Genetics From Genes to Genomes 6th edition Hartwell Test Bank

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Genetics, 6e **(Hartwell)**
Chapter 1 Genetics: The Study of Biological Information

1) How does DNA structure relate to its function?
A) The three-dimensional structure allows DNA to catalyze chemical reactions.
B) The order of nucleotides in a DNA strand specifies the order of amino acids in a protein.
C) DNA folds in a variety of shapes, each with a unique function.
D) The three-dimensional shape of DNA is critical for the storage of genetic information.

Answer: B
Section: 01.01
Topic: DNA: Life's Fundamental Information Molecule
Learning Objective: 01.01.01 Relate the structure of DNA function.
Bloom's: 2. Understand
Accessibility: Keyboard Navigation

2) What is a difference between the structure of DNA and proteins?
A) DNA is composed of amino acids and proteins are composed of nucleotides.
B) DNA is composed of the four nucleotides A, G, C, and T and proteins are composed of the four nucleotides A, G, C, and U.
C) DNA is composed of nucleotides and proteins are composed of amino acids.
D) DNA is composed of 10 different amino acids and proteins are composed of 20 different amino acids.

Answer: C
Section: 01.02
Topic: Proteins: The Functional Molecules of Life Processes
Learning Objective: 01.02.01 Compare the chemical structures of DNA and proteins.
Bloom's: 2. Understand
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3) A genome can be best described as
A) a segment of DNA that encodes an RNA or a protein.
B) an organized package of DNA and proteins.
C) a single pair of nucleotides connected by hydrogen bonds.
D) the DNA in all chromosomes in a cell.

Answer: D
Section: 01.01
Topic: DNA: Life's Fundamental Information Molecule
Learning Objective: 01.01.02 Differentiate between a chromosome, DNA, a gene, a base pair, and a protein.
Bloom's: 1. Remember
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4) What is the difference between the function of DNA and the function of proteins?
A) DNA performs most cellular functions and proteins store information.
B) DNA stores genetic information in the order of nucleotides and proteins store genetic information in the order of amino acids.
C) DNA stores genetic information and proteins perform most cellular functions.
D) DNA provides structure to the cell and proteins act as enzymes.

Answer: C
Section: 01.02
Topic: Proteins: The Functional Molecules of Life Processes
Learning Objective: 01.02.02 Differentiate between the functions of DNA and the functions of proteins.
Bloom's: 1. Remember
Accessibility: Keyboard Navigation

5) Which statement supports the theory that all organisms are related?
A) The genetic code is almost universal.
B) All flies have two wings.
C) Body parts with similar functions in different species are determined by unrelated genes.
D) Prokaryotes have circular chromosomes.

Answer: A
Section: 01.03
Topic: Molecular Similarities of All Life-Forms
Learning Objective: 01.03.01 Summarize the molecular evidence for the common origin of living organisms.
Bloom's: 1. Remember
Accessibility: Keyboard Navigation

6) New genes are thought to arise by which mechanism?
A) Gene duplication followed by divergence due to mutation.
B) Fusion of two genes due to mating between individuals of two different species.
C) Conversion of introns to exons by the accumulation of mutations.
D) Mutation of a DNA sequence activates a gene that was previously turned off.

Answer: A
Section: 01.04
Topic: The Modular Construction of Genomes
Learning Objective: 01.04.01 Describe mechanisms by which new genes could arise.
Bloom's: 1. Remember
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7) What is the most likely way a mutation in one gene can convert one body part to another?
A) The mutated gene encodes a protein that affects the expression of many other genes.
B) The mutated gene encodes a protein that determines cell shape.
C) The mutation is in a structural gene and results in production of more protein than usual.
D) A mutation in only one gene cannot convert one body part to another.

Answer: A
Section: 01.04
Topic: The Modular Construction of Genomes
Learning Objective: 01.04.02 Explain how regulation of gene expression can alter gene function.
Bloom's: 5. Evaluate
Accessibility: Keyboard Navigation

8) A recent technical advancement that has accelerated the study of genomes is the ability to
A) sequence large complex genomes rapidly and inexpensively.
B) rapidly identify and mutate individual disease-causing genes.
C) determine the function of genes by comparing genome sequences.
D) edit DNA in germ-line cells to correct disease-causing mutations.

