1. Many years ago, a scientist grew pea plants that produced wrinkled peas. The peas from these plants produced new plants that also produced wrinkled peas. The scientist concluded that something in the parent plants was being transmitted to the next generation. This discovery is now known as

   1) genetic engineering
   2) biological evolution
   3) heredity
   4) natural selection

2. Selective breeding has been used for thousands of years to

   1) develop bacteria that produce human insulin
   2) clone desirable plant varieties
   3) develop viruses that protect against diseases
   4) produce new varieties of domestic animals

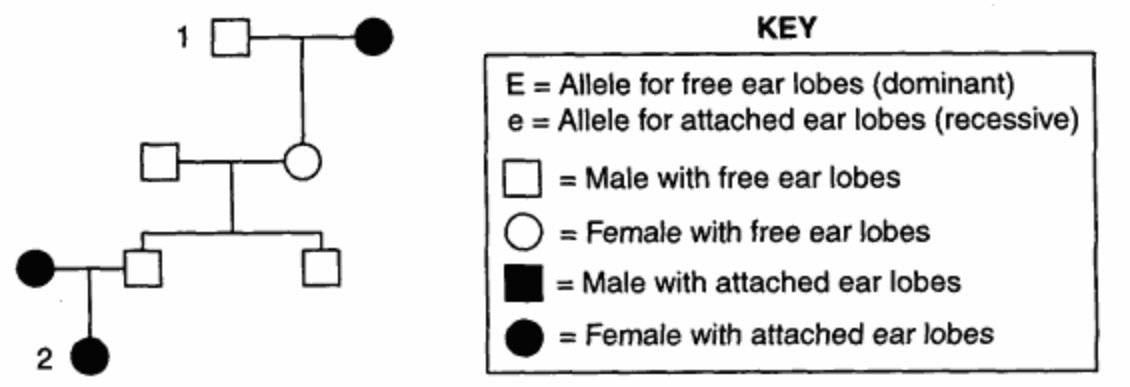
3. The processes of deletion, insertion, and substitution can alter genes in a skin cell. The altered genes will most likely be passed on to

   1) sperm cells
   2) egg cells
   3) every cell that develops from that skin cell
   4) only a few of the cells that develop from that skin cell

4. A child has brown hair and brown eyes. His father has brown hair and blue eyes. His mother has red hair and brown eyes. Which statement *best* explains why the child has brown hair and brown eyes?

   1) a gene mutation occurred that resulted in brown hair and brown eyes
   2) gene expression must change in each generation so evolution can occur
   3) the child received genetic information from each parent
   4) cells from his mother's eyes were present in the fertilized egg

Base your answers to questions **5** and **6** on the pedigree chart below, which shows a history of ear lobe shape, and on your knowledge of biology.



5. The genotype of individual 2 could be

   1) *EE*, only 2) *Ee*, only **3) *ee*** 4) *EE* or *Ee*

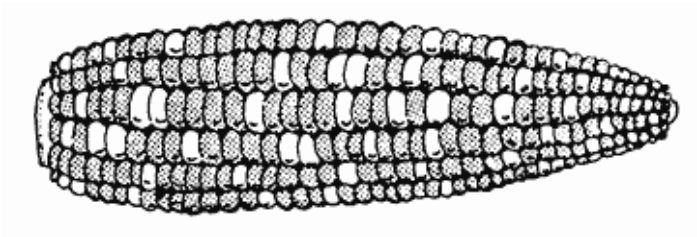
6. What could the genotype of individual 1 be?

   1) *EE*, only 2) *Ee*, only 3) *ee* **4) *EE* or *Ee***

7. In a certain species of mouse, gray fur (*G*) is dominant over cream-colored fur (*g*). If a homozygous gray mouse is crossed with a cream-colored mouse, the genotype of the F_1 generation will most likely be

   1) 100% *Gg*
   2) 50% *GG* and 50% *gg*
   3) 25% *GG*, 50% Gg, and 25% *gg*
   4) 75% *Gg* and 25% *gg*

8. Kernel color in corn is a trait determined by two alleles. The dominant allele (*P*) produces a purple color, and the recessive allele (*p*) produces a yellow color. The diagram below shows an ear of corn produced by crossing two corn plants. The shaded kernels are purple, and the unshaded ones are yellow.



