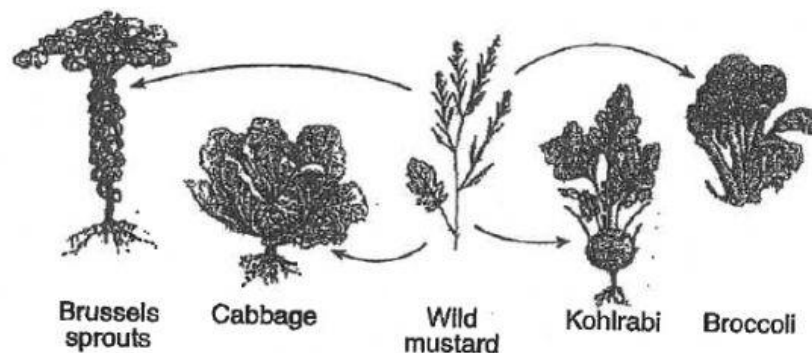


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### Living Environment – Topic 3 Practice

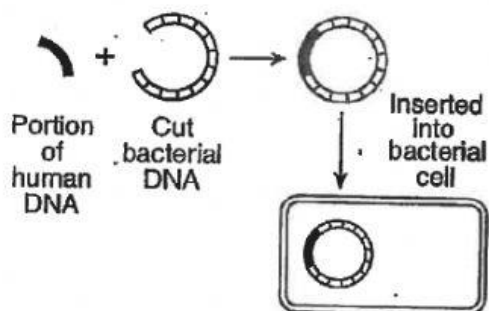
- 1) The arrows in the diagram below indicate the development of four different varieties of vegetable plants from wild mustard.



Each of these varieties was most likely produced as a result of

- A) changes in light availability  
 B) asexual reproduction in the wild for many years  
 C) selective breeding over many generations  
 D) competition between plants

- 2) The diagram below represents a technique used in some molecular biology laboratories.

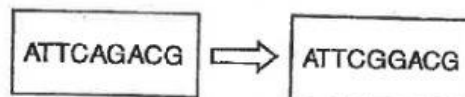


What type of technique does this represent?

- A) chromatography  
 B) genetic engineering  
 C) direct harvesting  
 D) gel electrophoresis

- 3) The shape of a protein is most directly determined by the
- A) kind and sequence of amino acids in the protein  
 B) amount of energy available for synthesis of the protein  
 C) type and number of DNA molecules in a cell  
 D) mistakes made when the DNA is copied

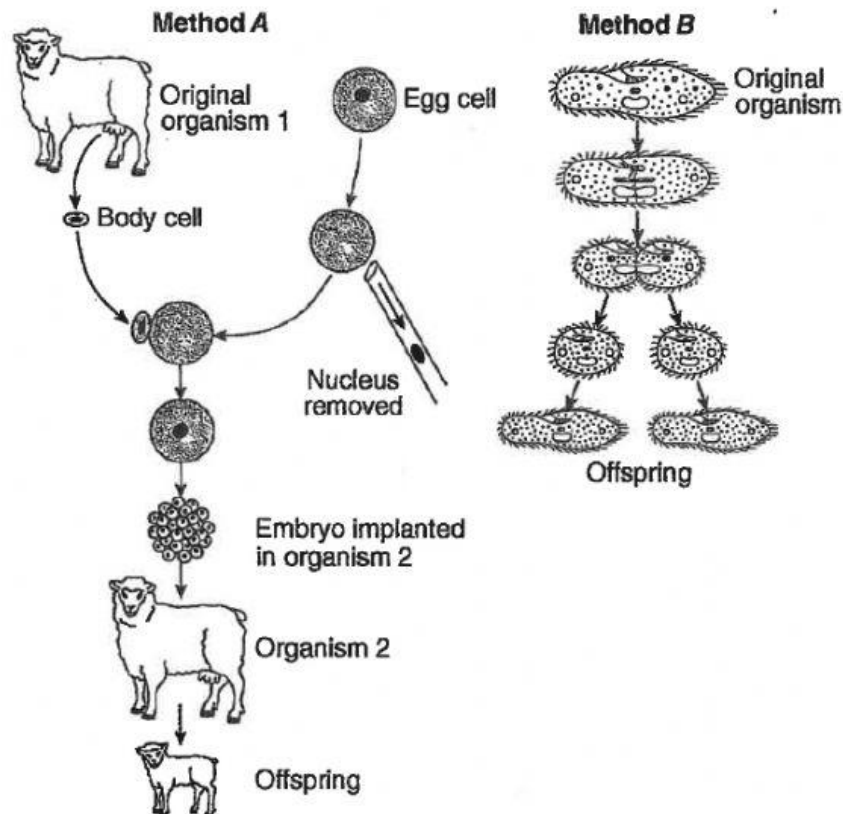
- 4) The diagram below represents one process that might occur in cells.



