Biology 12 - DNA & Protein Synthesis Practice Test

Use the following chart of mRNA codons to answer questions 1 and 2

Three-letter codons of messenger RNA and the amino acids specified by the codons

AAU, AAC – Asparagine	CAU, CAC – Histidine	GAU, GAC – Aspartic acid	UAU, UAC – Tyrosine
AAA, AAG – Lysine	CAA, CAG – Glutamine	GAA, GAG – Glutamate	UAA, UAG – Stop
ACU, ACC, ACA, ACG – Threonine	CCU, CCC, CCA, CCG – Proline	GCU, GCC, GCA, GCG – Alanine	UCU, UCC, UCA, UCG – Serine
AGU, AGC – Serine AGA, AGG – Arginine	CGU, CGC, CGA, CGG – Arginine	GGU, GGC, GGA, GGG – Glycine	UGU, UGC – Cysteine UGA – Stop UGG – Tryptophan
AUU, AUC, AUA – Isoleucine AUG – Methionine	CUU, CUC, CUA, CUG – Leucine	GUU, GUC, GUA, GUG – Valine	UUU, UUC – Phenylalanine UUA, UUG – Leucine

1. The following is a sequence of mRNA bases:

GCU UCU CCU

What sequence of amino acids results after translation occurs?
A. arginine, serine, stop
B. alanine, arginine, stop
C. alanine, serine, proline
D. arginine, arginine, glycine

2. Which of the following is an anticodon of a molecule of tRNA carrying isoleucine?
A. ATA
B. AUU
C. TAA
D. UAU

3. Which of the following are characteristics of DNA but not of RNA?

A.	single stranded	contains adenine	translates
B.	double stranded	contains guanine	replicates
C.	single stranded	contains thymine	replicates
D.	double stranded	contains uracil	translates

A.
B.
C.
D.

4. Which of the following is an example of complementary base pairing?
A. guanine - uracil
B. adenine - cytosine
C. cytosine - thymine
D. cytosine - guanine

5. What is the percentage of guanine in a DNA sample containing 20% thymine?
A. 10%
B. 20%
C. 30%
D. 40%

Use the following chart of mRNA codons to answer question 6

Three-letter codons of messenger RNA and the amino acids specified by the codons

AAU, AAC – Asparagine	CAU, CAC – Histidine	GAU, GAC – Aspartic acid	UAU, UAC – Tyrosine
AAA, AAG – Lysine	CAA, CAG – Glutamine	GAA, GAG – Glutamate	UAA, UAG – Stop
ACU, ACC, ACA, ACG – Threonine	CCU, CCC, CCA, CCG – Proline	GCU, GCC, GCA, GCG – Alanine	UCU, UCC, UCA, UCG – Serine
AGU, AGC – Serine AGA, AGG – Arginine	CGU, CGC, CGA, CGG – Arginine	GGU, GGC, GGA, GGG – Glycine	UGU, UGC – Cysteine UGA – Stop UGG – Tryptophan
AUU, AUC, AUA – Isoleucine AUG – Methionine	CUU, CUC, CUA, CUG – Leucine	GUU, GUC, GUA, GUG – Valine	UUU, UUC – Phenylalanine UUA, UUG – Leucine

6. What is a base sequence for a section of DNA which codes for the amino acids serine and arginine?
A. AGC AGA
B. AGT GCT
C. AGU AGA
D. UCA UCU

7. In an experiment to determine the identity of an unknown substance, it is determined that the sample contains 12% adenine, 12% thymine, 38% cytosine and 38% guanine. What is the unknown substance?
A. ATP
B. DNA
C. mRNA
D. nuclease

8. Which of the following types of bonding occurs during complementary base pairing?
   A. ionic
   B. peptide
   C. covalent
   D. hydrogen

