DNA Technology Exam

Name: _____ **Date:** _____

1. Why is artificial insemination used in breeding cattle?

   A. It is the most economical way to produce cattle of good quality.

   B. It results in the production of only female offspring.

   C. It can be used at any time in the estrous cycle in cattle.

   D. It increases the probability that advantageous mutants will develop.

2. Genetic engineering in corn allows genes from bacteria to be added to the genetic material of corn. In traditional breeding, genes of only closely related types of corn can be exchanged.

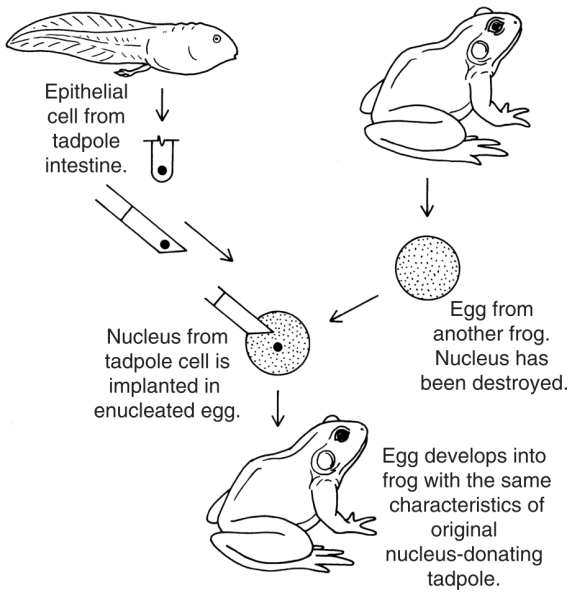
   What is one risk of genetically engineering corn plants?

   A. decreases the amount of pesticide needed to grown corn.

   B. increases the length of time corn can be stored before it rots

   C. increases the chance of adding a trait to corn that causes allergies

   D. decreases the number of corn plants a farmer can grow in a season

3. 

   Which of these is *best* demonstrated by the experiment above?

   A. Differentiated cells contain a complete set of genes.

   B. All frogs are genetically identical.

   C. Embryonic development is controlled by the cytoplasm.

   D. The nucleus of a tadpole cell is unspecialized.

4. The bacterium *Agrobacterium tumefaciens* infects plants, and a portion of its DNA is inserted into the plant's chromosomes. This causes the plant to produce gall cells, which manufacture amino acids that the bacterium uses as food. This process is a natural example of

A. polyploidy.

B. genetic manipulation.

C. grafting.

D. hybridization.

5. Genetic engineering has produced goats whose milk contains proteins that can be used as medicines. This effect was produced by

A. mixing foreign genes into the milk.

B. injecting foreign genes into the goats' udders.

C. inserting foreign genes into fertilized goat eggs.

D. genetically modifying the nutritional needs of the goats' offspring.

6. Two farmers plant different varieties of corn on neighboring farms. Farmer A plants genetically modified corn. Farmer B plants a non-modified variety of corn. What would be farmer B's *primary* concern if she plans to gather seed for next year's crop?

A. loss of genetic variability in the non-modified variety

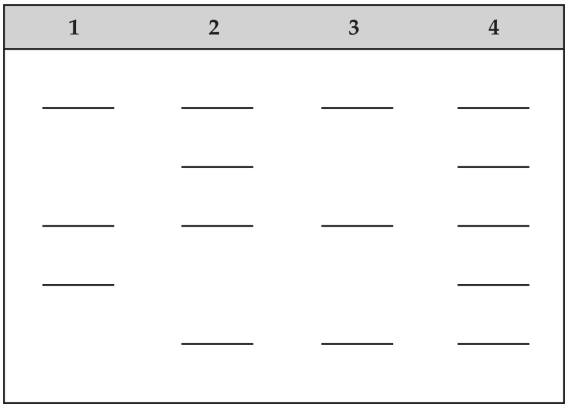
B. that mutation rates will increase in the non-modified variety

C. that insects will only pollinate the genetically modified corn

D. unintended transfer of modified genes to her crop by cross-pollination

7. DNA from four organisms was examined using gel electrophoresis. The results are shown in the diagram below.

DNA GEL ELECTROPHORESIS RESULTS



According to the data, which of these pairs of organisms are *most closely* related?

