

Chapter

11

DNA and Genes

Chapter Assessment

Reviewing Vocabulary

From the words provided in the list, write the one that best completes each of the following statements. Use these choices:

mRNA

nitrogenous bases

frameshift mutation

point mutation

tRNA

translation

codon

double helix

chromosomal mutation

replication

nondisjunction

cancer

- During the process of transcription, DNA serves as the template for making mRNA, which leaves the nucleus and travels to the ribosomes.
- A frameshift mutation involves the addition or deletion of a single base in a DNA molecule.
- Watson and Crick developed the double helix model of DNA.
- Thymine, adenine, guanine, and cytosine are Nitrogenous Bases.
- The process by which DNA makes a copy of itself is called Replication.
- Each set of three nitrogenous bases representing an amino acid is referred to as a codon.
- tRNA brings amino acids to the ribosomes for the assembly of proteins.
- A change in a single base pair of the DNA molecule is called a point mutation.
- Nondisjunction is the failure of a pair of homologous chromosomes to separate properly during meiosis.
- The process of converting RNA code into an amino acid sequence is called translation.
- When parts of chromosomes are broken off and lost or reattached incorrectly during mitosis or meiosis, the result is a chromosomal mutation.
- Mutations in DNA can result in cells reproducing rapidly, producing the disease called cancer.

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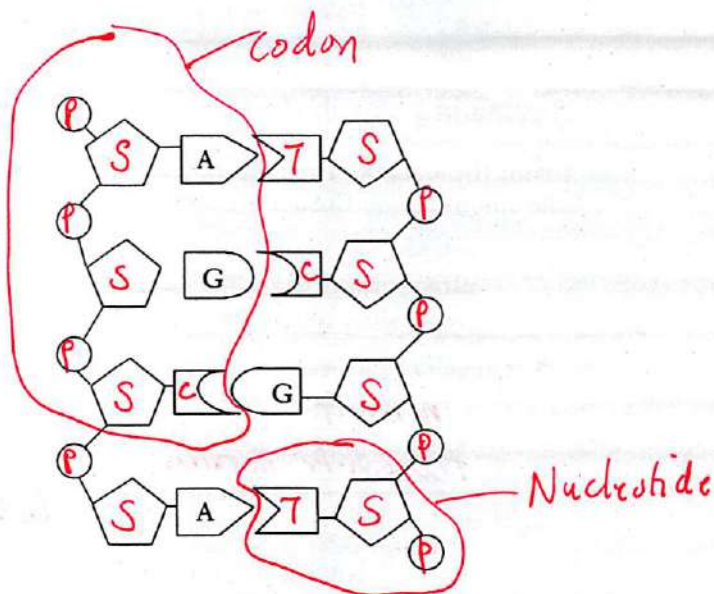
DNA and Genes, continued

Chapter Assessment

Understanding Main Ideas (Part A)

In the diagram, label the strand of DNA represented.

1. Use the letter **P** to label all of the phosphate groups.
2. Use an **S** to label all the sugar molecules.
3. For labeling the nitrogenous bases, use a **T** for thymine and a **C** for cytosine. Guanine and adenine have been filled in for you.
4. Circle and label a codon.
5. Circle and label a nucleotide.



In the space at the left, write the letter of the word or phrase that best completes the statement or answers the question.

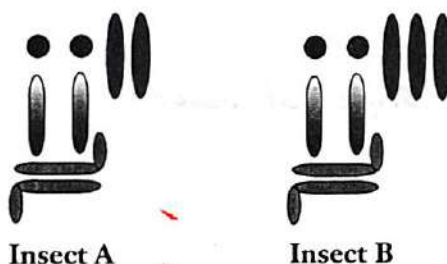
- D 6. X rays, ultraviolet light, and radioactive substances that can change the chemical nature of DNA are classified as
- a. growth regulators.
 - b. metamorphic molecules.
 - c. hydrolytic enzymes.
 - d. mutagens.
- C 7. An RNA molecule is a polymer composed of subunits known as
- a. polysaccharides.
 - b. ribose molecules.
 - c. nucleotides.
 - d. uracil molecules.
- A 8. The hereditary information for a particular trait is generally
- a. controlled by alleles located on chromosomes.
 - b. controlled by chromosomes located on an allele.
 - c. carried from the nucleus by tRNA to the gamete.
 - d. coded for by a ribosome located on the reticulum.
- B 9. Which series is arranged in order from largest to smallest in size?
- a. chromosome, nucleus, cell, DNA, nucleotide
 - b. cell, nucleus, chromosome, DNA, nucleotide
 - c. nucleotide, chromosome, cell, DNA, nucleus
 - d. cell, nucleotide, nucleus, DNA, chromosome
- C 10. A DNA nucleotide may be made up of a phosphate group, along with
- a. deoxyribose sugar and uracil.
 - b. ribose sugar and adenine.
 - c. deoxyribose sugar and thymine.
 - d. ribose sugar and cytosine.

