

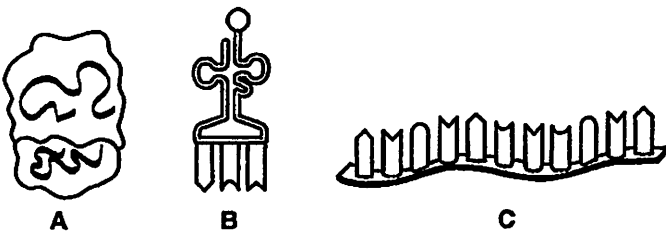
RNA and Protein Synthesis Review

Name _____

Period _____

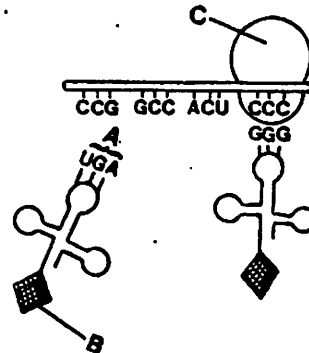
True or False. If the answer is False, change the underlined word(s) to make the statement true.

- _____ 1) The sugar found in RNA is called deoxyribose.
- _____ 2) The DNA molecule is double stranded and the RNA molecule is single stranded.
- _____ 3) The process of translation occurs at the ribosome.
- _____ 4) The job of mRNA is to pick up amino acids and transport them to the ribosomes.
- _____ 5) Transcription must occur before translation 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 not 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. H₂O 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 C. 9
B. 6 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:

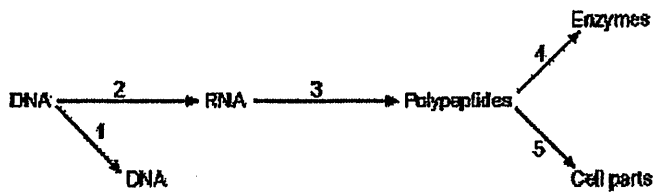
- a. B E A C D
b. D A E C B
c. B C E D A
d. C B A E D

26) What is the complementary messenger-RNA sequence for the DNA sequence shown below?

C A A G G T
| | | | |

- a. C-A-A-G-G-U
- b. G-T-T-C-C-A
- 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

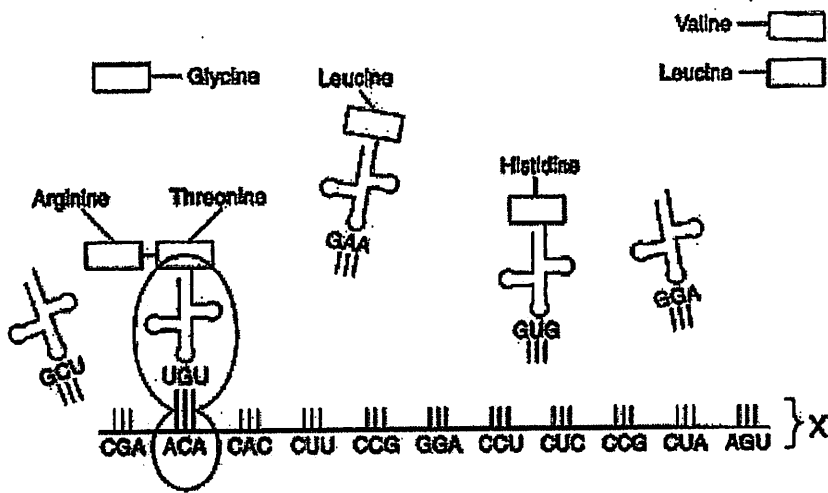
28) Process 2 is known as

- 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

- nucleus
- cytoplasm
- lysosome
- vacuole

31) The process represented in the diagram is most closely associated with the cell organelle known as the

- nucleolus
- ribosome
- chloroplast
- mitochondrion

32) Which amino acid would be transferred to the position of codon CAC?

- leucine
- glycine
- valine
- histidine

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-U
- G-G-T
- T-T-C
- U-U-A

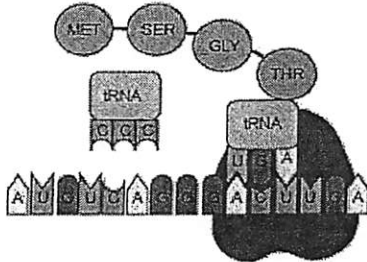
34) Which defines a codon?

- a protein that begins transcription by breaking apart H bonds
- a free-floating base that attaches to an open DNA strand
- the genetic code word of three bases on mRNA that specify one amino acid
- the strong bond between two complementary nitrogen bases

35) What is the role of tRNA during translation?

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

36) This diagram shows which cellular process?



