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Week 3: Cells & Genetics

Module 3: DNA & Proteins

Lesson: From Instructions to Illness: Solving a Genetic Case

Lesson Overview

Students investigate how DNA controls protein production and how changes in DNA can lead to health problems. They use evidence to trace a cause-and-effect chain from DNA to observable symptoms in the body.

Learning Targets

Explain how DNA provides instructions for proteins.

Describe how proteins affect body function.

Use evidence to explain how a change in DNA leads to a health problem.

Vocabulary

DNA
instructions for building proteins

Protein
molecules that perform jobs in the body

Amino acids
building blocks of proteins

Mutation
a change in DNA instructions

Gene
a section of DNA that codes for a protein

Materials

Module
Case scenario (newborn PKU case)
Student notebooks or case worksheet

Instructional Notes

This lesson builds on students' understanding that cells control body function by introducing the role of DNA in protein production. Emphasize the cause-and-effect relationship between DNA, proteins, and health outcomes rather than memorization of terms. Students may initially believe symptoms come directly from organs or behaviors. Guide them toward understanding the underlying molecular cause.

Learning Experience		
8 min	Opening	Present the case: "A newborn appears healthy, but tests show a dangerous chemical building up in the body." Ask students to use what they already know to determine what might be causing the problem. Students: Select one explanation and write one reason supporting their choice. Turn to a partner and compare responses. Work with a small group to agree on one explanation. Prepare to defend the group's reasoning. Sentence Frame: "I think the cause is _____ because _____, which means _____."
15 min	Module	**Focus**: How do instructions in DNA affect our health? **Guiding Questions**: • What role does DNA play in the body? • How are proteins built? • Why does protein shape matter? • What happens when DNA changes?
15 min	Application	Return to the case. Say: "Now that you have scientific evidence, your job is to solve the case. Use what you learned to explain what is causing the problem and support your explanation with evidence." Students: **Step 1: Review the Case** Revisit the case details. Identify what is known and what is still unknown. **Step 2: Connect to Learning** Select at least two pieces of evidence from the module. Use the evidence to evaluate possible explanations. **Step 3: Build the Cause Chain** Complete the sequence: DNA → Gene → Protein → Body Process → Symptom Identify how the problem moves through the system. **Step 4: Explain Reasoning** Write a complete explanation using evidence. Sentence Frames: "A mutation changes _____." "This changes the _____ of the protein." "As a result, the protein cannot _____." "This causes _____ in the body." Final Claim: "The most accurate explanation is _____ because _____."

2 min	Reflection	Where in the cause chain did the problem begin, and how did that small change eventually lead to the symptom seen in the newborn? Sentence Frame: "The problem began at _____. This affected _____, which eventually caused _____."
2 min	Career Connections	Doctors and scientists use the same type of reasoning when investigating genetic conditions. They often work backward from symptoms to identify problems in proteins, genes, or DNA. By tracing evidence through a biological system, health science professionals can diagnose diseases, explain causes, and develop treatments. This type of thinking is used in genetics, medicine, and biomedical research careers.