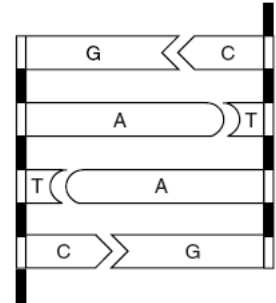
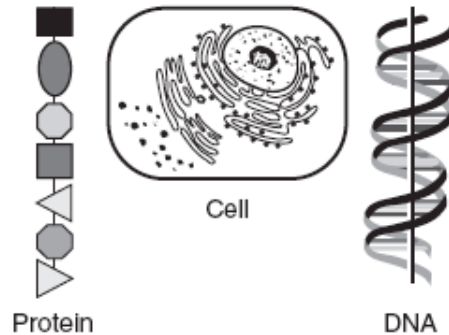


**REGENTS REVIEW: PROTEIN SYNTHESIS**

1. The diagram at the right represents a portion of a type of organic molecule present in the cells of organisms. What will most likely happen if there is a change in the base sequence of this molecule?

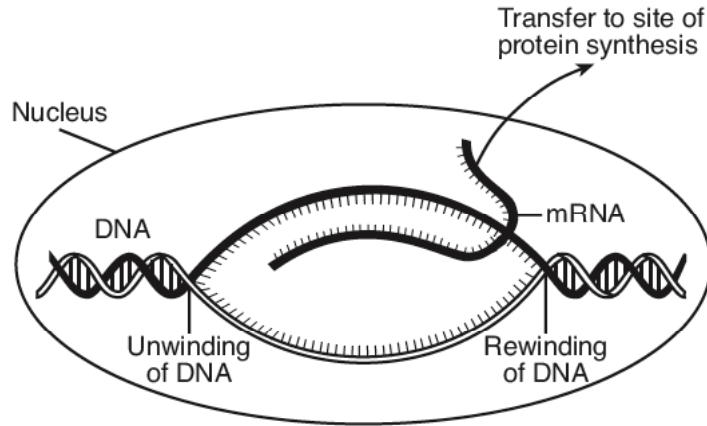


- The molecule will be converted into an inorganic compound.
  - The amino acid sequence may be altered during protein synthesis.
  - The chromosome number will decrease in future generations.
  - The chromosome number may increase within the organisms.
2. Three structures are represented in the diagram below. What is the relationship between these three structures?



- DNA is made up of proteins that are synthesized in the cell.
  - Protein is composed of DNA that is stored in the cell.
  - DNA controls the production of protein in the cell.
  - The cell is composed only of DNA and protein.
3. Which organelle is correctly paired with its specific function?
- cell membrane—storage of hereditary information
  - chloroplast—transport of materials
  - ribosome—synthesis of proteins
  - vacuole—production of ATP

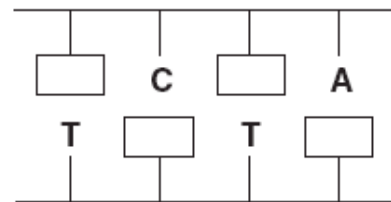
4. The diagram below shows some of the steps in protein synthesis.



The section of DNA being used to make the strand of mRNA is known as a

- a. carbohydrate
  - b. gene
  - c. ribosome
  - d. chromosome
5. An error in genetic information present in a body cell of a mammal would most likely produce
- a. rapid evolution of the organism in which the cell is found
  - b. a mutation that will affect the synthesis of a certain protein in the cell
  - c. an adaptation that will be passed on to other types of cells
  - d. increased variation in the type of organelles present in the cell

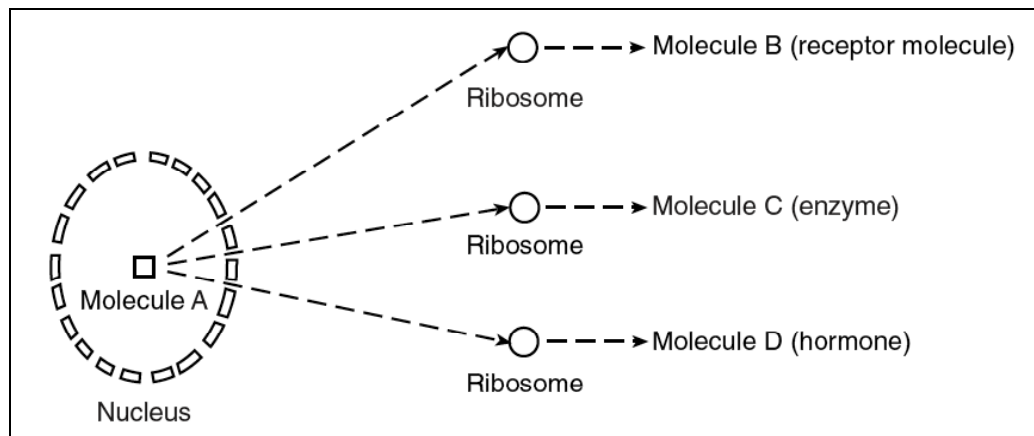
6. The diagram at the right represents an incomplete section of a DNA molecule. The boxes represent unidentified bases. When the boxes are filled in, the total number of bases represented by the letter A (both inside and outside the boxes) will be