Answer: A
Section: 01.05
Topic: Modern Genetic Techniques
Learning Objective: 01.05.01 Explain how advances in technology have accelerated the analysis of genomes.
Bloom's: 2. Understand
Accessibility: Keyboard Navigation

9) What is the difference between genetic dissection and genome sequencing?
A) Genetic dissection reveals information about one gene at a time and genome sequencing reveals information about all the genes in a genome at once.
B) Genetic dissection experiments can be accomplished in any species and genome sequencing is only possible in model organisms.
C) Genetic dissection depends on the availability of mutations in model organisms and mutations are of no use in the study of genomes by genome sequencing.
D) The genetic dissection approach is affordable and genome sequencing is prohibitively expensive.

Answer: A
Section: 01.05
Topic: Modern Genetic Techniques
Learning Objective: 01.05.02 Compare the knowledge obtained from genetic dissection and genome sequencing.
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10) Currently, what information can be obtained from sequencing an individual's genome?
A) Information about gene variants that predispose a person to a disease, such as cancer.
B) Information about gene variants that predispose a person to criminal activity.
C) Information that psychiatrists can use to predict personality and behavior.
D) Information that will accurately predict the life span of an individual.

Answer: A
Section: 01.06
Topic: Human Genetics and Society
Learning Objective: 01.06.01 Describe the types of information that can be obtained from an individual's genome sequence.
Bloom's: 1. Remember
Accessibility: Keyboard Navigation

11) Which is *not* a potential problem of allowing the genomic sequences of individuals to become widely available?
A) Discrimination by insurance companies.
B) Misinterpretation of the information.
C) Misuse of the information for social purposes.
D) Advances leading to healthier lives for some people.

Answer: D
Section: 01.06
Topic: Human Genetics and Society
Learning Objective: 01.06.02 Discuss the social issues that arise from the availability of personal genome sequences.
Bloom's: 1. Remember
Accessibility: Keyboard Navigation

12) One strand of DNA has the sequence 5′ GGTCTA 3′. What is the sequence of the other strand?
A) 5′ CCAGAT 3′
B) 5′ ATCTGG 3′
C) 3′ GGTCTA 5′
D) 5′ TAGACC 3′

Answer: D
Section: 01.01
Topic: DNA: Life's Fundamental Information Molecule
Learning Objective: 01.01.01 Relate the structure of DNA function.
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13) Which statement is true about the structure of DNA?
A) It is a polymer made up of a string of amino acids.
B) Each different sequence folds into a different three-dimensional shape.
C) The two strands of a DNA molecule are held together by base pairing.
D) It contains nitrogenous bases known as A, C, G, and U.

Answer: C
Section: 01.01
Topic: DNA: Life's Fundamental Information Molecule
Learning Objective: 01.01.01 Relate the structure of DNA function.
Bloom's: 2. Understand
Accessibility: Keyboard Navigation

14) The size of the mouse (*M. musculus*) genome is 2700 megabases (Mb) and it contains about 25,000 genes arranged on 40 chromosomes. If the genes are evenly distributed on chromosomes in the mouse, what is the average number of genes per chromosome?
A) 1
B) 9.3
C) 67.5
D) 625

Answer: D
Section: 01.01
Topic: DNA: Life's Fundamental Information Molecule
Learning Objective: 01.01.02 Differentiate between a chromosome, DNA, a gene, a base pair, and a protein.
Bloom's: 2. Understand
Accessibility: Keyboard Navigation

15) Which statement about the structure of proteins is false?
A) Proteins are made of long strings of 20 different common amino acids in different orders.
B) The order of amino acids in a polypeptide determines the three-dimensional shape of the folded molecule.
C) The chemical properties of each amino acid are determined by the amino acid's side chain.
D) Most proteins consist of two amino acid polymers attached together by hydrogen bonding.