- Replication
- Transcription
- Translation
- Mutation

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

- the amino acid sequence would be shorter than expected
- the identity of one amino acid would change
- the identity of more than one amino acid would change
- the amino acid sequence would remain unchanged

Codon 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

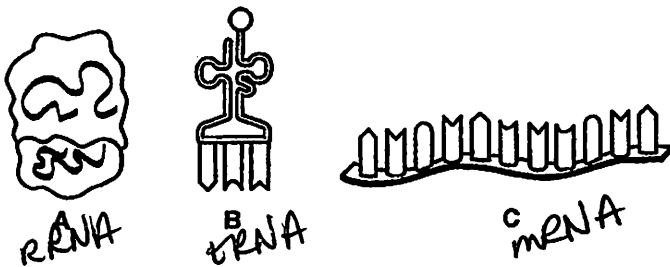
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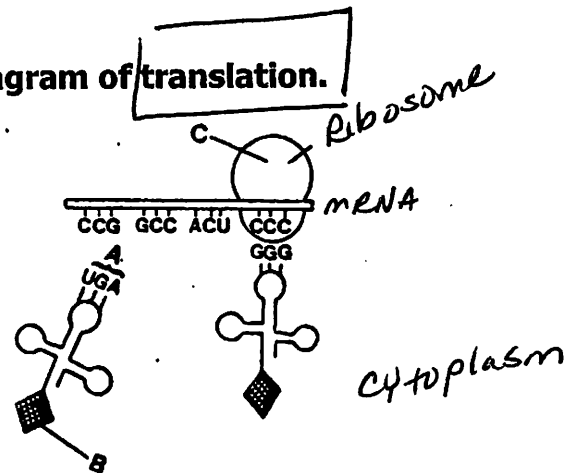
True or False. If the answer is False, change the underlined word(s) to make the statement true.

- F Ribose 1) The sugar found in RNA is called deoxyribose.
T 2) The DNA molecule is double stranded and the RNA molecule is single stranded.
T 3) The process of translation occurs at the ribosome.
F tRNA 4) The job of mRNA is to pick up amino acids and transport them to the ribosomes.
T 5) Transcription must occur before translation may occur.

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



Identify the labeled structures on the following diagram of translation.



- 7) Part A is the anticodon.
 8) Part B is the amino acid.
 9) Part C is the Ribosome.

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 :

G G G | U G C | A G A

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: Glycine
 12) Second amino acid: Cysteine
 13) Third amino acid: Arginine

Multiple Choice

- 14) Which of the following is attached to the transfer RNA (tRNA)?
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A. 3 B. 6 C. 9 D. 12
1 codon = 1 amino acid
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The correct order of these events is ..

- a. BEACD
b. DAECB
c. BCEDA
d. CBAED

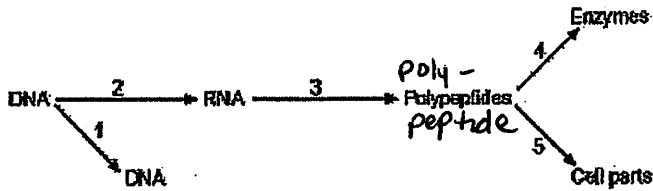
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C A A G G T
| | | | |

- a. ~~C~~-A-A-G-G-U
- b. G-T-T-C-C-A
- c. G-U-U-C-C-A
- d. ~~C~~-A-A-G-G-T

NO Thymine in RNA

Use the diagram below for Questions 27-29



1 = replication

2 = transcription

27) Which processes occur in the nucleus?

- a. 1 and 2
- b. 2 and 3
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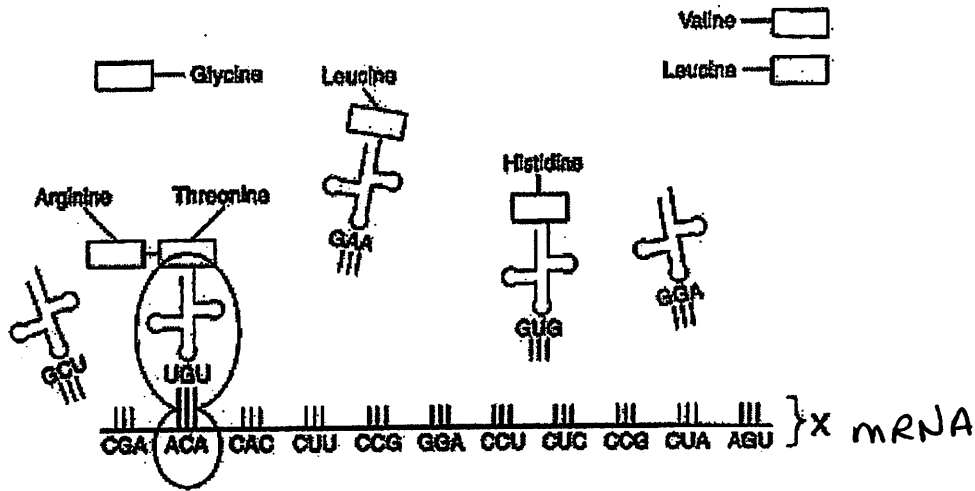
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Translation



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- c. T-T-C
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anticodon

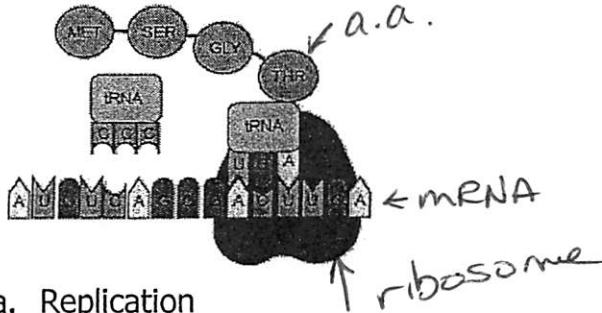
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both code for the same a.a.

Codon Chart

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	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

CAU (codon)

↓
Histidine

CAC (codon)

↓
Histidine