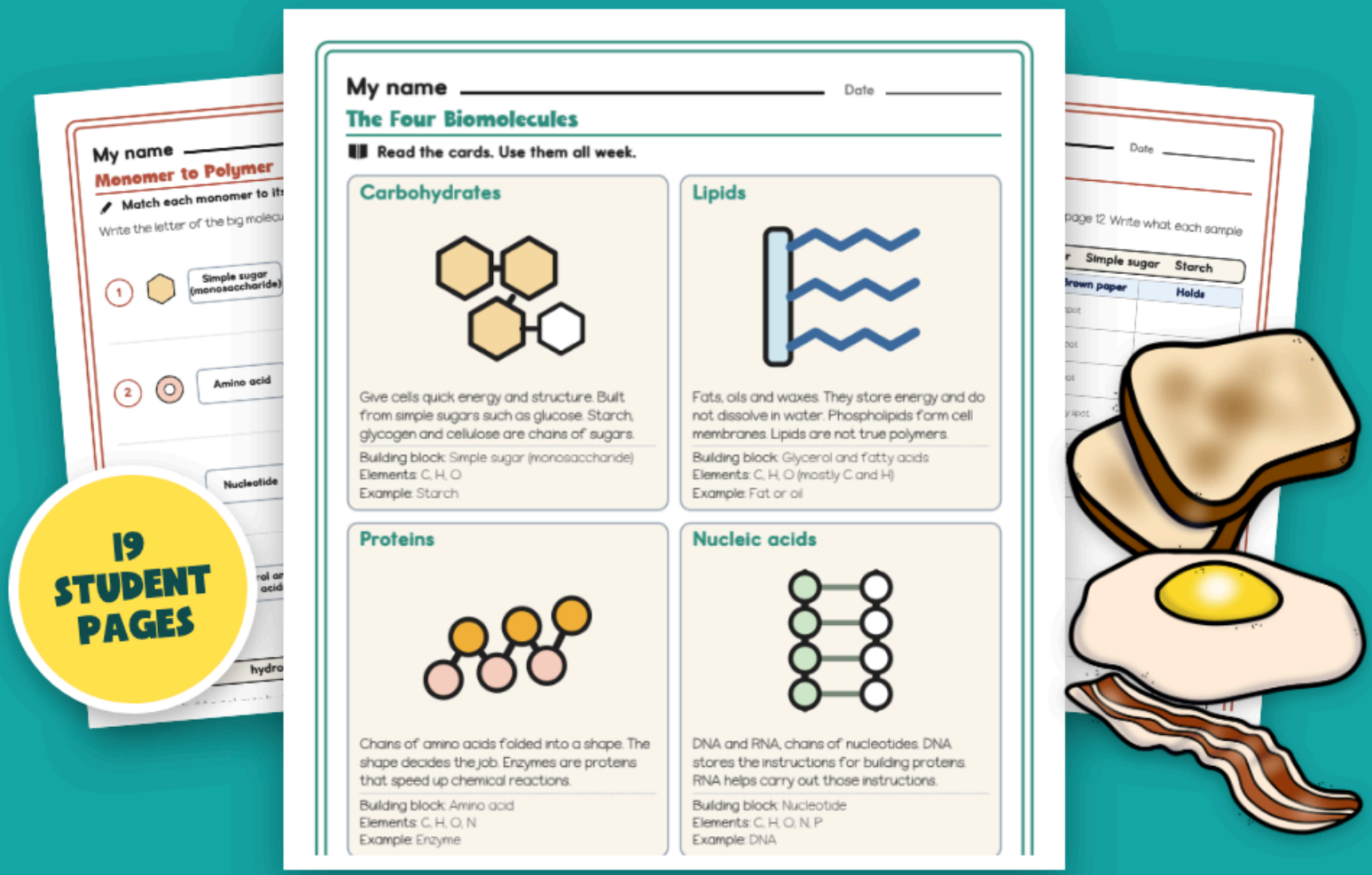
BIOMOLECULES WORKSHEETS

GRADES 9-10



19 STUDENT PAGES

Bright Path Sped

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PREVIEW

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My name _____ Date _____

Reading 1: Four Groups of Big Molecules

Read about biomolecules. Then answer.

Carbohydrates and lipids

Living things are built from four main groups of large molecules called **biomolecules**: **carbohydrates**, **lipids**, **proteins** and **nucleic acids**. Most are made the same way. Small units called **monomers** join in a chain to make a large molecule called a **polymer**. Carbohydrates give cells quick energy and structure. Their monomers are simple sugars such as **glucose**. Starch (stored by plants), glycogen (stored by animals) and cellulose (in plant cell walls) are chains of sugars. Lipids are fats, oils and waxes. They store energy, and the phospholipids in a cell membrane are lipids. Lipids do not dissolve in water. They are built from glycerol and fatty acids, but they are not true polymers.

