suzanne is looking at different types of muscle tissue using a microscope. She notices that cells from a stomach muscle (A) look smooth and spindle-shaped, while tissue from leg muscle appears to be striped (B). What is the reason that the two tissue types look different?

A. The stomach muscle is fill of dividing cells.
B. Stomach muscle functions differently than leg muscle.
C. The stripes in the leg muscle do not relate to its function.
D. The two muscles function the same despite differences in their appearance.
23. The pancreas contains a special group of cells that produce the hormone insulin. Insulin stimulates the liver to remove sugar from the blood. If the cells in the pancreas do not produce enough insulin then excess sugar builds up in the blood. The result is a disease called -

A. HYPOGLYCEMIA
B. PANCREATITIS
C. INSULIN-DEFICIENCY SYNDROME
D. DIABETES
Miguel is looking at cells through a microscope. His teacher, Mrs. Sheng, has told him that he is viewing either a tomato cell or a bacterial cell. Mrs. Sheng would like Miguel to answer some questions about the cell he is looking at.

24. Read the information above. Mrs. Sheng asks Miguel to figure out what type of cell he is viewing. What cell structure should Miguel be looking for to determine whether this cell came from a tomato plant or a bacterium?

A. RIBOSOMES  
B. MITOCHONDRIA  
C. NUCLEUS  
D. DNA
Adrian is watching a movie with his friends. When he sees something scary happen in the movie, his brain sends a signal to the adrenal gland, which releases the hormone adrenalin into the bloodstream. This hormone causes Adrian’s heart to pump faster and his breathing to speed up.

25. Refer to the information above. In Adrian’s body the effects of **adrenalin** are occurring at the level of-

A. INDIVIDUAL CELLS
B. GROUPS OF CELLS
C. A SINGLE ORGAN SYSTEM
D. MULTIPLE ORGAN SYSTEMS
26. Like complex carbohydrates, proteins are biomolecules that serve many functions and can be chemically broken down and restructured. Both **proteins** and complex **carbohydrates** are which of the following?

A. **POLYMERS OF SMALLER SUBUNITS**
B. **SEQUENCES OF SUGARS**
C. **LIPIDS OF LARGE MOLECULES**
D. **NUCLEOTIDES OF DNA**
27. An iodine solution is placed on the cut side of a potato. Within seconds, a blue-black color appears. What is most likely occurring?

A. A POSITIVE TEST FOR PROTEINS
B. A POSITIVE TEST FOR STARCHES
C. A NEGATIVE TEST FOR PROTEINS
D. A NEGATIVE TEST FOR STARCHES
28. The diagram below represents a cell.

Which **organelle** is the site where **amino acids are synthesized** into **proteins**?

A. 1  
B. 2  
C. 3  
D. 4
29. RNA and DNA are which type of organic compound?

A. CARBOHYDRATE
B. LIPID
C. NUCLEIC ACID
D. PROTEIN
30. This diagram shows an enzyme-substrate complex.

Which is represented by Structure X?

A. SUBSTRATE  
B. PRODUCT  
C. ENZYME  
D. COMPLEX
31. What will most likely happen if an appropriate enzyme is added to a chemical reaction?

A. The reaction rate will increase.
B. The equilibrium of the reaction will be maintained.
C. The reaction rate will decrease.
D. The reaction will stop.