What can the yellow kernels *best* be described as?

1) homozygous dominant
2) heterozygous
3) hybrid
4) homozygous recessive

9. Which statement best explains the fact that some identical twins appear different from one another?

   1) Their DNA is essentially the same and the environment plays little or no role in the expression of their genes.
   2) Their DNA is very different and the environment plays a significant role in the expression of their genes.
   3) Their DNA is very different and the environment plays little or no role in the expression of their genes.
   4) Their DNA is essentially the same and the environment plays a significant role in the expression of their genes.

10. Which statement is an accurate description of genes?

   1) Proteins are made of genes and code for DNA.
   2) Genes are made of proteins that code for nitrogen bases.
   3) DNA is made of carbohydrates that code for genes.
   4) Genes are made of DNA and code for proteins.

11. A human skin cell contains 46 chromosomes. A frog sperm cell contains 12 chromosomes. Which pair of numbers shows the chromosome number of a normal gamete from each of these species?

   1) human 46; frog 12
   2) human 46; frog 24
   3) human 23; frog 24
   4) human 23; frog 12

12. Which sequence correctly represents the arrangement of structures containing genetic material, from the largest to the smallest size?

   1) chromosome → gene → nucleus
   2) nucleus → chromosome → gene
   3) gene → chromosome → nucleus
   4) gene → nucleus → chromosome

13. The human liver contains many specialized cells that secrete bile. Only these cells produce bile because

   1) different cells use different parts of the genetic information they contain
   2) cells can eliminate the genetic codes that they do not need
   3) all other cells in the body lack the genes needed for the production of bile
   4) these cells mutated during embryonic development

14. A strand of DNA in a skin cell contains the bases:

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

   After the cell is exposed to ultraviolet light, the strand contains the bases:

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

   Which statement describes the result of this exposure?

   1) A new base has been inserted.
   2) A base has been deleted.
   3) One base has been substituted for another.
   4) There have been no changes in the bases.

15. The fruit fly represented in the diagram below has unusual, curled wings that formed after exposure to radiation.

   In order for the fly to pass this trait on to its offspring, a change had to occur in

   1) the blood cells of the fly
   2) the gametes of the fly
   3) all the body cells of the fly
   4) the muscles of the fly

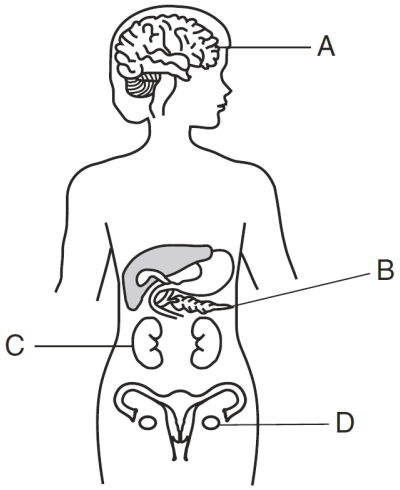
16. It is recommended that people avoid excessive use of tanning beds. Exposure to the radiation emitted by tanning beds can cause skin cancer. This cancer is the direct result of a

1) change in a starch molecule
2) mutation in the genetic material
3) mutation in a protein
4) change in a fat molecule

17. Some weed killers, insecticides, and food additives alter the DNA of certain cells. Because of this effect, these substances are known as

1) parasites
2) mutagens
3) contagions
4) producers

18. Some organs in the human body are represented in the diagram below.



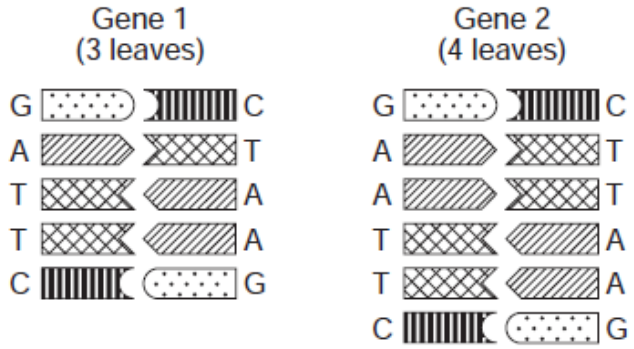
A sudden change in the DNA of cells developing in which organ could be passed to future generations?