Main idea: What is this reading mostly about?

Check what you read. Write the letter in the box.

1. What is a monomer?
   - **A** A small unit that joins with others in a chain
   - **B** A large molecule made of many chains
   - **C** A fat that does not dissolve in water

2. What is the monomer of a carbohydrate?
   - **A** An amino acid
   - **B** A simple sugar such as glucose
   - **C** A nucleotide

3. Which biomolecules form cell membranes (phospholipids)?
   - **A** Carbohydrates
   - **B** Nucleic acids
   - **C** Lipids

PREVIEW

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My name _____ Date _____

Reading 2: Proteins and Nucleic Acids

Read about proteins and nucleic acids. Then answer.

How the chains work

Proteins are polymers of **amino acids**. Cells use twenty kinds of amino acids, and the order of the amino acids decides how the chain folds. The shape decides the job. **Enzymes** are proteins that speed up chemical reactions. Other proteins build structures or carry materials. **Nucleic acids** are polymers of **nucleotides**. DNA stores the instructions for building proteins, and RNA helps carry out those instructions. All four groups contain carbon, hydrogen and oxygen. Proteins also contain nitrogen, and nucleic acids contain nitrogen and phosphorus. Together the four groups build and run a cell.

Main idea: What is this reading mostly about?

Check what you read. Write the letter in the box.

1. What is the monomer of a protein?
   - **A** An amino acid
   - **B** A nucleotide
   - **C** A simple sugar

2. What decides how a protein folds?
   - **A** The number of cells
   - **B** The order of its amino acids
   - **C** The kind of lipid

3. What does DNA do?
   - **A** Speeds up chemical reactions
   - **B** Stores energy as fat
   - **C** Stores the instructions for building proteins

PREVIEW

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My name _____ Date _____

Compare the Four Biomolecules

Fill in the chart. Use the word boxes.

Use each word box once. Write the answer in the right square.

Building block: **Amino acid** **Simple sugar (monosaccharide)** **Nucleotide** **Glycerol and fatty acids**

Elements: **C, H, O, N, P** **C, H, O (mostly C and H)** **C, H, O** **C, H, O, N**

Example: **Fat or oil** **DNA** **Starch** **Enzyme**

Main job: **Speed up reactions and build structures** **Quick energy** **Store genetic instructions** **Long-term energy storage**

Biomolecule	Building block	Elements	Example	Main job
Carbohydrates				
Lipids				
Proteins				
Nucleic acids				

Which two groups have the same elements? Which group has phosphorus?

PREVIEW

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My name _____ Date _____

Worked Example: Which Biomolecule?

Read the example. Then try one.

How to find the biomolecule

Read the clue. Find the key words. Look at the biomolecule cards (page 6) for a building block or a job that matches. Then check one other job to be sure.

Example. The clue is made up for practice.

Start	Read the clue: This molecule is a long chain of amino acids folded into a shape.
Step 1	'amino acids' and 'long chain' Look for key words.
Step 2	Proteins are chains of amino acids folded into a shape. Find a card that matches.
Step 3	Proteins Write the name.
Check	No, so it is not a nucleic acid. Is its building block a nucleotide?

Your turn. Do the same steps.

Start	Read the clue: This molecule stores a lot of energy and does not dissolve in water.
Step 1	Write the key words. _____
Step 2	Which biomolecule matches? Write its name. _____
Check	Is it built from simple sugars? ☐ yes ☐ no

PREVIEW

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My name _____ Date _____

Name That Biomolecule

Who am I? Write the name.

Some names in the bank are not used. Write the name that fits.

Cellulose	**Protein**	**Nucleic acid**	**Lipid**	**Carbohydrate**
Enzyme	**DNA**	**Starch**	**Glucose**	**Phospholipid**

1. I am a protein that speeds up a chemical reaction. _____
2. I am a chain of sugars that plants use to store energy. _____
3. I store a lot of energy and I do not dissolve in water. _____
4. I am the group of big molecules made of nucleotides. _____
5. I am a chain of sugars that makes plant cell walls strong. _____
6. I am a chain of amino acids folded into a shape. _____
7. I am the quick-energy group, built from simple sugars. _____
8. I am a nucleic acid that stores the cell's instructions. _____

Pick one clue. Tell the words that helped you.

PREVIEW

My name _____ Date _____

Read the Test Results

Read the table. Write what each sample holds.

