

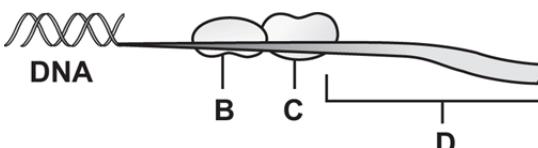
Quiz: Gene Expression and Regulation

Read each question. Circle the letter of the correct answer.

1. What is the term given to the chemical compounds in eukaryotes, which help to regulate gene expression?
 - A. operon
 - B. promoter
 - C. epigenome
 - D. transcription factor

 2. Transcription, which is a stage of gene expression, is the process by which genetic information encoded in DNA is transferred to a(n) _____.
 - A. RNA molecule
 - B. DNA molecule
 - C. tRNA molecule
 - D. uracil molecule

 3. In bacteria, a group of genes that code for functionally related enzymes, their promoter site, and the operator that controls them all function together as a(n) _____.
 - A. exon
 - B. intron
 - C. operon
 - D. ribosome

 4. Refer to the illustration.
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- The diagram illustrates the lac operon. A double-stranded DNA molecule is shown with a transcription start site indicated by a bracket labeled 'D'. Two regulatory proteins, represented by grey ovals, are positioned above the DNA. One protein is labeled 'B' and the other 'C'. Protein B is located closer to the start site than protein C.
- Where on the lac operon does transcription take place?
- A. B
 - B. C
 - C. D
 - D. regulator
5. The function of an operator is to _____.
 - A. turn on and off the molecules of tRNA
 - B. generate amino acids for protein synthesis
 - C. regulate access of RNA polymerase to specific genes
 - D. control the process of transcription within the nucleus

 6. If an organism's cells all contain the same DNA, why does one cell become bone while another cell becomes lung tissue?
 - A. Mitosis results in cells that are different from one another.
 - B. Cells differentiate between genes and use only certain ones.
 - C. When DNA is copied, different strands get different instructions.
 - D. The DNA undergoes a series of mutations during early development.

 7. What is the main function of a promoter?
 - A. tells RNA polymerase where to start
 - B. blocks the action of RNA polymerase
 - C. keeps eukaryote genes permanently "off"
 - D. codes for enzymes that break down sugar

 8. Which of these could not affect the final outcome of gene expression?
 - A. the presence of other cells
 - B. the environment of the cells
 - C. the timing of gene expression
 - D. the number of amino acids in the protein being produced

9. Cells must control gene expression so that _____.

- A. genetic disorders can be corrected
- B. their genes will never be expressed
- C. their genes will always be expressed
- D. their genes will be expressed only when needed

10. In prokaryotes, gene expression is regulated by controlling _____.

- A. processing
- B. translation
- C. replication
- D. transcription

Read each statement. Write your answer on the lines.

11. Give an example of an external factor that regulates gene expression and explain how it works.

12. Describe the physical structure of the *lac* operon.

13. What are exons and introns and how are they dealt with in the cell?

14. Why are operons so well-suited for the control of gene expression in bacteria?

15. How do eukaryotic organisms regulate the process of translation?
