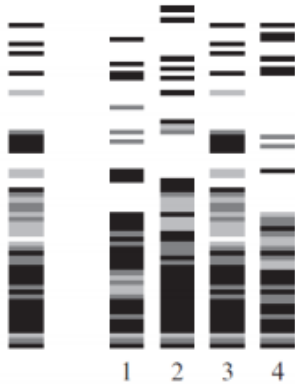


Biology Milestone: Unit 3 Topics (Growth and Heridity)

Multiple Choice

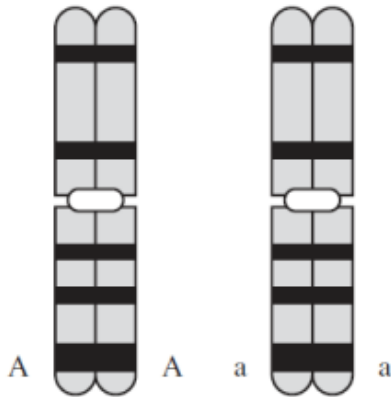
Identify the choice that best completes the statement or answers the question.

- _____ 1. The diagram shows the DNA fingerprints from a blood sample and four different hair samples. Based on the DNA fingerprints, which hair sample came from the same organism as the blood sample?



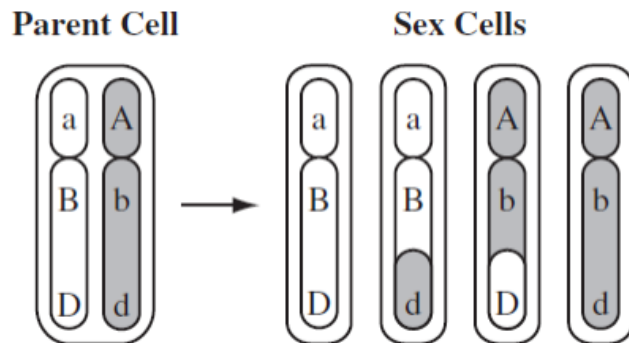
Blood Sample Hair Samples

- a. Hair Sample 1
 b. Hair Sample 2
 c. Hair Sample 3
 d. Hair Sample 4
- _____ 2. The diagram shows a pair of homologous chromosomes in a cell prior to the first division of meiosis. After completing meiosis, what percentage of the male sex cells would contain a chromosome with the dominant allele "A"?



- a. 0%
 b. 25%
 c. 50%
 d. 100%

3. The diagram shows the results of meiosis. The parent cell has one pair of chromosomes. The locations of three genes are shown on each chromosome. Why are the chromosomes in two of the sex cells different from the chromosomes in the parent cell?



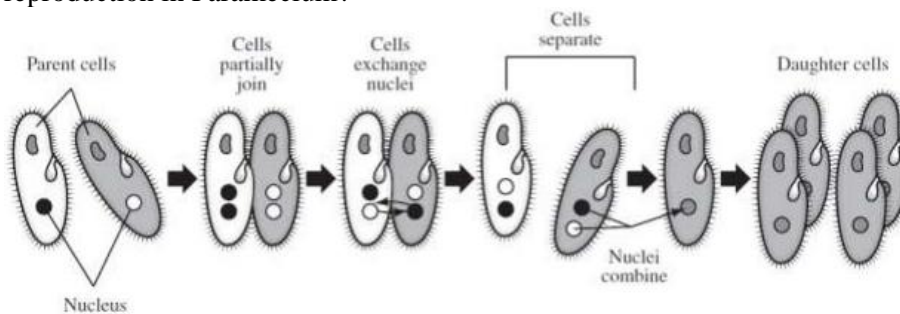
- a. crossing over occurred in the chromosome
 b. an insertion mutation occurred during replication
 c. some of the genes were damaged during replication
 d. the chromosomes from another parent cell were introduced

4. Use this information to answer the question. Plants with the genotype $RrYy$ are crossed with plants with the genotype $rryy$. What is the probability of an offspring with round, yellow seeds?

Alleles and Traits in Pea Plants	
R – round seeds	Y – yellow seeds
r – wrinkled seeds	y – green seeds

- a. 10%
 b. 25%
 c. 50%
 d. 100%

5. This diagram shows a form of reproduction in Paramecium. What is the advantage of this type of reproduction in Paramecium?