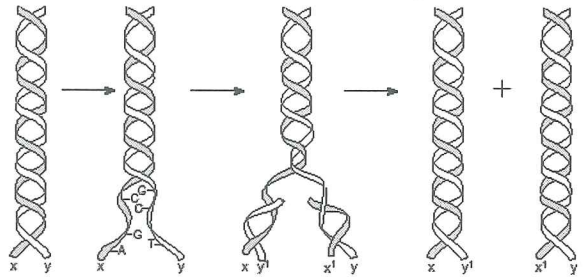
9. Which of the following is a product of the hydrolysis of DNA?
   A. water
   B. ribose
   C. nucleotides
   D. an amine group

10. Which of the following **best** describes the function of mRNA?
   A. It stays in the nucleus and is copied by DNA
   B. It carries amino acids to the growing polypeptide chain
   C. It makes up the ribosoomes and provides the site for protein synthesis
   D. It is transcribed from the DNA and carries the information to the ribosome

11. A cell which is going to replicate is treated with radioactive thymine. It can be anticipated that a biochemical study of the nucleic acids in the two daughter strands produced will show a degree of radioactivity in
   A. the DNA of the two daughter cells
   B. the DNA of one of the two daughter cells
   C. the RNA of the two daughter cells
   D. the DNA and the RNA of the two daughter cells

12. Which of the following is found in RNA but **not** in DNA?
   A. ribose
   B. adenine
   C. maltose
   D. phosphate

Use the following diagram to answer question 13



13. The process shown in the diagram above is
   A. hydrolysis
   B. translation
   C. replication
   D. transcription

Use the following chart to answer question 14

Three-letter codons of messenger RNA and the amino acids specified by the codons

AAU, AAC — Asparagine	CAU, CAC — Histidine	GAU, GAC — Aspartic acid	UAU, UAC — Tyrosine
AAA, AAG — Lysine	CAA, CAG — Glutamine	GAA, GAG — Glutamate	UAA, UAG — Stop
ACU, ACC, ACA, ACG — Threonine	CCU, CCC, CCA, CCG — Proline	GCU, GCC, GCA, GCG — Alanine	UCU, UCC, UCA, UCG — Serine
AGU, AGC — Serine AGA, AGG — Arginine	CGU, CGC, CGA, CGG — Arginine	GGU, GGC, GGA, GGG — Glycine	UGU, UGC — Cysteine UGA — Stop UGG — Tryptophan
AUU, AUC, AUA — Isoleucine AUG — Methionine	CUU, CUC, CUA, CUG — Leucine	GUU, GUC, GUA, GUG — Valine	UUU, UUC — Phenylalanine UUA, UUG — Leucine

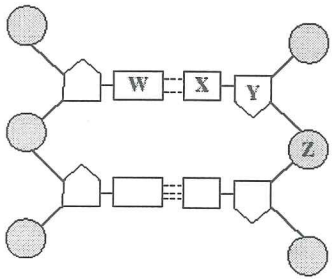
14. The DNA strand **CGA TGC GAC ATT** undergoes a mutation in which the section coding for the amino acid threonine is lost. Which of the following would be the correct codons after this mutation?
   A. ACG CUG UAA
   B. GCU ACG CUG
   C. GCU CUG UAA
   D. GCU ACG UAA

15. The number of adenine bases in a DNA molecule equals the number of thymine bases because
   A. DNA contains equal numbers of all four bases
   B. thymine always follows adenine on each DNA strand
   C. DNA is made of alternating adenine and thymine bases
   D. adenine on one strand bonds to thymine on the other strand

16. What is the anticodon which corresponds to the DNA base sequence **GAC**?
   A. CTG
   B. CUG
   C. GAC
   D. GUC

17. Which of the following is a definition of recombinant DNA?
   A. plasmids
   B. bacterial DNA
   C. DNA which has been cloned
   D. DNA from more than one source