A. 1 and 2

B. 2 and 3

C. 2 and 4

D. 3 and 4

8. Scientists create "transgenic" organisms when they transfer genes from one organism to a different kind of organism. Many people marvel at this technology, while others are concerned about its consequences and its effects on society. Which of these is *not* a realistic concern about the formation of "transgenic" organisms?

   A. Transgenic plants may produce chemicals that are harmful to wildlife.

   B. Humans will acquire harmful transgenic traits by consuming transgenic foods.

   C. Eating fruit from transgenic plants could trigger allergies in sensitive individuals.

   D. This technology may be misused or unintentionally used to make products harmful to humans and other organisms.

9. What technology was made possible by the discovery of the structure of DNA?

   A. organ transplants

   B. antibiotic production

   C. gene splicing

   D. artificial fertilization

10. Which of these is *not* a use for DNA fingerprinting?

    A. to determine how individuals are related

    B. to make messenger RNA

    C. to determine a genetic sequence

    D. to study inherited diseases

11. Certain plant crops are genetically engineered to grow faster and resist disease. These genetically engineered plant crops cannot reproduce because they have a "terminator" gene that keeps their seeds from sprouting. However, once the genetically engineered plant crops are planted outside, they may cross-pollinate with unaltered plant crops.

    The use of terminator genes is *least likely* to result in

    A. increased costs for seeds

    B. decreased varieties of food

    C. terminator genes spreading to other crops

    D. scientists being harmed from working with the terminator genes

12. A scientist cloned a goat. Which of these is a true statement about the cloned goat?

A. It has new genes and traits.

B. It lacks the genes for reproduction.

C. It has genes that are identical to the original goat.

D. It looks the same as the original goat but has different genes.

13. Scientists have determined the sequence of most of the human genome. Which of these fields of science will probably benefit the most from this knowledge?

A. chemistry

B. geology

C. physics

D. medicine

14. Use the information below to answer the following question(s).

Scientists genetically modified a variety of corn to protect it against pests like the corn borer. The corn borer is an insect caterpillar that feeds on the corn stalk, which weakens the stalk and makes it fall over. A new gene in the genetically modified corn causes the plant to produce a chemical that is toxic to the corn borer. Some people are concerned that the genetically modified corn could harm other insects such as the monarch butterfly caterpillar. The monarch caterpillar eats leaves of milkweed plants that might be coated with toxic corn pollen. However, not all researchers agree with the concerns regarding the monarch butterfly caterpillar. They state that it is unusual for large amounts of harmful corn pollen to be found on milkweed leaves. Also, only a small percentage of caterpillars feed on the milkweed plants near corn fields.

Which was *most likely* introduced into corn that made it pest-resistant?

A. gene

B. lipid

C. toxin

D. protein

15. When the segment of human DNA that codes for insulin production is inserted into bacterial DNA, the bacterium begins producing human insulin.

Which of these *best* identifies the process by which human DNA is inserted into bacterial DNA?

A. gene splicing

B. crossing-over

C. mutation

D. cloning

16. Certain disorders, such as sickle cell anemia, are linked to specific genes. Some scientists would like to use gene therapy to cure such disorders. Gene therapy involves replacing the nonworking cells with cells that have been genetically altered.

Which of these is a logical argument against gene therapy?

A. Changing one gene may negatively affect other genes.

B. Changing one gene may lead to the formation of a new species.

C. Scientists may not be able to distinguish one gene from another.

D. Drugs may already exist to cure these diseases, so there is no need for risky therapy.

17. Which of these is an example of selective breeding?

A. Cutting a stem from a plant so that a new plant grows from the stem

B. Taking a skin cell from a sheep and making an exact clone of the sheep

C. Replacing DNA of a plant with DNA that allows the plant to grow in little water

D. Selecting two horses and having them mate in order to produce stronger offspring

18. Sean is studying the advantages of selective breeding in plants. He made the following list of possible advantages:

1) Can produce corn that attracts grasshoppers

2) Can develop grass that can grow with less water

3) Can develop wheat that can grow in different types of soil

4) Can produce oranges that are not affected by freezing temperatures

Which items on the list provide logical arguments in favor of selective breeding?