- a. a greater number of offspring are produced
 b. the genetic variability in offspring is increased
 c. a more accurate form of DNA replication occurs
 d. the exchange of genetic information is decreased

6. People who have Tay-Sachs disease cannot metabolize some lipids effectively. Tay-Sachs is a recessive disorder. A student used a Punnett square to determine the probability of offspring inheriting the disease. The results from a Punnett Square are 25% TT, 50% Tt, and 25% tt. (T represents the dominant allele for this condition; t represents the recessive allele.)

Which conclusion can be made regarding the genotypes of the parents and the probability of inheriting a Tay-Sachs allele?

- The parents must be TT and tt, which yields a 25% chance of expressing the disease.
- The parents must be Tt and tt, which yields a 50% chance of inheriting an allele for the disease.
- The parents must be TT and TT, which yields a 25% chance of inheriting an allele for the disease.
- The parents must be Tt and Tt, which yields a 75% chance of inheriting an allele for the disease.

7. After conducting several tests, a scientist determines that the nucleic acid sample he is studying has the following characteristics:

- Contains nucleotides linked in a chain
- Contains 4 nitrogen bases
- Made of single strand
- Uracil is present

What is the BEST conclusion the scientist can make based on the observations?

- The nucleic acid is DNA.
- The nucleic acid is RNA
- The nucleic acid is a protein.
- More tests would be needed to determine the type of nucleic acid in the sample.

8. Scientists have studied organisms near steel mills. In one study, the scientists compared the DNA of two groups of mice. One group lived near a steel mill, and the other group lived in a rural area away from the steel mill. The scientists collected data on the number of mutations occurring in each group and created the table shown.

Which prediction can be made from this data?

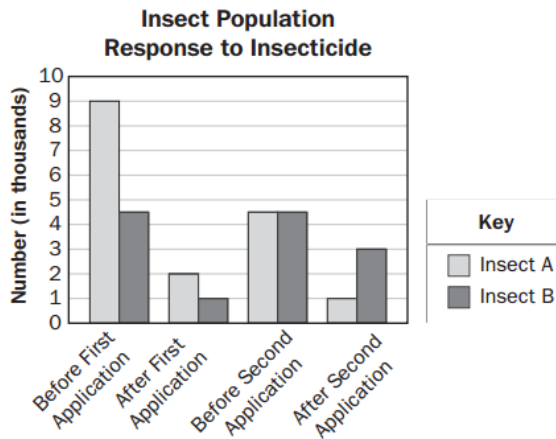
Gene Mutations in Mice

Population Group	Gene	Mice Offspring Counted	Number of DNA Genes Counted	Number of Mutant Genes of DNA	Percent Gene Mutation (%)
Rural	Ms6-hm	110	234	51	21.79
	Hm-2	96	150	23	15.33
Total			384	74	19.27
Steel Mill	Ms6-hm	94	188	50	26.60
	Hm-2	75	96	30	31.25
Total			284	80	28.17

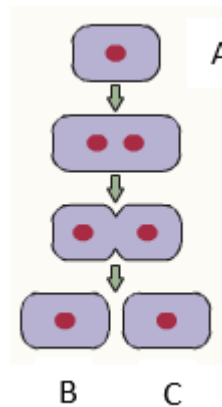
- Mice that live in rural areas will have more genes expressed than mice near steel mills.
- Mice that live near steel mills will have more genes expressed than mice in rural areas.
- Mice that live in rural areas will have higher rates of abnormalities due to mutations than mice near steel mills.
- Mice that live near steel mills will have higher rates of abnormalities due to mutations than mice in rural areas.

9. Scientists and farmers studied how populations of insects on a farm changed after the farmer started using an insecticide on the crops. The diagram shows population sizes, both before and after the insecticide was applied.

What conclusion can be made about the Insect A and Insect B populations?



- a. The insecticide was specific to Insect B.
- b. The insecticide became less effective for Insect A.
- c. Some insects passed a beneficial mutation to offspring.
- d. The farmer missed spraying insecticide on some plants.
10. In 1976, the enzyme DNA helicase was discovered. DNA helicase breaks bonds between nitrogenous bases. Which statement BEST describes how the discovery of DNA helicase furthered the understanding of DNA replication?
- a. It revealed the mechanism by which two DNA strands are “unzipped” from each other.
- b. It resulted in the development of laboratory methods of replicating RNA.
- c. It led scientists to discover that DNA is made up of nucleotides.
- d. It helped uncover the double-helix structure of DNA.
11. After “cell A” completes mitosis, daughter “cells B and C” are produced. What do the circles inside each cell represent?