Answer: D
Section: 01.02
Topic: Proteins: The Functional Molecules of Life Processes
Learning Objective: 01.02.01 Compare the chemical structures of DNA and proteins.
Bloom's: 2. Understand
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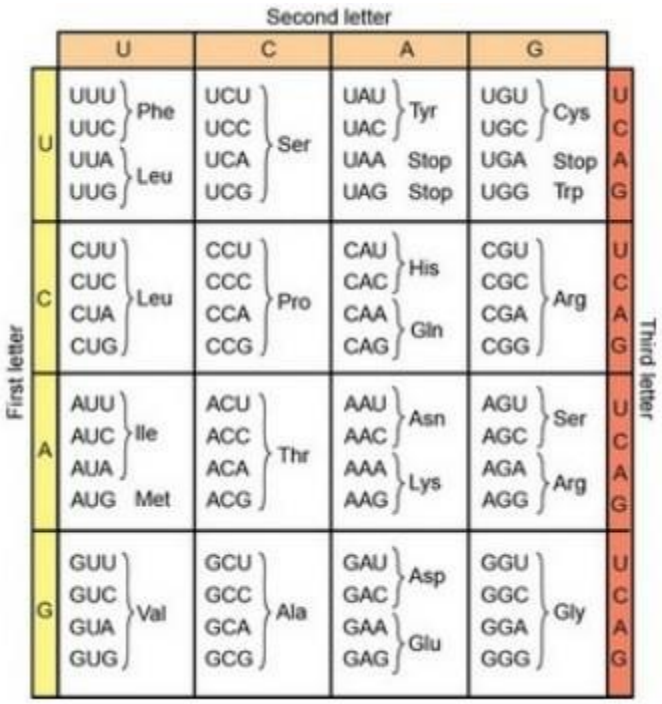
16) Which is a structural feature shared by DNA, RNA, and proteins?
A) The order of monomers is important for function.
B) Each sequence of monomers folds into a different three-dimensional shape.
C) Each molecule is a polymer of four different nucleotides.
D) Two strands of monomers are connected by hydrogen bonding.

Answer: A
Section: 01.03
Topic: Molecular Similarities of All Life-Forms
Learning Objective: 01.03.01 Summarize the molecular evidence for the common origin of living organisms.
Bloom's: 2. Understand
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17) A segment of a protein has the amino acid sequence Ser—Gly—Leu. Is it possible to infer the sequence of the RNA that encodes this amino acid sequence?



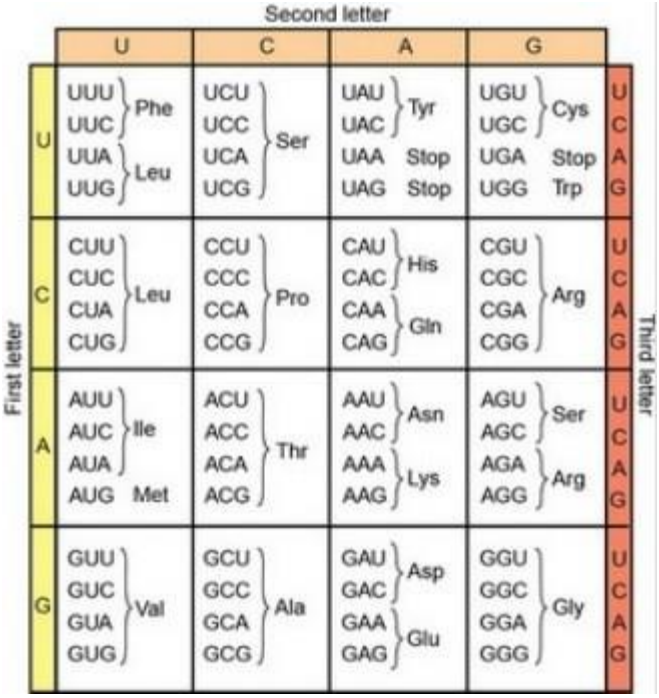
A) Yes, the sequence is UCU—GGA—CUC.
B) Yes, the sequence is TCT—GGA—CTC.
C) No; more than one type of RNA (more than one base sequence) could encode this amino acid sequence.
D) No; the sequence of bases in RNA is not related to the amino acid sequence.

Answer: C
Section: 01.03
Topic: Molecular Similarities of All Life-Forms
Learning Objective: 01.03.01 Summarize the molecular evidence for the common origin of living organisms.
Bloom's: 4. Analyze
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18) A sequence of bases in the middle of an RNA used to encode a polypeptide has the sequence UUA—AUG—CGU. Is it possible to infer the sequence of the amino acids encoded by this RNA?