These test results are made up for practice. Use the table on page 12. Write what each sample holds.

Lipid **Starch and protein** **Protein** **None of the four** **Simple sugar** **Starch**

Sample	Iodine	Benedict's	Biuret	Brown paper	Holds
Sample A	blue-black	blue	blue	no spot	
Sample B	yellow-brown	orange	blue	no spot	
Sample C	yellow-brown	blue	violet	no spot	
Sample D	yellow-brown	blue	blue	greasy spot	
Sample E	blue-black	blue	violet	no spot	
Sample F	yellow-brown	blue	blue	no spot	

7 Which sample holds two of the four? Write its letter. ☐

8 Which sample shows none of the four? Write its letter. ☐

9 Which sample is a lipid? Write its letter. ☐

A test shows nothing. Does that prove the sample holds no biomolecules? Tell why.

PREVIEW

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My name _____ Date _____

Find the Mistake

Find the mistake. Then fix it.

Dev is made up for practice. Each sentence has one mistake.

1 **Dev wrote:**

"Proteins are made of nucleotides."

What is wrong?

Write it the right way.

2 **Dev wrote:**

"Carbohydrates form the cell membrane."

What is wrong?

Write it the right way.

3 **Dev wrote:**

"An enzyme is a lipid that speeds up reactions."

What is wrong?

Write it the right way.

4 **Dev wrote:**

"Benedict's solution turns blue-black when starch is present."

What is wrong?

Write it the right way.

PREVIEW

My name _____ Date _____

Quiz

Pick the best answer. Write its letter.

Take your time. Guess if you are not sure.

1. Which group of biomolecules is made of amino acids?
   - **A** Proteins
   - **B** Lipids
   - **C** Carbohydrates

2. Which group stores the cell's genetic instructions?
   - **A** Proteins
   - **B** Lipids
   - **C** Nucleic acids

3. What is the main job of carbohydrates?
   - **A** Give cells quick energy
   - **B** Carry genetic instructions
   - **C** Speed up reactions

4. Iodine turns blue-black when this is present.
   - **A** Protein
   - **B** Starch
   - **C** Lipid

5. Which element do nucleic acids have that proteins do not?
   - **A** Phosphorus
   - **B** Nitrogen
   - **C** Carbon

6. Which of these are lipids?
   - **A** Starch, glycogen and cellulose
   - **B** Enzymes and DNA
   - **C** Fats, oils and waxes

PREVIEW

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My name _____ Date _____

Cut and Paste 1: Food and Job

Cut out the six pieces. Paste each one in the right box.

Read each piece. Which group of biomolecules does it tell about?

Carbohydrates	Lipids	Proteins

PREVIEW

Cut on the dashed lines: six pieces, one cut across and two cuts down.

Bread, rice and pasta (starch)	Butter, olive oil and nuts	Eggs, beans and meat
Builds muscle and makes enzymes	Gives cells quick energy	Stores a lot of energy and forms membranes

Which piece was hardest to place? Why?

My name _____ Date _____

Cut and Paste 3: Test Colors

Cut out the six pieces. Paste each one in the right box.

Read each piece. Which test does it tell about?

Iodine	Benedict's	Biuret

Cut on the dashed lines: six pieces, one cut across and two cuts down.

Blue changes to green, yellow, orange or red	Blue changes to violet or purple	Yellow-brown changes to blue-black
Shows that starch is present	Shows that protein is present	Shows that simple sugar is present

Which piece did you move? Why?

PREVIEW

Answer Key: Chart, Worked Example, Tests

The test results on page 13 are invented for practice. Sample letters match the table.

Compare the Four Biomolecules page 7

Group	Building block	Elements	Example	Main job
Carbohydrates	Simple sugar (monosaccharide)	C, H, O	Starch	Quick energy
Lipids	Glycerol and fatty acids	C, H, O (mostly C and H)	Fat or oil	Long-term energy storage
Proteins	Amino acid	C, H, O, N	Enzyme	Speed up reactions and build structures
Nucleic acids	Nucleotide	C, H, O, N, P	DNA	Store genetic instructions

Worked Example: your turn page 9

Step	Answer
Step 1 key words	stores a lot of energy / does not dissolve in water
Step 2 biomolecule	Lipids
Check	No: carbohydrates are built from simple sugars. This clue never mentions sugar.