*Retrieved from *Georgia Biology* by McDougal and Littell

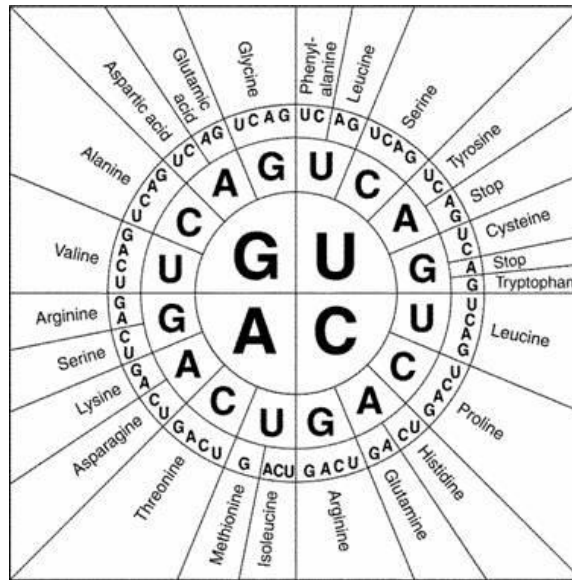
- a. chloroplast
- b. cell wall
- c. nucleus
- d. Cytoplasm

- ___ 12. How would you determine that a cell going through mitosis is a plant cell instead of an animal cell?
- a plant cell creates a cell plate to form the new cell wall
 - a plant cell forms a cleavage furrow to separate the cells
 - a plant cell forms both a cell plate and a cleavage furrow to form two new cells
 - both plant and animal cells are the same when undergoing mitosis
- ___ 13. Frogs have 26 chromosomes in their diploid skin cells. How many chromosomes are found in their haploid gametes?
- 26
 - 52
 - 13
 - 6
- ___ 14. Replicate the following DNA strand:

CCGTACT

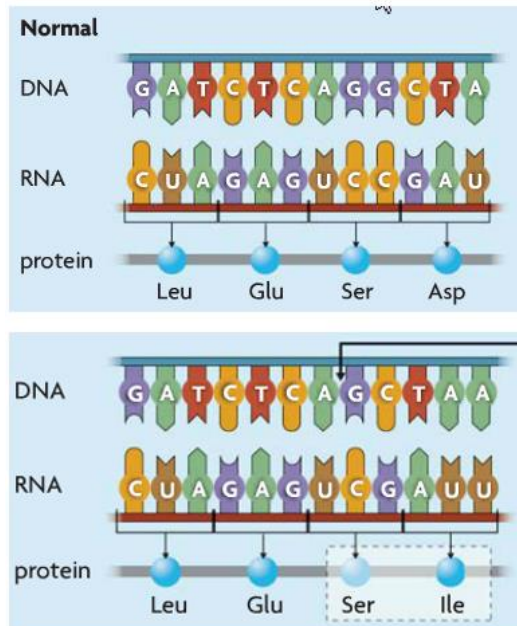
- GGCATGA
 - CCGAUGA
 - CCGTACT
 - GGCTAGT
- ___ 15. Translate the following mRNA sequence:

AUG GAG CGU



- methionine, valine, asparagine
 - isoleucine, glycine, arginine
 - methionine, glutamic acid, arginine
 - isoleucine, glutamic acid, asparagine
- ___ 16. Which of the following are correct statements about the roles of DNA and RNA in a cell?
- DNA contains the genetic instructions used in the development and functioning of living cells.
 - mRNA transfers the genetic code from the nucleus to the ribosome for the creation of proteins.
 - tRNA transfers the amino acid to the ribosome for the creation of proteins.
- I and II only
 - II and III only
 - I and III only
 - I, II, and III
- ___ 17. During replication, the DNA sequence changed from ATCGGA to AACGGA. What type of mutation occurred?
- frameshift
 - point
 - insertion
 - Deletion

_____ 18. The following picture represents a frameshift mutation.

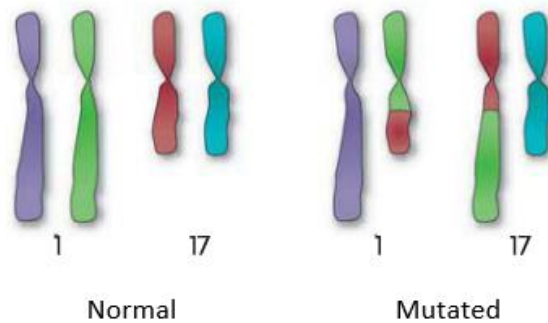


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Which of the following is the cause of THIS frameshift?