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DNA and Genes, continued
Chapter Assessment
Understanding Main Ideas (Part B)

In the space at the left, write the letter of the word or phrase that best completes the statement or answers the question.

 A

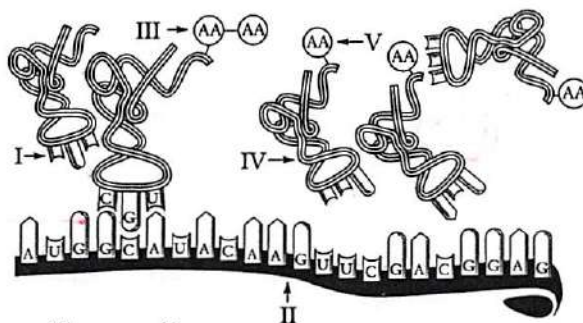
1. The diagram labeled **Insect A** represents the chromosomes taken from the body cell of a normal female insect. The diagram labeled **Insect B** represents those taken from the body cell of a female of the same species but with an abnormal phenotype.



The chromosomal alteration seen in Insect B could have resulted from

- ☒ a. nondisjunction ☐ b. crossing over.
☐ c. a frameshift mutation. ☐ d. a point mutation.

Refer to the diagram below to answer questions 2–5.


 A

2. The process illustrated is

- ☒ a. translation. ☐ b. replication. ☐ c. monoploidy. ☐ d. transcription.

 B

3. Structure III represents a(n)

- ☐ a. gene. ☒ b. amino acid. ☐ c. codon. ☐ d. DNA molecule.

 A

4. Which of the above structures are composed of RNA?

- ☒ a. II and IV ☐ b. III and IV ☐ c. I and V ☐ d. III and V

 C

5. Where in the cell does this process occur?

- ☐ a. in the nucleus ☐ b. in food vacuoles
☒ c. at the ribosomes ☐ d. within the plasma membrane

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DNA and Genes, *continued*

Chapter Assessment

Thinking Critically

For each set of terms in questions 1–3, complete the analogy by writing the appropriate term in the space provided. Then explain why you chose the term.

1. adenine: thymine :: guanine: cytosine

2. DNA: RNA :: double-stranded: single-stranded

3. translation: protein :: transcription: mRNA

translation produces protein

transcription produces mRNA

In the blank at the left, write the letter of the term that best completes the statement.

B

4. Applicants for the first job, "Positions Available," could qualify if they were

a. DNA. b. rRNA. mRNA
c. tRNA. a. rRNA. tRNA

C

5. Applicants for the second job, "Accuracy and Speed," could qualify if they were

a. DNA. b. mRNA.
c. tRNA. d. rRNA.

A

6. Applications for the third job, "Executive Position," could qualify if they were

a. DNA. b. mRNA.
c. tRNA. d. rRNA.

B

7. Applicants for the fourth job, "Supervisor," could qualify if they were

a. DNA. b. mRNA.
c. tRNA. d. rRNA.

Help Wanted

Positions Available in the genetics industry. Hundreds of entry-level openings for tireless workers. No previous experience necessary. Must be able to transcribe code in a nuclear environment. The ability to work in close association with ribosomes is a must. mRNA.

Accuracy and Speed vital for this job in the field of translation. Applicants must demonstrate skills in transporting and positioning amino acids. Salary commensurate with experience. tRNA

Executive Position available. Must be able to maintain genetic continuity through replication and control cellular activity by regulation of enzyme production. Limited number of openings. All benefits.

Supervisor of production of proteins—all shifts. Must be able to follow exact directions from double-stranded template. Travel from nucleus to the cytoplasm is additional job benefit.