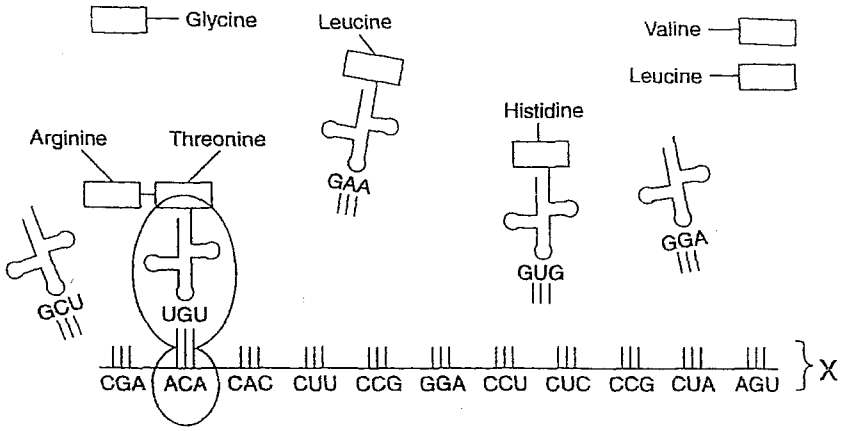
Base your answers to questions 2 through 4 on the diagram below of a biochemical process and on your knowledge of the living environment.



2 The synthesis of structure *X* occurred in the
1 nucleus 2 cytoplasm 3 lysosome 4 vacuole

3 Which amino acid would be transferred to the position of codon CAC?
1 leucine 2 glycine 3 valine 4 histidine

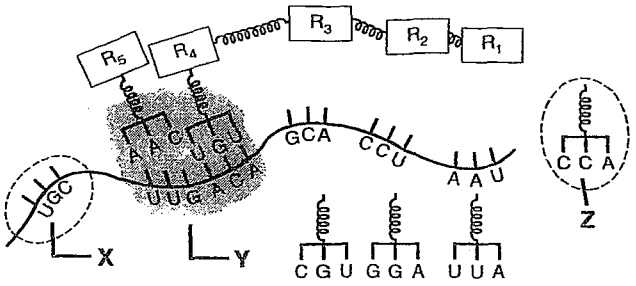
4 The biochemical process represented in the diagram is most closely associated with the cell organelle known as the
1 nucleolus 2 ribosome 3 chloroplast 4 mitochondrion

5 Which base is normally used in the synthesis of RNA but *not* in the synthesis of DNA?
1 adenine 2 uracil 3 cytosine 4 guanine

6 A sequence of three nitrogenous bases in a messenger-RNA molecule is known as a
1 codon 2 gene 3 polypeptide 4 nucleotide

7 In the synthesis of proteins, what is the function of messenger-RNA molecules?
1 They act as a template for the synthesis of DNA.
2 They carry information that determines the sequence of amino acids.
3 They remove amino acids from the nucleus.
4 They carry specific enzymes for dehydration synthesis.

8 A DNA molecule is composed of
1 carbon, hydrogen, oxygen, nitrogen, and phosphorus
2 carbon, hydrogen, oxygen, phosphorus, and calcium
3 calcium, hydrogen, oxygen, phosphorus, and iron
4 oxygen, hydrogen, phosphorus, sulfur, and iron



86. The original template for this process is a molecule of (1) DNA (2) messenger RNA (3) transfer RNA (4) ribosomal RNA

87. The units labeled R_1, R_2, and R_3 represent (1) nucleotides (2) RNA molecules (3) DNA molecules (4) amino acids

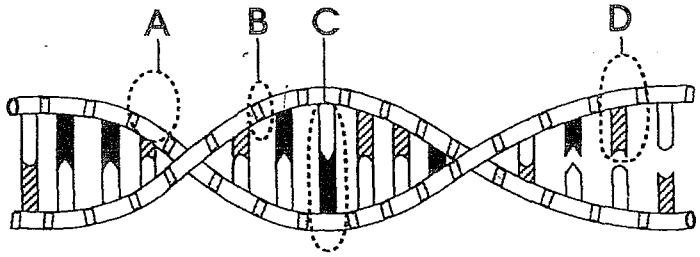
88. The organelle labeled *Y*, on which this process occurs, is the (1) nucleus (2) ribosome (3) chloroplast (4) mitochondria

89. The circled portion labeled *X* is known as (1) an amino acid (2) a codon (3) an anticodon (4) a single nucleotide

90. The circled portion labeled *Z* represents a molecule of (1) DNA (2) messenger RNA (3) transfer RNA (4) ribosomal RNA