Which process is represented in the diagram?

- A) meiosis  
 B) mutation  
 C) gene replication  
 D) cell reproduction

\_\_\_ 5) Two methods of reproduction are represented in the diagram below.



How does the DNA in the offspring produced by these methods compare to the DNA in the original organism?

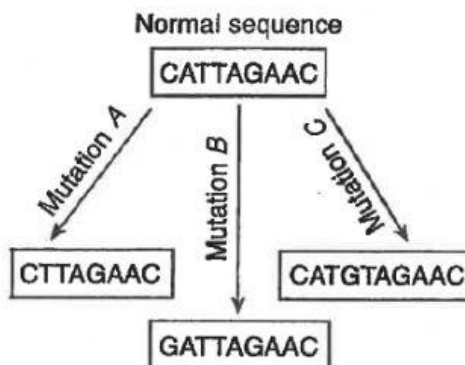
- A) The DNA in the offspring is genetically identical to that of the original organism in both methods.
- B) The number of DNA bases is less than that of the original organism in method A, but more than the original number in method B.
- C) The offspring contain half the original number of chromosomes in each method.
- D) The offspring produced by method A contain twice the original number of genes, while those produced by method B contain half the original number of genes.

\_\_\_ 6) Cotton plants produce seeds that contain high-quality protein. This protein could be used as a food source except that the seeds are poisonous to humans. Recently, scientists have inserted a section of DNA into the cotton plants that makes the cotton seeds nonpoisonous. The technique for this procedure is known as

- A) cloning
- B) direct harvesting
- C) gene manipulation
- D) reproduction

7)

The diagram below shows a normal gene sequence and three mutated sequences of a segment of DNA.



Which row in the chart below correctly identifies the cause of each type of mutation?

Row	Mutation A	Mutation B	Mutation C
(1)	deletion	substitution	insertion
(2)	insertion	substitution	deletion
(3)	insertion	deletion	substitution
(4)	deletion	insertion	substitution

A) Row 1

B) Row 2

C) Row 3

D) Row 4

8)

A sample of body cells and samples of sex cells received from four members of a species are screened for the presence of a specific gene mutation. The results of the gene-testing procedure conducted on the cells are shown in the table below.

Species Member Tested	Type of Cells Tested and the Result (+ = mutation present, - = mutation absent)		
	Body Cells	Sperm	Egg
1	+		+
2	+	+	
3	-		+
4	+	-	

Which species member would be unlikely to pass the gene mutation on to its offspring?

A) 1

C) 3

B) 2

D) 4

9)

The way a protein molecule is folded determines the shape of the molecule, which determines the

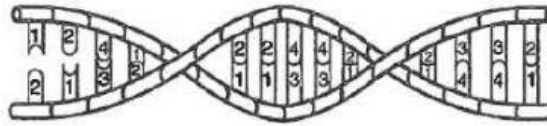
- A) function of that protein
- B) structure of ATP containing that protein
- C) amino acids in that protein
- D) type of simple sugars in that protein

10)

The DNA of a fly and the DNA of a gorilla are made up of subunits that are

- A) different bases in each of the two species
- B) arranged in the same order in both species
- C) in different sequences in each of the two species
- D) arranged in chains of the same length in both species

- \_\_\_ 11) Part of a molecule found in cells is represented below.



Which process is most directly affected by the arrangement of components 1 through 4?

- A) sequencing of amino acids in cells  
B) diffusion through cell membranes  
C) fertilization of a sex cell  
D) increasing the number of cells in an organism
- \_\_\_ 12) A scientist wants to change the DNA of a sexually reproducing organism and have the new DNA present in every cell of the organism. In order to do this after fertilization, she would change the DNA in the
- A) zygote  
B) ovaries of the mother  
C) placenta  
D) testes of the father
- \_\_\_ 13) Which mutation in a fruit fly could be passed on to its offspring?
- A) a mutation in a cell of an eye that changes the color of the eye  
B) a mutation in a leg cell that causes the leg to be shorter  
C) a mutation in a sperm cell that changes the shape of the wing  
D) a mutation in a cell of the digestive tract that produces a different enzyme
- \_\_\_ 14) A deletion of a DNA segment alters a gene in a single skin cell of an individual. Which statement *best* describes a result of this mutation?
- A) Any cell produced from this skin cell will have the same mutation.  
B) The gametes of this individual will have the same mutation.  
C) The mutation will spread into other types of cells.  
D) All offspring of the individual will have a skin cell mutation.

- \_\_\_ 15) Four different segments of a DNA molecule are represented below.

