"RNA and Protein Synthesis Problem Set"

True or False. If the answer is False, change the underlined word(s) to make the statement true.

_____ _____ 1) The sugar found in RNA is called <u>deoxyribose</u>.

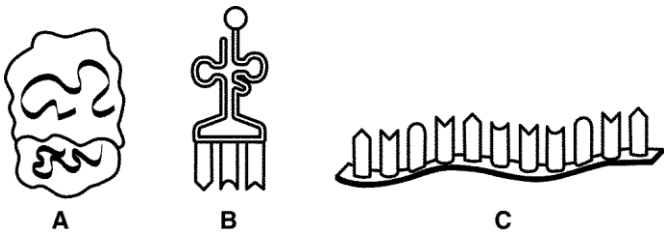
_____ _____ 2) The DNA molecule is double stranded and the RNA molecule is <u>single</u> stranded.

_____ _____ 3) The process of <u>translation</u> occurs at the ribosome.

_____ _____ 4) The job of <u>mRNA</u> is to pick up amino acids and transport them to the ribosomes.

_____ _____ 5) <u>Transcription</u> must occur before <u>translation</u> may occur.

6) In the figure below, A, B, and C are three types of _____.

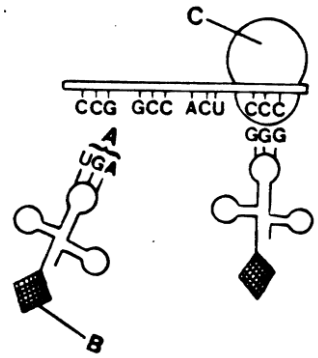


Identify the labeled structures on the following diagram of translation.

7) Part A is the _____.

8) Part B is the _____.

9) Part C is the _____.



10) The sense strand of a DNA molecule is: C C C A C G T C T
The mRNA sequence from this DNA molecule is : _____

Use the amino acid chart on the last page to identify the amino acids from the mRNA sequence in problem # 10.

11)First amino acid: _____

12)Second amino acid: _____

13)Third amino acid: _____

Multiple Choice

14) Which of the following is attached to the transfer RNA (tRNA)?
A. DNA B. ribosome C. amino acid D. nucleic acid

15) Which of the following is <u>not</u> part of protein synthesis?
A. replication B. translation C. transcription

16) The codon is located on the
A. mRNA. B. tRNA. C. rRNA. D. DNA.

17) In the RNA molecule, which nitrogen base is found in place of thymine?
A. guanine B. cytosine C. thymine D. uracil

18) During the process of transcription, which of the following is produced?
A. H_2O B. ATP C. mRNA D. DNA

19) The actual site of protein synthesis is the
A. nucleus. B. mitochondrion. C. chloroplast. D. ribosome.

20) If the DNA template reads "ATA", then which of the following would be the corresponding sequence on the mRNA?
A. UAU B. ATA C. TUT D. UCU

21) The genetic code is based upon the reading of how many bases at a time?
A. one B. two C. three D. four

22) Amino acids are held together by __?__ bonds.
A. hydrogen B. peptide C. ionic D. high energy

23) How many codons are needed to specify three amino acids?

A. 3
B. 6
C. 9
D. 12

24) One similarity between DNA and messenger RNA molecules is that they both contain
a. the same sugar
b. genetic codes based on sequences of bases
c. a nitrogenous base known as uracil
d. double-stranded polymers

25) Some events that take place during the synthesis of a specific protein are listed below.
a. Messenger RNA attaches to a ribosome.
b. DNA serves as a template for RNA production.
c. Transfer RNA bonds to a specific codon.
d. Amino acids are bonded together.
e. RNA moves from the nucleus to the cytoplasm.

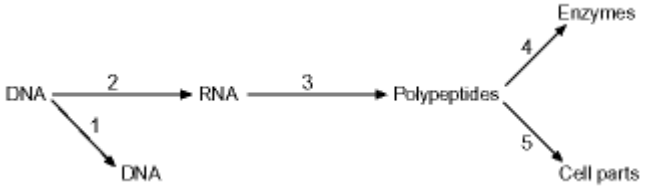
The correct order of these events is
a. B E A C D
b. D A E C B
c. B C E D A
d. C B A E D

26) What is the complementary messenger-RNA sequence for the DNA sequence shown below?
a. G-T-T-C-C-A
b. C-A-A-G-G-U
c. G-U-U-C-C-A
d. C-A-A-G-G-T