PART A – MULTIPLE CHOICE

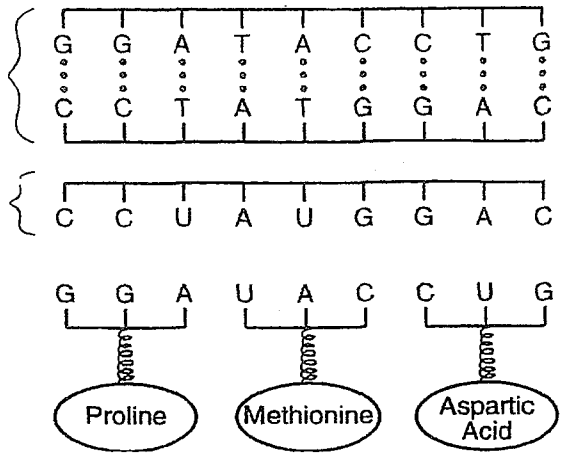
1 In the diagram below, which letter indicates a section of the molecule that includes all the components of a nucleotide?



1 *A* 2 *B* 3 *C* 4 *D*

PART B – CONSTRUCTED-RESPONSE

Base your answers to questions 11 through 14 on the diagram at the right and on your knowledge of the living environment. The diagram represents molecular structures involved in protein synthesis.



11 Structure 1 represents a portion of a molecule of

_____.

12 The DNA (3-nucleotide) code for aspartic acid is ___-___-___.

13 Proline, methionine, and aspartic acid represent three types of

_____.

14 Structure 2 (messenger RNA) is synthesized in what cell organelle?

_____

Directions for questions 18 through 21 For *each* statement, select the type of nucleic acid molecule, *chosen from the list below*, that is best described by that phrase. [A number may be used more than once or not used at all.]

Types of Nucleic Acid Molecules

(1) DNA molecules, only
(2) RNA molecules, only
(3) Both DNA and RNA molecules
(4) Neither DNA nor RNA molecules

18 May contain adenine, cytosine, guanine, and thymine. ____

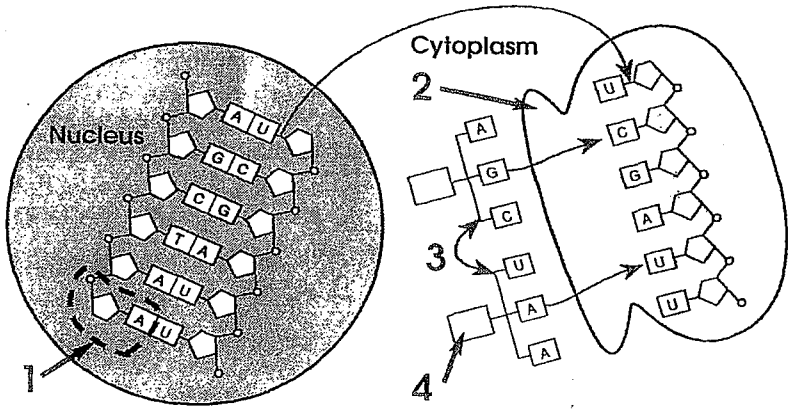
19 Carry genetic information from nucleus to ribosomes. ____

20 Are present in the nucleus of the cell. ____

21 Consist of chains of nucleotides. ____

PART C – EXTENDED CONSTRUCTED-RESPONSE

Base your answers to questions 22 through 25 on the diagram below and on your knowledge of the living environment. The diagram represents some steps in a metabolic process.



22 What is the type of genetic structure shown within the dashed area of the DNA molecule identified at number 1? [1] _____

23 What is the name of the cell organelle indicated by number 2? [1]

_____

24 What is the process called that is partially represented in the diagram which uses the information coded in DNA to chemically link amino acids into a chain? [1] _____

25 The molecules indicated by number 3 are most likely [1] _____.

14 The messenger RNA genetic codes for 3 different amino acids are:

UUU = phenylalanine, GCU = alanine, and GGU = glycine

Using this information, the strip of messenger RNA (GCUUUUGGU) would result in an amino acid sequence consisting of

1 phenylalanine-alanine-glycine
2 alanine-glycine-phenylalanine
3 alanine-glycine-glycine
4 alanine-phenylalanine-glycine

15 Watson and Crick described the DNA molecule as a
1 straight chain
2 single strand
3 double helix
4 branching chain

16 A segment of DNA has nine (9) nucleotides. How many codons are represented in this segment?
1 1
2 2
3 3
4 4

17 What are the basic structural units of a DNA molecule?
1 glucose
2 lipids
3 amino acids
4 nucleotides

18 DNA and RNA molecules are similar in that they both contain
1 nucleotides
2 a double helix
3 deoxyribose sugars
4 thymine

19 The presence of which nitrogen base indicates that the molecule associated with the ribosome is RNA?
1 guanine
2 uracil
3 cytosine
4 adenine

20 The replication of a double-stranded DNA molecule begins when the strands separate at the
1 phosphate bonds
2 deoxyribose molecules
3 ribose molecules
4 hydrogen bonds