A. 1, 2, 3

B. 2, 3, 4

C. 2, 4

D. 3, 4

19. Scientists want to create citrus trees that are tolerant of cold weather. Currently, if the fruit from a citrus tree has not been picked and a freeze occurs, the fruit is damaged and cannot be sold. The scientists are studying how to alter the tree's cells so that they are not damaged by the freezing temperatures.

Which of these is a logical reason for continuing this research?

A. Plants that can tolerate the cold would be less likely to become infected by fungi.

B. Plants that can tolerate the cold could allow citrus trees to grow in colder climates.

C. The research could make it easier to preserve the picked fruit during storage and shipping.

D. The research could help scientists alter human cells so that human skin is not damaged by frostbite. S

20. Scientists at a research center are studying plants that have a natural resistance to insects.

Which of these is a logical justification for continuing this research?

A. Insect-resistant plants grow faster than plants that are not insect resistant, making larger-producing crops.

B. Studying the genes of insect-resistant plants could help in the development of crops resistant to insects.

C. Finding these genes could help lead to finding the genes that allow a plant to survive with little water.

D. The research could lead to development of new kinds of food crops with different nutrients.

21. Scientists found an organism that can live without water for long periods of time. The scientists made copies of its DNA, then injected this new DNA into corn.

Which of these describes the process the scientists used?

A. Cloning

B. Selective breeding

C. Genetic engineering

D. Asexual reproduction

22. A bacterium, *Bacillus thuringiensis* (*Bt*), makes a toxin that destroys the larvae of insects that threaten corn crops. Scientists engineered corn plants, known as *Bt*-corn. *Bt*-corn can make a toxin to destroy the larvae that eat the corn.

Which of these supports the argument to stop production of genetically engineered Bt-corn?

A. *Bf*-corn pollen may harm helpful insects that pollinate the corn, such as bees.

B. *Bt*-corn kernels may attract unwanted animals that can damage the crop, such as crows.

C. *Bt*-corn plants use much less pesticide than unmodified corn plants.

D. *Bt*-corn seed is more expensive than unmodified corn seed.

23. Which activity is an example of selective breeding?

A. Collecting wild saplings from a forest and replanting them

B. Cross-pollinating plants that produce large numbers of fruit

C. Allowing a population of laboratory mice to mate randomly

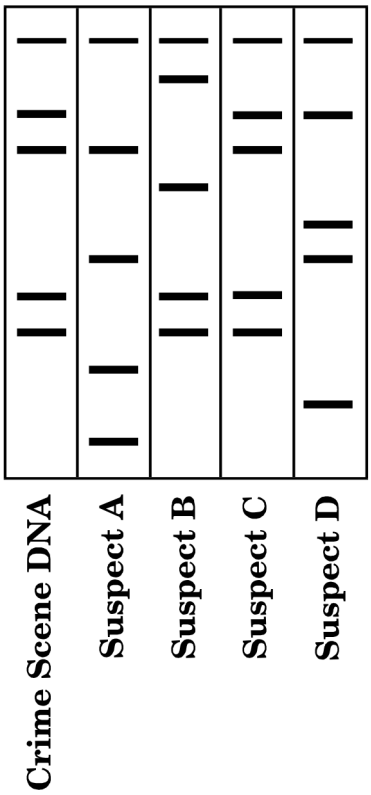
D. Raising sheep that have been cloned from adult sheep tissues

24. A single isolated gene can be cloned *most* rapidly using genetically engineered—

A. bacteria.
B. nematodes.
C. sea anemones.
D. pea plants.

25. The diagram below represents DNA fingerprints which are the result of gel electrophoresis done on several DNA samples found at a crime scene.

Gel Electrophoresis Results



Which suspect is linked to the crime scene by this DNA analysis?