Segment 1	Segment 2	Segment 3	Segment 4
T-A-G-G-C	G-G-T-G-A	G-A-T-T-A	C-A-A-T-G
A-T-C-C-G	C-C-A-C-T	C-C-A-A-T	G-T-T-A-C

There is an error in the DNA molecule in

- A) segment 1, only  
B) segments 2 and 3  
C) segment 3, only  
D) segments 2 and 4
- \_\_\_ 16) When changes occur in the genes of sex cells, these changes
- A) lead to mutations in the parent organism  
B) are always harmful to the offspring  
C) can be the basis for evolutionary change  
D) only affect asexually reproducing organisms
- \_\_\_ 17) The pedigree of Seattle Slew, a racehorse considered by some to be one of the fastest horses that ever lived, includes very fast horses on both his mother's side and his father's side. Seattle Slew most likely was a result of
- A) environmental selection  
B) alteration of DNA molecules  
C) selective breeding  
D) a sudden mutation
- \_\_\_ 18) Domestic horses have a greater diversity of coat colors than that of wild horses. The process that led to a greater diversity of coat colors in domestic horses is
- A) random mutation  
B) selective breeding  
C) natural selection  
D) gene alteration
- \_\_\_ 19) An alteration of genetic information is shown below.

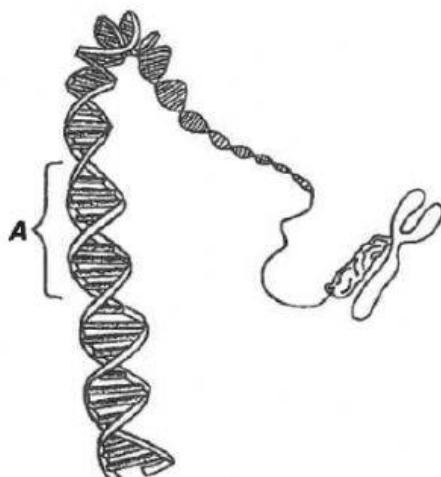
A-G-T-A-C-C-G-A-T → A-G-T-G-A-T

This type of alteration of the genetic information is an example of

- A) deletion  
B) insertion  
C) recombination  
D) substitution



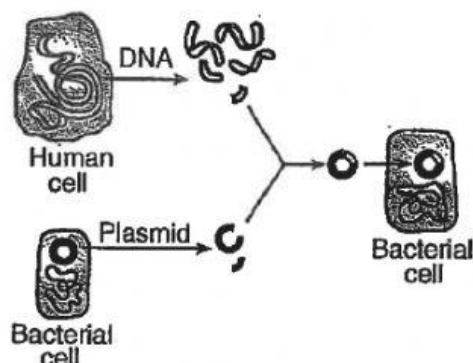
- 20) The diagram below represents a structure found in most cells.



The section labeled A in the diagram is most likely a

- A) biological catalyst  
 B) part of a gene for a particular trait  
 C) protein composed of folded chains of base subunits  
 D) chromosome undergoing a mutation
- 21) In sexually reproducing organisms, mutations can be inherited if they occur in
- A) any body cell of either the mother or the father  
 B) the sperm, only  
 C) either the egg or the sperm  
 D) the egg, only
- 22) Even though identical twins have the same genetic material, they may develop slightly different characteristics because
- A) each twin receives different chromosomes from the egg  
 B) one twin may only have genes from the father  
 C) gene expression may be influenced by factors that switch genes on and off  
 D) a gene mutation may have occurred before the zygote divided
- 23) Selective breeding is a technique that is used to
- A) produce organisms from extinct species  
 B) give all organisms a chance to reproduce  
 C) produce offspring with certain desirable traits  
 D) keep farm crops free of all mutations

- 24) Which one of the following sets of terms correctly identifies the procedure shown in the diagram below and a substance produced by this procedure?



- A) genetic engineering — insulin  
 B) replicating — glucose  
 C) cloning — antibiotics  
 D) selective breeding — growth hormone
- 25) Throughout the history of life on Earth, many processes have resulted in new traits in organisms. Which list shows some of these processes in order from the oldest to the most recently used?
- A) gene manipulation, natural selection, selective breeding  
 B) selective breeding, gene manipulation, natural selection  
 C) natural selection, gene manipulation, selective breeding  
 D) natural selection, selective breeding, gene manipulation
- 26) The shape of a protein is originally determined by the
- A) location of the protein within the cell  
 B) arrangement of amino acids in the protein  
 C) function the protein must carry out  
 D) size of the protein molecule
- 27) Some diseases and their causes are listed below.
- A. Flu — influenza virus  
 B. Lung cancer — smoking  
 C. Cystic fibrosis — genes  
 D. Dysentery — parasitic amoeba
- Which disease would individuals have the *greatest* difficulty preventing in themselves?
- A) A  
 B) B  
 C) C  
 D) D
- 28) Which one of the following statements *best* describes a human chromosome?
- A) It is normally passed to the next generation through a placenta.  
 B) It varies in function from one generation to the next.  
 C) It is made of amino acid subunits that form genes.  
 D) It contains genes that may code for the production of enzymes.