Use the following diagram to answer question 18

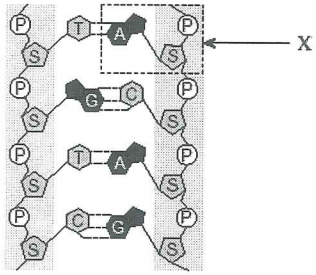


18. Which of the following correctly identifies the parts labelled W, X, Y and Z?

	W	X	Y	Z
A.	phosphate	ribose	cytosine	guanine
B.	thymine	uracil	ribose	phosphate
C.	adenine	thymine	phosphate	ribose
D.	adenine	thymine	deoxyribose	phosphate

A.
B.
C.
D.

Use the following diagram to answer question 19



19. Which of the following is indicated by X?
    A. RNA
    B. a codon
    C. a nucleotide
    D. an amino acid

20. What is meant by the term "unzipping" as it occurs during replication?
    A. denaturing of the DNA molecule
    B. formation of temporary bonds between mRNA and tRNA
    C. breaking the bonds between the bases of DNA nucleotides
    D. breaking the bonds between the sugar and phosphate molecules

21. Which type of replication does DNA have?
    A. Semi-conservative because mutations may change part of the base sequence
    B. Semi-conservative because DNA formed by replication has one old strand and one new strand
    C. Conservative because the base sequence remains unchanged
    D. Conservative because the DNA formed by replication contains one strand conserved from the parent DNA molecule

Use the following information to answer question 22

1. Uracil bonds with adenine
2. Complementary bonding between codon and anticodon
3. DNA unzips
4. mRNA joins with ribosome

22. The correct order of the above during protein synthesis is
    A. 1, 2, 4, 3
    B. 1, 3, 2, 4
    C. 3, 1, 4, 2
    D. 3, 2, 1, 4

23. Which of the following differentiates DNA from RNA?
    A. DNA is linear and RNA is a double helix
    B. DNA has deoxyribose and RNA has ribose
    C. DNA is single-stranded and RNA is double-stranded
    D. DNA is produced during transcription and RNA is produced during replication

24. If a cell grown in the presence of radioactively-labelled uracil is actively producing protein containing lysine, which of the following is correct?
    A. The lysine produced is radioactive
    B. The codons for lysine are radioactive
    C. The DNA code for lysine is radioactive
    D. The anticodons for lysine are radioactive

25. What is the production of mRNA called?
    A. mutation
    B. translation
    C. replication
    D. transcription

Use the following table to answer question 26

Three-letter codons of messenger RNA and the amino acids specified by the codons

AAU, AAC — Asparagine	CAU, CAC — Histidine	GAU, GAC — Aspartic acid	UAU, UAC — Tyrosine
AAA, AAG — Lysine	CAA, CAG — Glutamine	GAA, GAG — Glutamate	UAA, UAG — Stop
ACU, ACC, ACA, ACG — Threonine	CCU, CCC, CCA, CCG — Proline	GCU, GCC, GCA, GCG — Alanine	UCU, UCC, UCA, UCG — Serine
AGU, AGC — Serine AGA, AGG — Arginine	CGU, CGC, CGA, CGG — Arginine	GGU, GGC, GGA, GGG — Glycine	UGU, UGC — Cysteine UGA — Stop UGG — Tryptophan
AUU, AUC, AUA — Isoleucine AUG — Methionine	CUU, CUC, CUA, CUG — Leucine	GUU, GUC, GUA, GUG — Valine	UUU, UUC — Phenylalanine UUA, UUG — Leucine

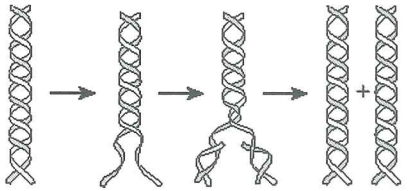
26. A single base mutation causes the amino acid leucine to replace tryptophan in the primary sequence of a protein. The base in the **DNA** that changes to cause this mutation is
    A. adenine
    B. guanine
    C. cytosine
    D. thymine

27. How many ribosomes are needed for the production of one polypeptide containing 30 amino acids?
    A. 1
    B. 3
    C. 10
    D. 30

28. Which of the following base pairs would form between mRNA and tRNA during protein synthesis?
    A. adenine - uracil
    B. uracil - guanine
    C. thymine - adenine
    D. cytosine - thymine