A) Yes, the sequence is Leu—Met—Arg.
B) Yes, the sequence is Asn—Tyr—Ala.
C) No, this RNA sequence could encode more than one amino acid sequence.
D) No; the sequence of amino acids in polypeptides is not related to the sequence of bases in RNA.

Answer: A
Section: 01.03
Topic: Molecular Similarities of All Life-Forms
Learning Objective: 01.03.01 Summarize the molecular evidence for the common origin of living organisms.
Bloom's: 4. Analyze
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19) Mutation of a mouse gene results in mice that lack heart muscle. What characteristic would you expect to find in a human gene that has a common origin with this mouse gene?
A) The DNA sequence of the human gene will be identical to the DNA sequence of the mouse gene.
B) The human and mouse genes will specify proteins with similar amino acid sequences.
C) The human and mouse genes will specify unrelated sequences of amino acids, but both proteins will function to prevent the formation of heart muscle.
D) The human and mouse genes will specify unrelated sequences of amino acids, and the human gene will not be involved in heart muscle formation.

Answer: B
Section: 01.03
Topic: Molecular Similarities of All Life-Forms
Learning Objective: 01.03.01 Summarize the molecular evidence for the common origin of living organisms.
Bloom's: 3. Apply
Accessibility: Keyboard Navigation

20) A mouse gene was identified and determined to be required for formation of heart muscle. A gene with a similar sequence was identified in the human genome. What experiment could scientists do to determine if the mouse and human genes have similar functions?
A) The scientist could search the human genome for genes that encode proteins that are identical to the protein encoded by the mouse gene.
B) The scientist could place the normal human gene into normal mice and see if the resulting mice are viable.
C) The scientist could place the normal human gene into mutant mice to see if heart muscle forms in the mouse.
D) The scientist could place the mutant mouse gene into humans to see if humans develop without heart muscle.

Answer: C
Section: 01.03
Topic: Molecular Similarities of All Life-Forms
Learning Objective: 01.03.01 Summarize the molecular evidence for the common origin of living organisms.
Bloom's: 3. Apply
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21) A sequence of amino acids found in a subunit of the ATP synthase enzyme in several species is shown below. Which amino acids are likely to be most important to the function of ATP synthase?



A) Those that are shaded dark blue because the amino acids are identical between species.
B) Those that are shaded light blue because the amino acids are similar, but not identical.
C) Those that are not shaded because the amino acid sequences are different between species.
D) Comparing sequence between species does not indicate which amino acids are important to function.

Answer: A
Section: 01.04
Topic: The Modular Construction of Genomes
Learning Objective: 01.04.01 Describe mechanisms by which new genes could arise.
Bloom's: 3. Apply
Accessibility: Keyboard Navigation

22) The function of a single fruit fly gene was inactivated completely by mutation. A fruit fly with this mutation did not have legs. Which is a reasonable conclusion to make based on this information?
A) The normal gene function is required for viability in fruit flies.
B) The normal gene function is required for leg formation in fruit flies.
C) The normal gene is unlikely to regulate other genes involved in leg formation.
D) The normal gene is likely required in fruit flies for formation of legs, wings, and antenna.

Answer: B
Section: 01.05
Topic: Modern Genetic Techniques
Learning Objective: 01.05.02 Compare the knowledge obtained from genetic dissection and genome sequencing.
Bloom's: 3. Apply
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23) Galactosemia is a metabolic disorder characterized by the inability to metabolize the sugar galactose. People with galactosemia suffer from liver, kidney, and brain damage among other symptoms. A gene mutation underlying galactosemia was identified by sequencing the genome of a person with galactosemia. What additional evidence would support the hypothesis that the mutation in the candidate gene causes the disease?
A) Observing that the genome of the person with galactosemia contains mutations in several other genes.
B) Collecting family history and determining that no other family members have galactosemia.
C) Sequencing the genomes from unrelated people with galactosemia and discovering that they also have mutations in the candidate gene.
D) Sequencing the genomes of family members without galactosemia and discovering that they also have mutations in the candidate gene.

Answer: C
Section: 01.05
Topic: Modern Genetic Techniques
Learning Objective: 01.05.03 Discuss how genome sequence information can be used to treat or cure diseases.
Bloom's: 3. Apply
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