Use the diagram below for Questions 27-29

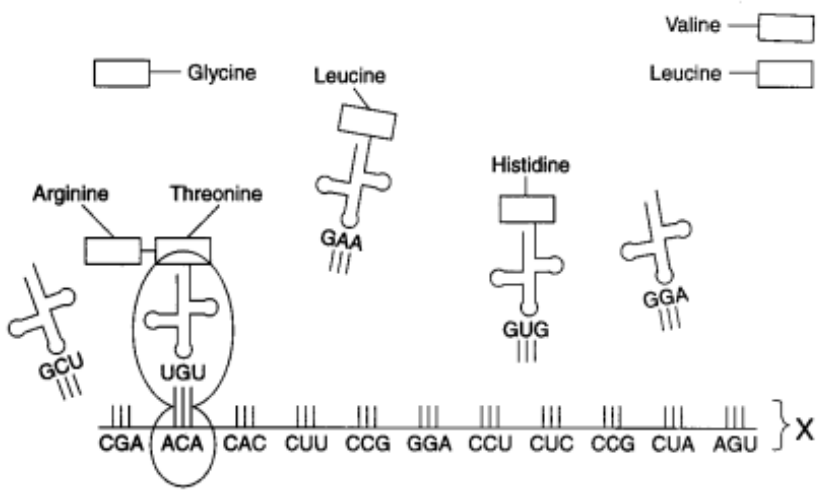
27) Which processes occur in the nucleus?
a. 1 and 2
b. 2 and 3
c. 3 and 4
d. 4 and 5

28) Process 2 is known as
a. replication
b. mutation
c. transcription
d. translation



29) What is the product of process 3?
   a. a strand of DNA
   b. two complementary strands of DNA
   c. a strand of RNA
   d. a chain of amino acids

Use the diagram below for Questions 30-32



30) Structure X was made in the
   a. nucleus
   b. cytoplasm
   c. lysosome
   d. vacuole

31) The process represented in the diagram is most closely associated with the cell organelle known as the
   a. nucleolus
   b. ribosome
   c. chloroplast
   d. mitochondrion

32) Which amino acid would be transferred to the position of codon CAC?
   a. leucine
   b. glycine
   c. valine
   d. histdine

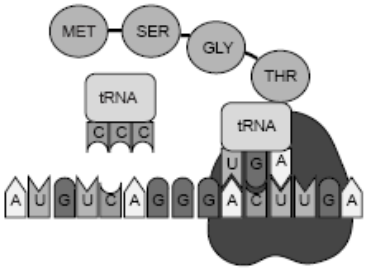
33) If a portion of a messenger RNA molecule contains the base sequence A-A-U, the corresponding transfer RNA base sequence is
   a. A-A-U
   b. G-G-T
   c. T-T-C
   d. U-U-A

34) Which defines a codon?
   a. a protein that beins transcription by breaking apart H bonds
   b. a free-floating base that attaches to an open DNA strand
   c. the genetic code word of three bases on mRNA that specify one amino acid
   d. the strong bond between two complementary nitrogen bases

35) What is the role of tRNA during translation?

a. bond to open the DNA strand to carry the code for protein synthesis out of the nucleus
b. carry ribosomes to the site of protein synthesis
c. break aparty mRNA and send it back to the nucleus so that it can be reused
d. Carry amino acids to the mRNA for correct placement into the protein chain

36) This diagram shows which cellular process?



a. Replication
b. Transcription
c. Translation
d. Mutation

37) Which of the following changes would be expected if a CAUUUG sequences of bases mutated to CACUUG?

a. the amino acid sequence would be shorter than expected
b. the identity of one amino acid would change
c. the identity of more than one amino acid would change
d. the amino acid sequence would remain unchanged

Condon Chart

	U	C	A	G	
U	Phenylalanine	Serine	Tyrosine	Cysteine	U
	Phenylalanine	Serine	Tyrosine	Cysteine	C
	Leucine	Serine	Stop	Stop	A
	Leucine	Serine	Stop	Tryptophan	G
C	Leucine	Proline	Histidine	Arginine	U
	Leucine	Proline	Histidine	Arginine	C
	Leucine	Proline	Glutamine	Arginine	A
	Leucine	Proline	Glutamine	Arginine	G
A	Isoleucine	Threonine	Asparagine	Serine	U
	Isoleucine	Threonine	Asparagine	Serine	C
	Isoleucine	Threonine	Lysine	Arginine	A
	Methionine	Threonine	Lysine	Arginine	G
G	Valine	Alanine	Aspartic Acid	Glycine	U
	Valine	Alanine	Aspartic Acid	Glycine	C
	Valine	Alanine	Glutamic Acid	Glycine	A
	Valine	Alanine	Glutamic Acid	Glycine	G