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

19. The sickle-cell trait is an inherited condition resulting from the presence of abnormal molecules of the protein hemoglobin in red blood cells. A person with the sickle-cell trait may have a child with the same condition because the child receives from the parent

1) abnormal red blood cells
2) abnormal hemoglobin molecules
3) a code for the production of abnormal hemoglobin
4) a code for the production of abnormal amino acids

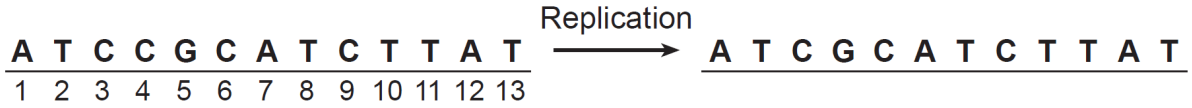
20. The diagrams below represent portions of two genes that code for leaf structure in the same species of clover. Gene 1 was taken from the cells of a clover plant with 3 leaves and gene 2 was taken from the cells of a clover plant with 4 leaves.



The clover plant having gene 2 (4 leaves) was most likely the result of

1) an insertion
2) a deletion
3) a substitution
4) normal replication

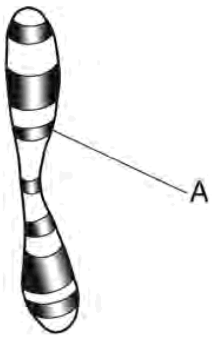
21. The diagram below shows an alteration that occurred during the replication process of a portion of a gene. The numbers identify the locations of specific bases in the sequence



This alterations is most likely the result of

1) a substitution at base 2
2) a deletion of base 2
3) an insertion of base 3
4) a deletion of base 4

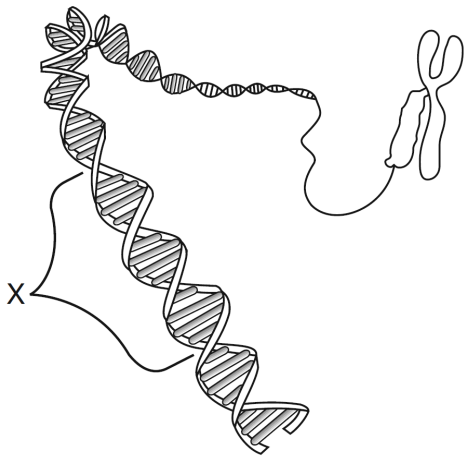
22. Human genetic material is represented in the diagram below.



The region labeled A is made up of a section of

1) a protein that becomes an enzyme
2) DNA that may direct protein synthesis
3) a carbohydrate made from amino acids
4) glucose that may be copied to make DNA

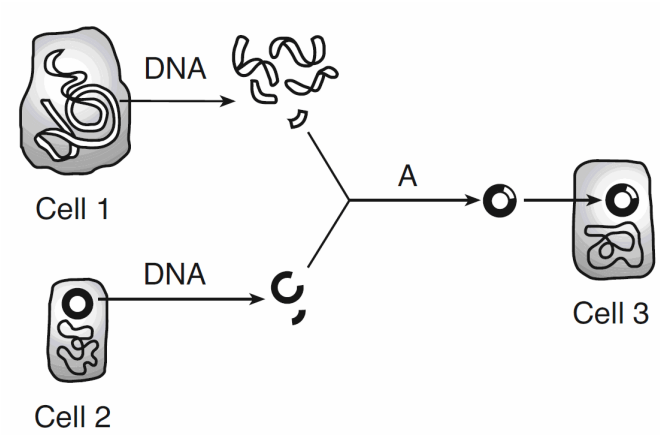
23. The diagram below represents genetic material.



