

DNA to Work

Trace evidence from DNA information to specialized cell activity.

HS-LS1-1 "Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline statements that link DNA base order or DNA use to protein structure, then to specialized cell activity or larger life functions. Number the links 1, 2, and 3 in chain order, and circle the observations scientists use as evidence.

A Chain of Evidence

- ① Inside nearly every cell, DNA is arranged as a long molecule with two matching strands. Its structure includes an order of chemical bases, often described by the letters A, T, C, and G. The order matters because it stores instructions. Evidence from comparing DNA sequences shows that a difference in base order can be linked to a difference in a protein made by cells. A cell uses the information in a DNA section to build a protein with a particular structure. That structure helps determine what the protein can do in the cell.
- ② Cells in a multicellular organism share the same complete DNA, yet they do not all use the same DNA instructions at the same time. During development and daily life, a cell can use certain DNA sections more than others. As a result, it builds a particular set and amount of proteins. Evidence for this connection comes from finding different protein patterns in cells that have different roles, even when their DNA is the same. The proteins present help each cell carry out its specialized work. Groups of specialized cells work together, so their protein-based activities support larger life functions.
- ③ Scientists test this explanation by looking for patterns and by changing one part of the chain. If a DNA base order differs, researchers can check whether the protein structure also differs and whether cell activity changes. When these changes occur together in repeated observations, they support a cause-and-effect explanation. The evidence does not mean that one DNA change always produces the same result in every situation. Other DNA sections and conditions can affect which instructions a cell uses. Still, the consistent chain, DNA information, protein structure, cell activity, provides evidence that DNA structure helps organize life functions through specialized cells.

2 ANSWER WITH EVIDENCE Use the passage

1 How does the passage connect the order of DNA bases to the structure of a protein?

2 What two changes do scientists compare when they test whether a difference in DNA base order affects cell activity?

3 Why can specialized cells have different protein patterns even though they contain the same complete DNA?

4 Why do repeated observations of DNA differences, protein structure differences, and cell activity changes support a cause-and-effect explanation?

3 YOUR TURN Your own words

A study finds that two groups of specialized cells contain the same DNA. Group A uses DNA section R more often and has more protein Q than Group B. In samples with a changed base order in section R, protein Q has a different structure and Group A's activity differs. Write exactly three sentences that construct an evidence-based explanation linking DNA structure, protein structure, and specialized cell activity. Refer to at least two observations from the study.

PART 1 • READ AND MARK

Underline statements that link DNA base order or DNA use to protein structure, then to specialized cell activity or larger life functions. Number the links 1, 2, and 3 in chain order, and circle the observations scientists use as evidence. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How does the passage connect the order of DNA bases to the structure of a protein?	The order of DNA bases stores instructions, and a cell uses information in a DNA section to build a protein with a particular structure.
2	What two changes do scientists compare when they test whether a difference in DNA base order affects cell activity?	They check whether the protein structure differs and whether cell activity changes.
3	Why can specialized cells have different protein patterns even though they contain the same complete DNA?	They can use certain DNA sections more than others, so they build different sets and amounts of proteins.
4	Why do repeated observations of DNA differences, protein structure differences, and cell activity changes support a cause-and-effect explanation?	When the changes occur together repeatedly, they provide evidence that a change in DNA information is linked to protein structure and cell activity.

PART 3 • YOUR TURN (SAMPLE ANSWER)

The shared DNA shows that differences between the groups can result from using different DNA sections, not from having different complete DNA. Group A uses section R more often and has more protein Q, so the information in that section is connected to the proteins present in its specialized cells. The changed base order, different protein structure, and changed cell activity together support the explanation that DNA structure affects protein structure and cell activity.

Accept explanations that accurately connect DNA base order or DNA section use to protein structure or amount, then to specialized cell activity. Students should cite at least two study observations and avoid claiming that one DNA change always causes the same result in every situation.