

BIOLOGY CH 10 GENETICS WORKSHEETS - ANSWERS

Section 10-1

VOCABULARY REVIEW

1. A purine is a nitrogen-containing base with two rings of carbon and nitrogen atoms. Examples may include adenine or guanine.
2. A pyrimidine is a nitrogen-containing base with one ring of carbon and nitrogen atoms. Examples may include cytosine or thymine.
3. A complementary base-pair is a pair of nitrogen-containing bases connected to each other by hydrogen bonds. Examples may include adenine-thymine and cytosine-guanine.
4. one of three molecules that constitutes a nucleotide

MULTIPLE CHOICE

1. c 2. d 3. a 4. b 5. b

SHORT ANSWER

1. The three parts are a deoxyribose sugar, a phosphate group, and a nitrogen-containing base. The phosphate group and the base are connected to different parts of the sugar.
2. Since guanine and cytosine are complementary, another 15% of the nucleotides must contain cytosine. The remaining 70% of the nucleotides (100%–30%) must contain adenine and thymine in equal proportions (35% each), since they are complementary to each other.
3. Producing exact copies ensures that when a cell divides, the offspring cells will receive the same genetic information.
4. The hydrogen bonds break easily, making it easier for the two strands in the molecule to separate during replication. The strong covalent bonds ensure that the sequence of nucleotides remains fixed in each strand.

STRUCTURES AND FUNCTIONS

- a, deoxyribose; b, guanine; c, adenine; d, phosphate group

Section 10-2

VOCABULARY REVIEW

1. mRNA carries genetic information from the DNA in the nucleus to the cytosol of a eukaryotic cell.
2. tRNA is a chain of RNA nucleotides that are folded into a hairpin shape and can bind to a specific amino acid.
3. Transcription is the process by which genetic information is copied from DNA to RNA.
4. A promoter is a region of DNA that marks the beginning of the DNA chain that is to be transcribed.

MULTIPLE CHOICE

1. c 2. d 3. a 4. b 5. d

SHORT ANSWER

1. RNA contains ribose; DNA contains deoxyribose. RNA usually contains uracil in place of thymine. In eukaryotes DNA is found only in the nucleus; RNA is not.
2. mRNA is a single uncoiled chain. tRNA is a single chain folded into a hairpin shape. rRNA is globular.
3. Information is transcribed from DNA into mRNA, which moves through the pores of the nuclear

membrane into the cytosol.

4. The RNA sequence would be CGAUUAGGC.
5. RNA polymerase would not recognize the termination signal and would continue to synthesize RNA until it reached the termination signal. Thus, two genes would probably be transcribed into a single piece of RNA.

STRUCTURES AND FUNCTIONS

- a, 3; b, 1; c, 5; d, 2; e, 4

Section 10-3

VOCABULARY REVIEW

1. A codon is a combination of three mRNA nucleotides that codes for a specific amino acid.
2. Translation is the process of assembling polypeptides from information encoded in mRNA.
3. An anticodon is a combination of three tRNA nucleotides that pairs with a specific codon.

MULTIPLE CHOICE

1. a 2. d 3. b 4. c 5. b

SHORT ANSWER

1. The anticodons are UAC, GUA, CGU, and UCA. (The last three nucleotides in the mRNA sequence are a stop codon, which has no anticodon.) The polypeptide will initially contain four amino acids.
2. The tRNA that pairs with the start codon on mRNA carries methionine.
3. Proteins synthesized on ribosomes attached to the endoplasmic reticulum are exported from the cell, whereas proteins synthesized on ribosomes that are free in the cytosol are used inside the cell.
4. All of the codons from the deletion point to the end of the transcript would be shifted by one nucleotide, so the sequence of amino acids specified from that point on would be different. Translation would terminate prematurely if the shift resulted in a new stop codon before the end of the transcript.

STRUCTURES AND FUNCTIONS

- a, polypeptide or protein; b, peptide bond; c, amino acid; d, tRNA; e, anticodon; f, codon; g, mRNA or transcript; h, ribosome

Section 11-1

VOCABULARY REVIEW

1. A regulator gene is a prokaryotic gene that codes for the production of a repressor protein, which inhibits the transcription of one or more structural genes.
2. Binding of a repressor protein to an operator blocks the transcription of one or more structural genes; this blockage is called repression.
3. An inducer is a molecule that initiates prokaryotic gene transcription by removing a repressor protein, a process called activation.
4. A transcription factor is a protein that facilitates gene transcription by binding to RNA polymerase and to an enhancer.

MULTIPLE CHOICE

1. c 2. d 3. a 4. b 5. d