The expression of the section labeled *X* may be modified by

1) temperature, only
2) asexual reproduction
3) the environment
4) pH, only

24. A laboratory technique is represented in the diagram below. Letter *A* represents a process.



Which specific chemicals are needed to successfully carry out the process shown at *A*?

1) receptor molecules 2) carbohydrates
3) enzymes 4) starch molecules

25. In a DNA sample, 15% of the bases are thymine (T). What percentage of the bases in this sample are adenine (A)?

1) 15% 2) 30% 3) 35% 4) 85%

26. In a portion of a gene, the nitrogenous base sequence is T-C-G-A-A-T. Which nitrogenous base sequence would normally be found bonded to this section of the gene?

1) A-C-G-T-A-A 2) A-C-G-U-U-A
3) A-G-C-T-T-A 4) U-G-C-A-A-U

27. A DNA nucleotide may contain

1) deoxyribose, cytosine, and a lipid
2) deoxyribose, thymine, and a phosphate group
3) ribose, uracil, and a polypeptide
4) ribose, adenine, and thymine

28. The molecule DNA contains the four bases listed below.

A – adenine
C – cytosine
G – guanine
T – thymine

Which base pairings normally occur during DNA replication?

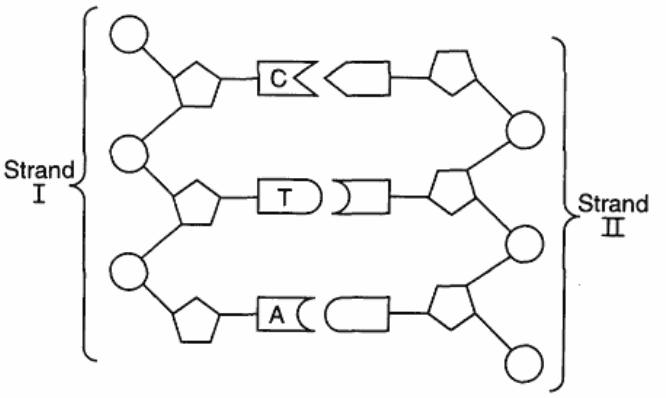
1) Guanine pairs with cytosine. Thymine pairs with thymine.
2) Adenine pairs with thymine. Cytosine pairs with guanine.
3) Thymine pairs with guanine. Cytosine pairs with adenine.
4) Cytosine pairs with cytosine. Thymine pairs with thymine.

29. Which nuclear process is represented below?

A DNA molecule untwists. → The two strands of DNA separate. → Molecular bases pair up. → Two identical DNA molecules are produced.

1) recombination 2) fertilization **3) replication** 4) mutation

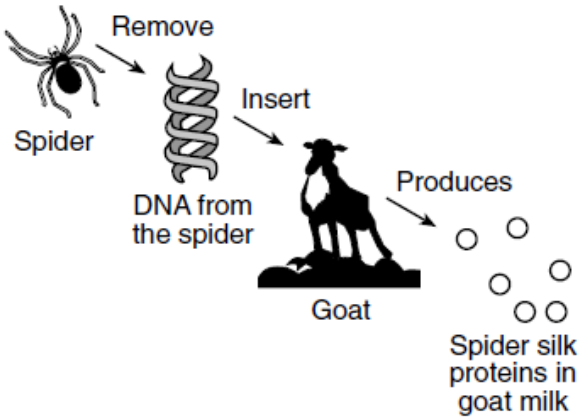
30. In the diagram below, strands I and II represent portions of a DNA molecule.