- a. insertion
- b. deletion
- c. substitution
- d. inversion

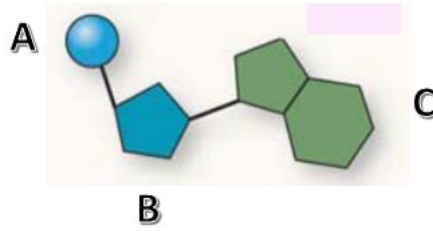
_____ 19. This diagram represents how incorrect crossing over during meiosis can cause mutations. Which specific mutation does this picture represent?



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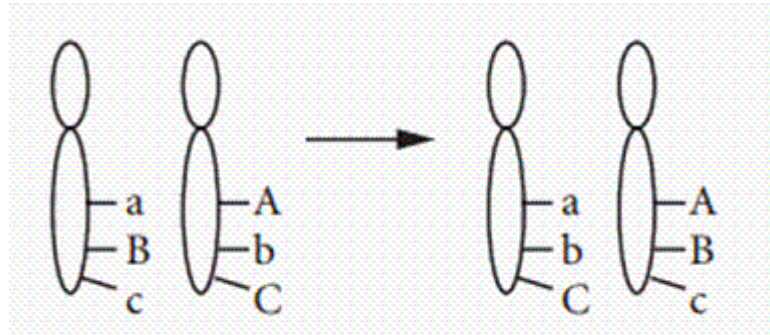
- a. deletion
- b. duplication
- c. inversion
- d. Translocation

___ 20. In a double-stranded DNA molecule, what would “B” attach to in the nucleotide below?



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- a. deoxyribose
 - b. phosphate
 - c. nitrogen base
 - d. ribose
- ___ 21. The allele that causes hemophilia is X-linked recessive. The symbol for the dominant allele is X^H . The symbol for the recessive allele is X^h . If an $X^H X^H$ female and an $X^h Y$ male have children, what percentage of their male offspring would be expected to be hemophiliacs?
- a. 0%
 - b. 50%
 - c. 75%
 - d. 100%
- ___ 22. Genetic disorders can be diagnosed before birth by taking a sample of cells to analyze a picture of the chromosomes which is called _____. If a picture of a patient’s chromosomes show an extra copy of chromosome 21, what is this called?
- a. karyotype; Klinefelter’s syndrome
 - b. sonogram; Turner syndrome
 - c. ultrasound; Down syndrome
 - d. karyotype; Trisomy 21
- ___ 23. The diagram below shows the crossing over of genes on a pair of chromosomes during meiosis. This diagram represents Mendel’s law of



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- a. Independent assortment because genes assort independently
 - b. Independent assortment because genes assort together
 - c. Incomplete dominance because certain genes mask others
 - d. Asexual reproduction because cells inherit identical copies of genes
- ___ 24. What is produced after a complete round of mitosis?
- a. Two genetically unique haploid cells
 - b. Four genetically unique haploid cells
 - c. Two genetically identical diploid cells
 - d. Four genetically identical diploid cells
- ___ 25. Mitosis : Nuclear division :: _____ : Cellular division
- a. interphase
 - b. cytokinesis
 - c. prophase
 - d. anaphase

**Biology Milestone: Unit 3 Topics (Growth and Heridity)
Answer Section**

MULTIPLE CHOICE

- | | |
|------------|--------|
| 1. ANS: C | PTS: 1 |
| 2. ANS: C | PTS: 1 |
| 3. ANS: A | PTS: 1 |
| 4. ANS: B | PTS: 1 |
| 5. ANS: B | PTS: 1 |
| 6. ANS: D | PTS: 1 |
| 7. ANS: B | PTS: 1 |
| 8. ANS: D | PTS: 1 |
| 9. ANS: C | PTS: 1 |
| 10. ANS: A | PTS: 1 |
| 11. ANS: C | PTS: 1 |
| 12. ANS: A | PTS: 1 |
| 13. ANS: C | PTS: 1 |
| 14. ANS: A | PTS: 1 |
| 15. ANS: C | PTS: 1 |
| 16. ANS: D | PTS: 1 |
| 17. ANS: B | PTS: 1 |
| 18. ANS: B | PTS: 1 |
| 19. ANS: D | PTS: 1 |
| 20. ANS: B | PTS: 1 |
| 21. ANS: A | PTS: 1 |
| 22. ANS: D | PTS: 1 |
| 23. ANS: A | PTS: 1 |
| 24. ANS: C | PTS: 1 |
| 25. ANS: B | PTS: 1 |