29. Which of the following is a characteristic of replication?
    A. Sugar joins to phosphate groups, producing new DNA
    B. Anticodons bond to codons by complementary base pairing, producing proteins
    C. Adenine bonds with thymine and cytosine bonds with guanine, producing mRNA
    D. Adenine bonds with uracil and cytosine bonds with guanine, producing new DNA

Use the following diagram to answer question 30



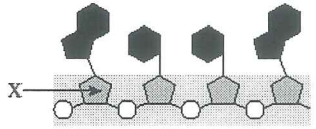
30. In which organelle does the above process occur?
    A. nucleus
    B. nucleolus
    C. rough endoplasmic reticulum
    D. smooth endoplasmic reticulum

31. During what process are polypeptides assembled at the ribosomes?
    A. hydrolysis
    B. translation
    C. replication
    D. transcription

32. What type of chemical bond is broken during the first step of replication?
    A. ionic
    B. peptide
    C. covalent
    D. hydrogen

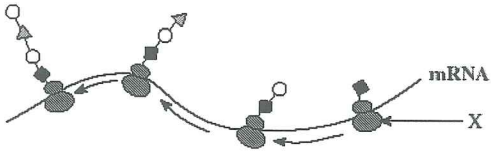
33. During which process would adenine bond with thymine but not uracil?
    A. translation
    B. replication
    C. transcription
    D. dehydration synthesis

Use the following diagram to answer question 34



34. What is the structure labelled X?
    A. uracil
    B. ribose
    C. protein
    D. phosphate

Use the following diagram to answer question 35



35. Where is structure **X** produced?
    A. in the nucleus
    B. in the nucleolus
    C. in the ribosomes
    D. in the endoplasmic reticulum

36. A change in the sequence of bases in a strand of DNA that occurs as a result of exposure ot x-rays is an example of
    A. mutation
    B. denaturation
    C. transcription
    D. protein synthesis

37. During transcription, hydrogen bonds form between which of the following?
    A. amino acid pairs
    B. mRNA and DNA
    C. mRNA and ribosomes
    D. sugar and phosphate molecules

38. Which of the following is a definition of transcription?
    A. the production of rRNA from tRNA
    B. the production of mRNA from DNA
    C. the production of protein by ribosomes
    D. the production of new DNA before cell division

39. The molecule that is responsible for carrying amino acids to ribosomes is
    A. DNA
    B. tRNA
    C. rRNA
    D. mRNA

40. Consider the following portion of an mRNA strand:

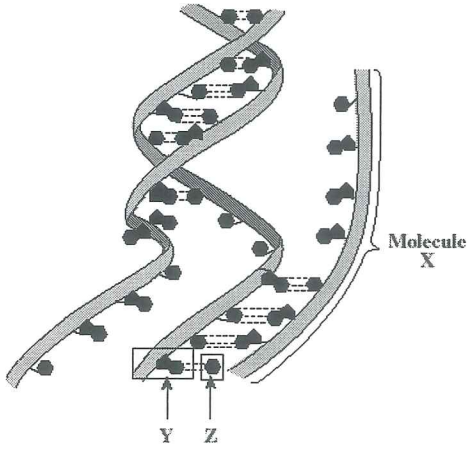
    UAC GGG AUA

    What are the anticodons that will be paired to this strand?
    A. ATG CCC TAT
    B. ATA GGG TAC
    C. AUG CCC UAU
    D. UAC GGG AUA

41. Which of the following is a possible use for recombinant DNA?
    A. producing steroid hormones
    B. producing insulin using bacteria
    C. cloning tissue cells for transplant
    D. encouraging nerve cells to regenerate

42. What is found in RNA but **not** in DNA?
    A. uracil
    B. thymine
    C. deoxyribose
    D. sugar-phosphate backbone

Use the following diagram to answer questions 43 to 45



43. What process produces molecules **X**?
    A. translation
    B. replication
    C. denaturation
    D. transcription