Strand II would normally include

1) AGC 2) TCG 3) TAC **4) GAT**

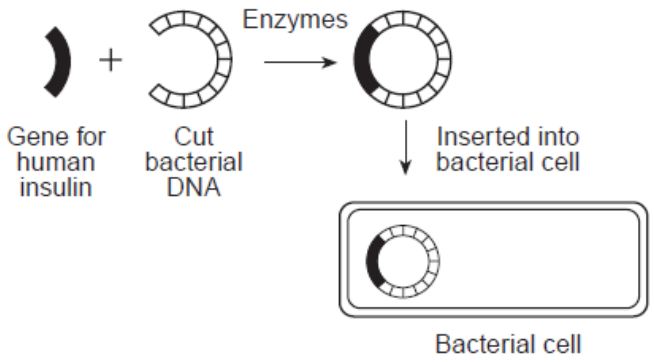
31. A sequence of events is represented in the diagram below.



Which statement best describes a result of this process?

1) The spider from which the DNA sample was obtained can no longer produce spider silk.
2) The goat milk now contains DNA molecules made of spider silk proteins.
3) Both the spider and the goat can now produce both spider silk and goat milk.
4) **Spider silk proteins can now be produced in large quantities without killing spiders to obtain them.**

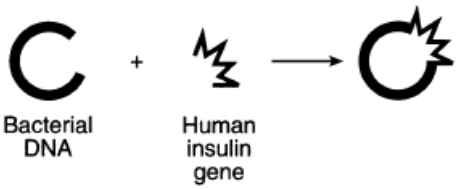
32. The diagram below represents some steps in a procedure used in the field of biotechnology.



This bacterial cell can now be used to produce

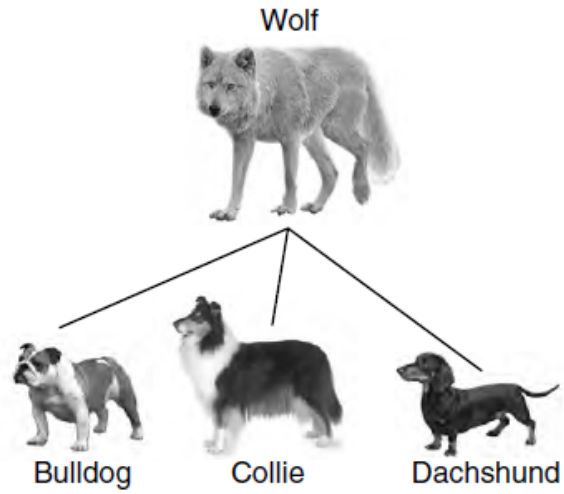
1) the bacterial gene for insulin that can be inserted into humans
2) human genes for enzymes that can be inserted into humans
3) insulin that can be used by humans
4) enzymes necessary to treat human diseases

33. The process shown below is used to



1) determine if a person has a genetic disease
2) produce human growth hormone
3) identify the father of a newborn
4) produce a hormone to regulate blood sugar

34. The diagram below indicates a few of the many varieties of domestic dogs thought to have originated from wolves that were domesticated thousands of years ago.



(Not drawn to scale)

Adapted from: http://evolution.berkeley.edu/evolibrary/article

The many varieties of domesticated dogs were most likely produced as a result of

1) mutating the body cells of the dogs
2) selective breeding over many generations
3) genetic engineering with specific enzymes
4) cloning dogs with desirable traits

35. The headline “Improved Soybeans Produce Healthier Vegetable Oils” accompanies an article describing how a biotechnology company controls the types of lipids (fats) present in soybeans. The improved soybeans are most likely being developed by the process of

1) natural selection
2) asexual reproduction
3) genetic engineering
4) habitat modification

Answer Key
Exam 5.1 Practice 3.15.2019

1. **3**
2. **4**
3. **3**
4. **3**
5. **3**
6. **4**
7. **1**
8. **4**
9. **4**
10. **4**
11. **4**
12. **2**
13. **1**
14. **1**
15. **2**
16. **2**
17. **2**
18. **4**
19. **3**
20. **1**
21. **4**
22. **2**
23. **3**
24. **3**
25. **1**
26. **3**
27. **2**
28. **2**
29. **3**
30. **4**
31. **4**
32. **3**
33. **4**
34. **2**
35. **3**