Fuel for Flight

How four biomolecule groups help a bird survive migration

FB.2.6 "Explain the role of the major biomolecules (carbohydrates, proteins -including enzymes, lipids, and nucleic acids) to the survival of living organisms."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one survival job for each of the four biomolecule groups. Number the groups in the order they first appear to trace their roles through the bird's journey.

A Night in the Air

(1) At dusk, a small songbird leaves a coastal marsh and flies through the night. Its wing muscles need a steady supply of energy. Carbohydrates from seeds and berries are broken into sugars, which cells can use to release energy. The bird also stores some sugar as glycogen, a carbohydrate it can draw on when food is scarce. Yet a long flight needs more than its limited glycogen supply. Before migration, the bird builds up fat. These lipids store a large amount of energy for their mass, helping fuel hours of flight without another meal.

(2) Energy alone cannot keep the bird alive. Each wingbeat depends on muscle proteins that help fibers contract. Proteins also act as enzymes, molecules that speed up chemical reactions in cells. Digestive enzymes break food into smaller molecules that the bird can absorb, while other enzymes help cells release usable energy from fuel. As it grows new feathers, the bird needs proteins to build them. Lipids have a second job beyond storing fuel: phospholipids form much of the thin membranes around cells. These membranes help keep the inside of each cell separate from its surroundings.

(3) How does the bird make the proteins it needs? Its cells contain DNA, a nucleic acid that stores instructions for building proteins. When a cell needs a particular protein, it makes an RNA copy of the relevant instructions. Ribosomes use that RNA to assemble amino acids in the correct order. The finished protein might strengthen a muscle or act as an enzyme that helps process food. Before cells divide, DNA is copied so new cells receive the instructions they need. Together, nucleic acids and the other biomolecules support movement, maintenance, and survival during the long journey.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do carbohydrates help the bird during flight, and why might their stored supply run out?

2. Explain two different ways lipids help the bird survive.

3. How do proteins help the bird move and obtain usable energy from food?

4. How do DNA and RNA help the bird make a protein it needs?

3 YOUR TURN

Your own words

A young fox eats a meal, then goes without food for a day while a small cut heals. In four or five sentences, explain how carbohydrates, lipids, proteins, including enzymes, and nucleic acids work together to help it survive.

Fuel for Flight

PART 1 · READ AND MARK

Underline one survival job for each of the four biomolecule groups. Number the groups in the order they first appear to trace their roles through the bird's journey. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do carbohydrates help the bird during flight, and why might their stored supply run out?	**Cells use sugars from carbohydrates to release energy, and the bird can draw on stored glycogen. Its glycogen supply is limited, so it may not last through a long flight.**
2	Explain two different ways lipids help the bird survive.	**Stored fat provides energy for a long flight. Phospholipids form much of the membranes that separate the inside of cells from their surroundings.**
3	How do proteins help the bird move and obtain usable energy from food?	**Muscle proteins help fibers contract. Protein enzymes break down food for absorption and speed reactions that help cells release usable energy.**
4	How do DNA and RNA help the bird make a protein it needs?	**DNA stores the instructions for the protein. An RNA copy carries the relevant instructions to ribosomes, which assemble amino acids in the correct order.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

After a meal, the fox breaks down carbohydrates into sugars that its cells use to release energy. When food runs out, stored lipids provide fuel, while phospholipids help form cell membranes. Proteins help the fox move, and digestive enzymes break down its food. DNA holds instructions for making proteins, and RNA carries those instructions to ribosomes. The ribosomes assemble proteins that can help the fox repair tissue near the cut.

Accept accurate explanations that connect each biomolecule group to a survival need. For the open task, look for an enzyme's role and a clear link from DNA through RNA to protein production.