44. What type of bond joins the structure in box **Y** with the structure in box **Z**?
    A. ionic
    B. peptide
    C. covalent
    D. hydrogen

45. What two components are part of the structure shown in box **Y**?
    A. ribose and guanine
    B. ribose and cytosine
    C. deoxyribose and uracil
    D. deoxyribose and adenine

#	ID	Points	Type	Answers
	AMINO ACID FROM MRNA 1		INS	
1	AMINO ACID FROM MRNA 2	1.00	MCS	C
2	ANTICODON FROM AA 1	1.00	MCS	D
3	DNA VS. RNA 1	1.00	MCS	B
4	CBP 1	1.00	MCS	D
5	NUCLEOTIDE % 1	1.00	MCS	C
	DNA FROM AMINO ACID 1		INS	
6	DNA FROM AMINO ACID 2	1.00	MCS	B
7	ID FROM NUCLEOTIDE % 1	1.00	MCS	B
8	CBP 3	1.00	MCS	D
9	HYDROLYSIS/SYNTHESIS 1	1.00	MCS	C
10	MRNA: FUNCTION 2	1.00	MCS	D
11	IB 23	1.00	MCS	A
12	DNA VS. RNA 7	1.00	MCS	A
	REPLICATION: DEFN 4		INS	
13	REPLICATION: DEFN 5	1.00	MCS	C
	MUTATIONS 14		INS	
14	MUTATIONS 15	1.00	MCS	C
15	NUCLEOTIDE % 5	1.00	MCS	D
16	ANTICODON FROM DNA 1	1.00	MCS	C
17	RDNA: DEFN 1	1.00	MCS	D
	DNA: NUCLEOTIDE 3		INS	
18	DNA: NUCLEOTIDE 4	1.00	MCS	D
	NUCLEOTIDE COMP 4		INS	
19	NUCLEOTIDE COMP 5	1.00	MCS	C
20	REPLICATION: UNZIP 2	1.00	MCS	C
21	IB 18	1.00	MCS	B
	PROTEIN SYNTHESIS 3		INS	
22	PROTEIN SYNTHESIS 4	1.00	MCS	C
23	DNA VS. RNA 6	1.00	MCS	B
24	RADIOACTIVELY-LABEL 1	1.00	MCS	D
25	TRANSCRIPTION: DEFN 1	1.00	MCS	D
	MUTATIONS 3		INS	
26	MUTATIONS 4	1.00	MCS	C
27	TRANSLATION: SITE 2	1.00	MCS	A
28	TRANSLATION: CBP 1	1.00	MCS	A
29	REPLICATION: PROCESS 3	1.00	MCS	A
	REPLICATION: SITE 1		INS	
30	REPLICATION: SITE 2	1.00	MCS	A
31	TRANSLATION: SITE 1	1.00	MCS	B
32	REPLICATION: UNZIP 1	1.00	MCS	D
33	REPLICATION: CBP 1	1.00	MCS	B
	RNA: NUCLEOTIDE 1		INS	
34	RNA: NUCLEOTIDE 2	1.00	MCS	B
	RRNA 1		INS	
35	RRNA 2	1.00	MCS	B
36	MUTATIONS 10	1.00	MCS	A
37	TRANSCRIPTION: CBP 1	1.00	MCS	B
38	TRANSCRIPTION: DEFN 2	1.00	MCS	B
39	TRNA: FUNCTION 1	1.00	MCS	B
40	ANTICODON FROM MRNA 1	1.00	MCS	C
41	RDNA: USES 1	1.00	MCS	B
42	DNA VS. RNA 2	1.00	MCS	A
	TRANSCRIPTION: DEFN 3		INS	
43	TRANSCRIPTION: DEFN 4	1.00	MCS	D
44	TRANSCRIPTION: CBP 2	1.00	MCS	D
45	DNA: NUCLEOTIDE 5	1.00	MCS	D
SECTION 1 (45 items)		**45.00**		