Introduction to Biomolecules

Name: _____ **Date:** _____

Quick Review

Biomolecules are molecules that are produced by or important to living organisms. They help build cells, provide and store energy, control chemical reactions, and store genetic information.

The four major groups of biomolecules are:

Biomolecule	Major Functions	Examples
Carbohydrates	Provide energy and some structural support	Glucose, starch
Lipids	Store energy and form cell membranes	Fats, oils, phospholipids
Proteins	Build structures and perform many cell functions	Enzymes, antibodies
Nucleic acids	Store and transmit genetic information	DNA, RNA

Carbon is especially important because a carbon atom can form four strong covalent bonds. This allows carbon atoms to form chains, branches, and rings and therefore an enormous variety of biological molecules.

Part A — Multiple Choice

1. What is a biomolecule?

A. A molecule important to living organisms
B. A molecule found only in rocks
C. Any molecule containing oxygen
D. A type of cell

2. Which is NOT one of the four major biomolecule groups?

A. Carbohydrates
B. Lipids
C. Minerals
D. Proteins

3. Which biomolecule is an important source of energy for cells?

A. Carbohydrates
B. Nucleic acids
C. Minerals
D. Water

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4. Which group includes fats and oils?

A. Proteins
B. Lipids
C. Carbohydrates
D. Nucleic acids

5. DNA belongs to which group?

A. Carbohydrates
B. Proteins
C. Nucleic acids
D. Lipids

6. Why is carbon especially important in biomolecules?

A. Carbon can form four bonds
B. Carbon cannot bond with other carbon atoms
C. Carbon is the largest atom
D. Carbon is only found in living things

Part B — Match the Biomolecule

Match each biomolecule to its function.

A. Carbohydrates
B. Lipids
C. Proteins
D. Nucleic acids

_____ Store genetic information

_____ Provide a major source of energy

_____ Include enzymes that speed up chemical reactions

_____ Provide long-term energy storage

_____ Include DNA and RNA

_____ Help form cell membranes

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Part C — Complete the Table

Fill in the missing information.

Biomolecule	One Important Function	Example
Carbohydrate	_____	Glucose
Lipid	_____	Fat
Protein	_____	Enzyme
Nucleic acid	_____	DNA

Part D — Biomolecules in a Cell

Identify the most appropriate biomolecule group.

1. A cell needs a molecule that can provide energy quickly. Biomolecule: _____

2. A cell needs to build part of its cell membrane. Biomolecule: _____

3. A cell needs instructions for making new proteins. Biomolecule: _____

4. A cell needs an enzyme to speed up a chemical reaction. Biomolecule: _____

5. An organism needs to store energy for later use. Biomolecule: _____

Part E — Why Carbon?

Carbon can form **four bonds** with other atoms. It can also bond with other carbon atoms.

1. Why does this make carbon useful in living organisms?

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2. Circle the structures that carbon atoms can form:

chains branches rings only single atoms

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Part F — Compare Biomolecules

Complete each statement.

1. Carbohydrates and lipids can both be involved in:

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2. Proteins are different from nucleic acids because proteins commonly:

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3. Nucleic acids are especially important because they:

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4. Which two biomolecule groups are particularly important in cell membranes?

_____ and _____

Part G — Apply Your Knowledge

A scientist studies four unknown biological substances.

- **Substance W** provides cells with a readily available source of energy.
- **Substance X** stores genetic instructions.
- **Substance Y** is an enzyme.
- **Substance Z** is used for long-term energy storage.

Identify each substance.

W: _____ **X:** _____

Y: _____ **Z:** _____

Exit Ticket

1. Name the four major groups of biomolecules.

2. Which element forms the foundation of most biological molecules?

3. Which biomolecule group includes DNA?

4. Give one important function of proteins.

5. Why are biomolecules essential to living organisms?

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Introduction to Biomolecules — Answer Key

Part A — Multiple Choice

1. **A** — A molecule important to living organisms
2. **C** — Minerals
3. **A** — Carbohydrates
4. **B** — Lipids
5. **C** — Nucleic acids
6. **A** — Carbon can form four bonds

Part B — Match the Biomolecule

1. Store genetic information — **D. Nucleic acids**
2. Provide a major source of energy — **A. Carbohydrates**
3. Include enzymes that speed up chemical reactions — **C. Proteins**
4. Provide long-term energy storage — **B. Lipids**
5. Include DNA and RNA — **D. Nucleic acids**
6. Help form cell membranes — **B. Lipids**

Part C — Complete the Table

Biomolecule	One Important Function	Example
Carbohydrate	**Provides energy / short-term energy**	Glucose
Lipid	**Long-term energy storage / forms cell membranes**	Fat
Protein	**Catalyses reactions / builds cell structures**	Enzyme
Nucleic acid	**Stores and transmits genetic information**	DNA

Accept other scientifically correct functions.

Part D — Biomolecules in a Cell

1. Provides energy quickly — **Carbohydrate**
2. Builds part of the cell membrane — **Lipid**
3. Provides instructions for making proteins — **Nucleic acid**
4. Enzyme that speeds up a reaction — **Protein**
5. Stores energy for later use — **Lipid**

Part E — Why Carbon?

1. Why does this make carbon useful in living organisms?

Carbon can form **four strong covalent bonds** and can bond with other carbon atoms. This allows it to form many different large and complex molecules.

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2. Structures carbon can form:

✓ chains
✓ branches
✓ rings

Do **not** circle *only single atoms*.

Part F — Compare Biomolecules

1. Carbohydrates and lipids can both be involved in:
Energy storage and/or providing energy.

2. Proteins are different from nucleic acids because proteins commonly:
Perform cell functions, provide structure, and act as enzymes.

3. Nucleic acids are especially important because they:
Store and transmit genetic information.

4. Which two biomolecule groups are particularly important in cell membranes?
Lipids and proteins

Part G — Apply Your Knowledge

W: Carbohydrate
X: Nucleic acid
Y: Protein
Z: Lipid

Exit Ticket

1. Name the four major groups of biomolecules.
Carbohydrates, lipids, proteins, and nucleic acids

2. Which element forms the foundation of most biological molecules?
Carbon

3. Which biomolecule group includes DNA?
Nucleic acids

4. Give one important function of proteins.
Possible answers include:

- Acting as enzymes
- Providing structural support
- Transporting substances
- Cell signalling

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- Helping defend the body

5. Why are biomolecules essential to living organisms?
They **provide energy, build cellular structures, carry out cell functions, and store and transmit genetic information**.

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