Indicator Tests page 12

Result	What it shows
1. Iodine turns blue-black	Starch
2. Benedict's solution turns brick red	Simple sugar
3. Biuret solution turns purple	Protein
4. The brown paper shows a greasy spot	Lipid
5. Iodine stays yellow-brown	No starch
6. Biuret solution stays blue	No protein

Read the Test Results page 13

Sample or item	Answer
Sample A	Starch
Sample B	Simple sugar
Sample C	Protein
Sample D	Lipid
Sample E	Starch and protein
Sample F	None of the four
7. Which sample holds two of the four?	E
8. Which sample shows none of the four?	F
9. Which sample is a lipid?	D

Lipids in the chart

Lipids are not true polymers: they are built from glycerol and fatty acids, so the chart gives those two as the building block. Accept "fatty acids" for the lipid building block. The element answers for carbohydrates and lipids both start with C, H, O.

PREVIEW

Answer Key: Sorts and Writing

Pieces are named by their row and column in the cutting grid, left to right and top to bottom.

Cut and Paste 1: Food and Job page 20

Piece (row, column)	Box
r1 c1: Bread, rice and pasta (starch)	Carbohydrates
r1 c2: Butter, olive oil and nuts	Lipids
r1 c3: Eggs, beans and meat	Proteins
r2 c1: Builds muscle and makes enzymes	Proteins
r2 c2: Gives cells quick energy	Carbohydrates
r2 c3: Stores a lot of energy and forms membranes	Lipids

Cut and Paste 2: Building Blocks page 21

Piece (row, column)	Box
r1 c1: Glucose and fructose	Simple sugars
r1 c2: Joined in a chain to make a protein	Amino acids
r1 c3: Each has a sugar, a phosphate and a base	Nucleotides
r2 c1: Twenty kinds are used by cells	Amino acids
r2 c2: Joined in a chain to make starch	Simple sugars
r2 c3: Joined in a chain to make DNA or RNA	Nucleotides

Cut and Paste 3: Test Colors page 22

Piece (row, column)	Box
r1 c1: Blue changes to green, yellow, orange or red	Benedict's
r1 c2: Blue changes to violet or purple	Biuret
r1 c3: Yellow-brown changes to blue-black	Iodine
r2 c1: Shows that starch is present	Iodine
r2 c2: Shows that protein is present	Biuret
r2 c3: Shows that simple sugar is present	Benedict's

Short answers: what to look for page 16

Item	Look for
16.1	A monomer is a small unit and a polymer is a large molecule made of many monomers. Any correct pair, such as a simple sugar and starch, an amino acid and a protein, or a nucleotide and DNA.
16.2	Each group does a different job: carbohydrates give quick energy, lipids store energy and form membranes, proteins speed up reactions and build structures, nucleic acids store instructions. Accept any two correct jobs.
16.3	It holds protein. It shows no starch.

Exit tickets

- Page 18: ticket 1 names the four groups with a correct job for each; ticket 2 picks one group with its building block and an example; ticket 3 is open.

PREVIEW

Class Progress Grid

Every student on one grid: items right by kind of sheet.

Class or group _____ Month _____

Student	Readings (of 6)	Words (of 6)	Chart (of 16)	Matching (of 16)	Tests (of 15)	True or false (of 6)	Mistakes (of 4)	Quiz (of 6)	Sorts (of 18)

PREVIEW

How to fill this in

For each column, add up how many items that student has right with no prompt (the tracker rows). One glance across a row shows which skill is easiest and which is next.

Grouping for small-group time

Students low in Readings, Words or the Chart need the readings, the four cards and the worked example first (pages 4 to 9). Students low in Tests need pages 12 and 13 again. Students near full marks can move to the mistakes, the quiz and the sorts (pages 15, 17 and 20 to 22).

Biomolecules at Home

Dear family, this week we are learning the science words for the big molecules in living things. These questions are for talking, not for a grade. They are about the science words, not about what anyone should eat.

Student _____ Week of _____

Three things to talk about

- Ask your student to name the four groups of biomolecules and tell one job of each. Short answers are fine.
- Ask: what is the difference between a monomer and a polymer? (A monomer is a small unit. A polymer is a long chain of them.)
- Ask: what color does iodine turn when starch is present? (Blue-black.)

My words from home

A group of biomolecules I know _____

Its building block _____

One example _____

Words that may come up

Biomolecule: a large molecule that living things build and use. **Monomer:** a small unit that joins with others. **Polymer:** a large molecule made of many monomers. **Enzyme:** a protein that speeds up a chemical reaction. **Nucleotide:** the building block of DNA and RNA.

Note from the teacher

Note from home

PREVIEW

Binder Cover

Slide this into the front of a binder. The divider tabs and a spine label to cut out are on the next page (page 33).

Biology - Grades 9-10

BIOMOLECULES

Carbohydrates, Lipids, Proteins and Nucleic Acids

Read | **Compare** | **Test**

Teacher _____

Class or student _____

PREVIEW