A. Suspect A
B. Suspect B
C. Suspect C
D. Suspect D

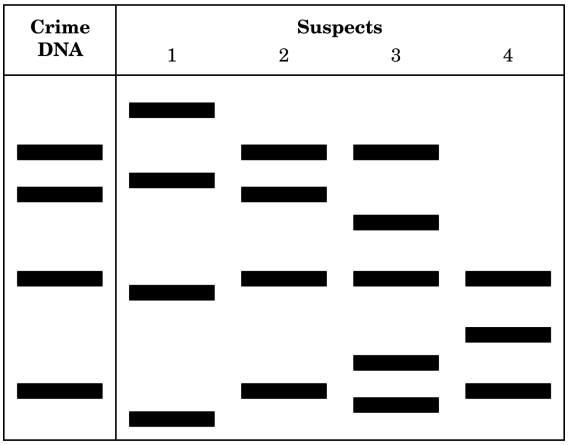
26. Use the information below to answer the following question(s).

As scientists have developed more productive crop varieties, farmers have switched from growing many traditional varieties to new high-yield varieties. For example, in India, the 10,000 varieties or rice once grown have been reduced to 10 major ones for most of the rice crop.

Besides the varieties of rice being reduced, what else is reduced by this practice?

A. types of soil nutrients
B. the gene pool for rice
C. food chains that include rice
D. human dietary choices

27. This diagram represents samples of DNA that were cut with a restriction enzyme during DNA fingerprinting in a crime lab.



Which technique was used to produce these bands?

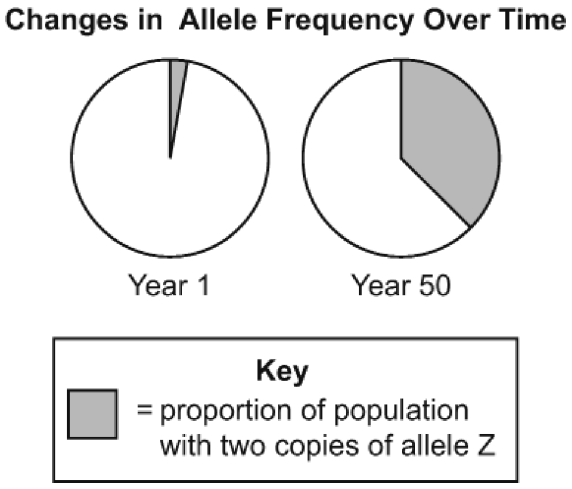
A. cloning
B. gel electrophoresis
C. gene splicing
D. genetic engineering

28. Which is the *best* way to determine if two people are genetically related?

A. DNA fingerprinting B. blood typing

C. karyotyping

29. Use the circle graphs below to answer the question.



The graphs illustrate change in a lizard population over time. Which process *most likely* led to the change in the lizard population?

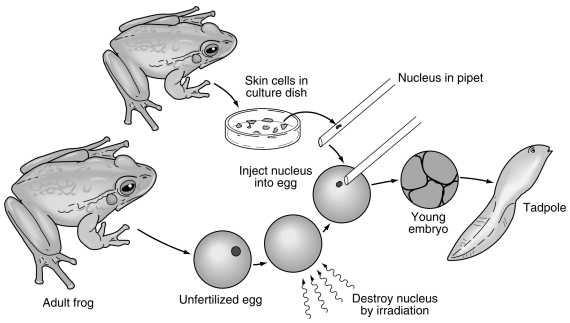
A. natural selection acting on a harmful trait

B. natural selection acting on a beneficial trait

C. natural selection acting on a dominant trait

D. natural selection acting on a recessive trait

30. The diagram below shows the procedure scientists used to clone a frog from the nucleus of a skin cell.



The tadpole produced by the cloning process will be genetically _____.

A. most similar to the frog the egg cell came from

B. most similar to the frog the skin cell came from

C. different from both frogs that the cells came from

D. identical to both frogs that the cells came from

DNA Technology Exam 4/25/2019

1.
Answer: A

2.
Answer: C

3.
Answer: A

4.
Answer: B

5.
Answer: C

6.
Answer: D

7.
Answer:

8.
Answer:

9.
Answer: C

10.
Answer: B

11.
Answer: D

12.
Answer: C

13.
Answer: D

14.
Answer: A

15.
Answer: A

16.
Answer: A

17.
Answer: D

18.
Answer: B

19.
Answer: B

20.
Answer: B

21.
Answer: C

22.
Answer: A

23.
Answer: B

24.
Answer: A

25.
Answer: C

26.
Answer: B

27.
Answer: B

28.
Answer: A

29.
Answer: B

30.
Answer: B