

Skills Worksheet

Active Reading**Section: From Genes to Proteins**

Read the passage below. Then answer the questions that follow.

Like DNA, **ribonucleic acid (RNA)** is a nucleic acid—a molecule made of nucleotides linked together. RNA differs from DNA in three ways. First, RNA consists of a single strand of nucleotides instead of the two strands found in DNA. Second, RNA nucleotides contain the five-carbon sugar ribose rather than the sugar deoxyribose found in DNA nucleotides. And third, RNA has a nitrogen base called **uracil**—abbreviated as *U*—instead of the base thymine (T) found in DNA. No thymine (T) bases are found in RNA. Like thymine, uracil is complementary to adenine whenever RNA base-pairs with another nucleic acid.

SKILL: RECOGNIZING SIMILARITIES AND DIFFERENCES

Read each question, and write your answer in the space provided.

1. In the spaces provided, write *D* if the statement is true of DNA. Write *R* if the statement is true of RNA. Write *B* if the statement is true of both DNA and RNA.

- _____ a. consists of a single strand of nucleotides
- _____ b. made of nucleotides linked together
- _____ c. contains deoxyribose
- _____ d. has the nitrogen base uracil
- _____ e. contains ribose
- _____ f. is a nucleic acid
- _____ g. consists of a double strand of nucleotides
- _____ h. contains a base that pairs with adenine

An analogy is a comparison. In the space provided, write the letter of the term or phrase that best completes the analogy.

- _____ 2. RNA is to *U* as DNA is to
- a. *C*
 - b. *G*
 - c. *T*
 - d. *A*

Answer Key

Directed Reading

SECTION: FROM GENES TO PROTEINS

1. b
2. e
3. d
4. c
5. a
6. RNA polymerase
7. RNA
8. nucleus
9. Transcription makes RNA molecules, and DNA replication makes copies of DNA molecules. Also, in DNA replication, both strands of DNA are used as templates. In transcription, only one strand is used as a template.
10. Transcription begins at a gene's promoter, a specific sequence of DNA that acts as a "start" signal for a gene that is to be transcribed. Transcription ends at a sequence of bases that acts as a "stop" signal.
11. RNA is a type of nucleic acid. Messenger RNA is a form of RNA that carries the instructions for making a protein from a gene to the site of translation.
12. Codons are sequences of three nucleotides in an mRNA molecule that correspond to particular amino acids. The genetic code is the amino acids and "stop" and "start" signals coded for by mRNA codons.
13. 2
14. 6
15. 4
16. 3
17. 5
18. 1

SECTION: GENE REGULATION AND STRUCTURE

1. enzymes
2. promoter
3. operator
4. operon
5. *lac* operon
6. repressor

7. An enhancer is a sequence of DNA that can be bound by a transcription factor and thus influence transcription although it is located thousands of nucleotide bases away from the promoter.
8. A nuclear membrane separates transcription from translation in eukaryotes.
9. Gene expression is more complex in eukaryotes, and genes with related functions are often scattered on different chromosomes.
10. before, during, and after transcription and after mRNA leaves the nucleus or after the protein is functional
11. Introns are long segments of nucleotides in eukaryotic genes that have no coding information. Exons are the portions of a eukaryotic gene that are translated into proteins.
12. The mRNA that contains introns becomes smaller when enzymes cut out the introns and "stitch" the exons back together.
13. Introns might add evolutionary flexibility because each exon encodes a different part of the protein and cells can shuffle exons between genes, which makes new genes.
14. gametes
15. point
16. substitution
17. deletion
18. insertion

Active Reading

SECTION: FROM GENES TO PROTEINS

1. a. R e. R
 b. B f. B
 c. D g. D
 d. R h. B
2. c