7.4 True or False

Write true if the statement is true or false if the statement is false.

_____ 1. In your body, different types of cells have different genes.

_____ 2. Using a gene to make a protein is called protein expression.

_____ 3. A regulatory element is located on the DNA.

_____ 4. An operon is a region of prokaryotic DNA.

_____ 5. lacX, lacY, lacZ, and lacA are genes for the four proteins needed to digest lactose.

_____ 6. Essentially, regulatory proteins must turn “on” certain genes in particular cells.

_____ 7. In prokaryotic cells, RNA polymerase binds to the operator.

_____ 8. Repressors promote transcription by enhancing the interaction of RNA polymerase with the promoter.

_____ 9. The ATAT box is a regulatory element that is part of the promoter of most eukaryotic genes.

_____ 10. Because of a mutation, it is possible for a fly to have legs growing out of its head.

_____ 11. Mutations in some regulatory genes can cause cancer.

_____ 12. In eukaryotic gene regulation, regulatory proteins must bind to the regulatory elements before RNA polymerase binds to the promoter.

_____ 13. In the lac operon, when lactose is absent, the repressor protein does not bind to the operator.

_____ 14. Homeobox genes code for regulatory proteins that switch on whole series of major developmental genes.

_____ 15. In your body, different types of cells use different genes.
7.4 Multiple Choice
Circle the correct choice.

1. Using a gene to make a protein is called
   protein expression.
   gene expression.
   gene regulation.
   protein synthesis.

2. Gene expression is regulated
   to ensure that all cells make the same proteins.
   to ensure that the correct proteins are made from the right genes.
   to ensure that the correct proteins are made in the cells in which they are needed.
   to ensure that all cells only use some genes.

3. Which of the following statements concerning the lac operon is correct?
   When lactose is present, the repressor protein binds to the operator.
   When lactose is absent, a repressor protein binds to the operator.
   When lactose is absent, a repressor protein binds to the promoter.
   When lactose is present, the repressor protein binds to the promoter.

4. Gene regulation during development involves
   homeobox genes.
   proto-oncogenes and tumor-suppressor genes.
   the lac operon.
   all of the above

5. Which three factors are involved in eukaryotic gene regulation?
   regulatory proteins, regulatory elements, and activators
   regulatory proteins, operator, and promoter
   regulatory proteins, regulatory elements, and RNA polymerase
   regulatory proteins, regulatory elements, and enhancers

6. Which of the following statements is correct?
   (1) Activators promote transcription by enhancing the interaction of RNA polymerase with the promoter.
   (2) Repressors promote transcription by enhancing the progress of RNA polymerase along the DNA strand.
   (3) Repressors prevent transcription by impeding the progress of RNA polymerase along the DNA strand.
   (4) Activators prevent transcription by impeding the interaction of RNA polymerase with the promoter.
   1 and 3
   2 and 4
   1 only
   All 4 statements are correct.

7. Which statement best describes the TATA box?
   The TATA box is a regulatory element that is part of the promoter of most prokaryotic genes.
   The TATA box is a regulatory element that is part of the promoter of most eukaryotic genes.
   The TATA box is a regulatory protein that binds to the promoter of most eukaryotic genes.
   The TATA box is a regulatory protein that binds to the promoter of most prokaryotic genes.
   Which of the following statements is correct?
7.4 Vocabulary I

Match the vocabulary word with the proper definition.

Definitions

_____ 1. using a gene to make a protein

_____ 2. regulatory region of DNA located near the promoter

_____ 3. a region of prokaryotic DNA that consists of one or more genes that encode the proteins needed for a specific function and their regulatory regions

_____ 4. when inactivated leads to tumor formation and cancer

_____ 5. enzyme that transcribes DNA to mRNA

_____ 6. code for regulatory proteins that switch on whole series of major developmental genes

_____ 7. protein that binds to regulatory region on DNA

_____ 8. a regulatory element that is part of the promoter of most eukaryotic genes

_____ 9. promotes transcription by enhancing the interaction of RNA polymerase with the promoter.

_____ 10. region of a gene where RNA polymerase binds

_____ 11. gene for a regulatory protein that controls the cell cycle

_____ 12. consists of a promoter, an operator, and three genes that encode the enzymes needed to digest lactose

Terms

a. activator
b. gene expression
c. homeobox genes
d. lac operon
e. operon
f. promoter
g. proto-oncogene
h. regulatory element
i. regulatory protein
j. RNA polymerase
k. TATA box
l. tumor-suppressor gene
Fill in the blank with the appropriate term.

1. The ____________ is a region of an operon where regulatory proteins bind.

2. Transcription is partly controlled by ____________ proteins.

3. Using a gene to make a protein is called ____________ expression.

4. RNA ____________ is the enzyme that transcribes DNA to mRNA.

5. The ____________ box is a regulatory element that is part of the promoter of most eukaryotic genes.

6. Regulatory proteins bind to regions of DNA, called regulatory ____________.

7. Gene expression is regulated to ensure that the correct ____________ are made.

8. Mutations in tumor-suppressor genes can cause ____________.

9. Homeobox genes regulate ____________.

10. Activators ____________ transcription.

11. Repressors ____________ transcription.

12. An ____________ is a region of DNA that consists of one or more genes that encode the proteins needed for a specific function.