- a. 1
- b. 3
- c. 2
- d. 4

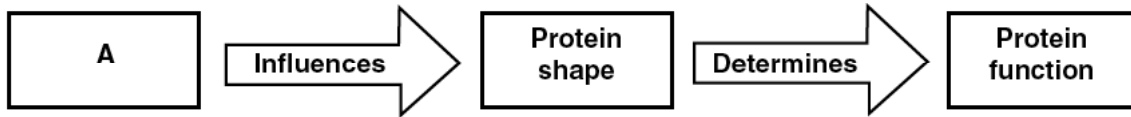
7. A human liver cell is very different in structure and function from a nerve cell in the same person. This is best explained by the fact that
- different genes function in each type of cell
  - liver cells can reproduce while the nerve cells cannot
  - liver cells contain fewer chromosomes than nerve cells
  - different DNA is present in each type of cell

**Directions:** Base your answers to questions 8 and 9 on the diagram below, which represents a sequence of events in a biological process that occurs within human cells and on your knowledge of biology.



8. Molecule *A* contains the
- starch necessary for ribosome synthesis in the cytoplasm
  - organic substance that is broken down into molecules *B*, *C*, and *D*
  - proteins that form the ribosome in the cytoplasm
  - directions for the synthesis of molecules *B*, *C*, and *D*
9. Molecules *B*, *C*, and *D* are similar in that they are usually
- |                                    |  |
|------------------------------------|--|
| a. composed of genetic information | c. involved in the synthesis of antibiotics          |
| b. composed of amino acids         | d. involved in the diffusion of oxygen into the cell |

10. The diagram below provides some information concerning proteins.



Which phrase is represented by A?

- a. sequence of amino acids
- b. sequence of simple sugars
- c. sequence of starch molecules
- d. sequence of ATP molecules

Base your answer to question 11 on the portion of the mRNA codon chart and information below.

AUU } AUC } <b>ILE</b> AUA } (Isoleucine)	ACU } ACC } <b>THR</b> ACA } (Threonine) ACG }	AAU } <b>ASN</b> AAC } (Asparagine)	AGU } <b>SER</b> AGC } (Serine)
AUG } <b>MET</b> (Methionine)	AAA } <b>LYS</b> AAG } (Lysine)	AGA } <b>ARG</b> AGG } (Arginine)	

11. Series I represents three mRNA codons. Series II includes a mutation of series I.

Series I      AGAUCGAGU  
Series II     ACAUCGAGU

How would the amino acid sequence produced by the mutant strand (series II) compare to the amino acid sequence produced by series I?

- a. The amino acid sequence would be shorter.
- b. One amino acid in the sequence would change.
- c. The amino acid sequence would remain unchanged.
- d. More than one amino acid in the sequence would change.

Base your answers to questions 12 through 14 on the information and chart below and on your knowledge of biology.

In DNA, a sequence of three bases is a code for the placement of a certain amino acid in a protein chain. The table below shows some amino acids with their abbreviations and DNA codes.

Amino Acid	Abbreviation	DNA Code
Phenylalanine	Phe	AAA, AAG
Tryptophan	Try	ACC
Serine	Ser	AGA, AGG, AGT, AGC, TCA, TCG
Valine	Val	CAA, CAG, CAT, CAC
Proline	Pro	GGA, GGG, GGT, GGC
Glutamine	Glu	GTT, GTC
Threonine	Thr	TGA, TGG, TGT, TGC
Asparagine	Asp	TTA, TTG

12. Which amino acid chain would be produced by the DNA base sequence below?

**C-A-A-G-T-T-A-A-A-T-T-A-T-T-G-T-G-A**

- (1) Val Glu Phe Asp Thr Asp  
(2) Val Pro Phe Asp Asp Thr  
(3) Val Glu Phe Asp Asp Thr  
(4) Val Glu Phe Thr Asp Asp

13. Identify one environmental factor that could cause a base sequence in DNA to be changed to a different base sequence.

\_\_\_\_\_

14. Describe how a protein would be changed if a base sequence mutates from GGA to TGA.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Base your answers to questions 15 through 17 on the table below, which represents the DNA codes for several amino acids.

Amino Acid	DNA Code Sequence
Cysteine	ACA or ACG
Tryptophan	ACC
Valine	CAA or CAC or CAG or CAT
Proline	GGA or GGC or GGG or GGT
Asparagine	TTA or TTG
Methionine	TAC

15. A certain DNA strand has the base sequence: **TACACACAAACGGGG**. In the space provided below, write the sequence of amino acids synthesized from this code if it is read from left to right.

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16. The DNA sequence undergoes the following change:

**TACACACAAACGGGG → TACACCCAAACGGGG**

How would the sequence of amino acids be changed as a result of this mutation?

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17. The original DNA sequence undergoes the following change:

**TACACACAAACGGGG → TACACACAAACGGGT**

State *one* reason this mutation produces *no change* in the action of the final molecule that will be synthesized from this code.

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