

Standard 4 Objective 3 Explain how the structure and replication of DNA are essential to heredity and protein synthesis

34 Question(s)  
Test ID: 2142483955

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- 1) Read the following excerpt about Embryo Transfer. Answer the question that follows.

Embryo Transfer allows a producer to get several progeny from one female at the same time. Hormones are given to the animal to induce the ovulation of several eggs. Artificial Insemination of the animal follows. The fertilized eggs are then flushed from the donor, evaluated for quality, and implanted into recipient females. This practice was first done commercially in the cattle industry in the early 1970's. Today many cattle are bred using the practice of Embryo Transfer.

A generalization that can be made about the article is that:

- A. Embryo Transfer is practiced as a necessary part of Artificial Insemination
  - B. Producers of cattle use Embryo Transfer as the sole means of genetic improvement
  - C. Embryo Transfer plays an important role in genetic improvement
  - D. Embryo Transfer is of vital importance to the entire livestock industry
- 2) April 16. Cpl. John C. Mayfield and Cpl. Joseph Vlasovsky were found guilty of disobeying a lawful order. The U.S. Department of Defense requires DNA samples for a database that could be used to identify soldiers' remains. The two Marines refused.

At their court martial, the two Marines argued that DNA samples could be examined for genes related to disease or even behavior and, therefore, the database was an invasion of privacy. As a result of the concerns raised by this case, the U.S. Department of Defense has changed its policies. It now destroys DNA samples upon request when an individual leaves military service. Do people have a right to control their own DNA samples?

THE VIEWPOINTS

DNA Information is not Private

As the court recognized, the U.S. Department of Defense had good reasons for requiring that DNA samples be taken and stored. Furthermore, DNA sequences are no more private and personal than fingerprints or photographs, which are taken by private and government agencies all the time. An employer has a right to take and keep such information. Individuals should have no reason to fear the abuse of such databases.

DNA Information is Private and Personal

The use of DNA for personal identification by the military may be justified. An individual's genetic information, however, is a private matter. A recent study at Harvard and Stanford universities turned up more than 200 cases of discrimination because of genes individuals carried or were suspected of carrying. Employers with DNA information might use it to discriminate against workers who carry genes they suspect might cause medical or behavioral problems. Individuals must have the right to control their own DNA and to withhold samples from such databases.

Using this reading, which of the following is a fact?

- A. Insurance companies use DNA information to deny coverage
  - B. Employers might discriminate against employees because of their DNA
  - C. The military keeps DNA samples to identify remains
  - D. DNA is usually not private
- 3) April 16. Cpl. John C. Mayfield and Cpl. Joseph Vlasovsky were found guilty of disobeying a lawful order. The U.S. Department of Defense requires DNA samples for a database that could be used to identify soldiers' remains. The two Marines refused.

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Which of the following statements is an inference?

- A. The two Cpl.s were found guilty of disobeying orders
  - B. DNA information is private and personal
  - C. A study at Harvard and Stanford turned up more than 200 cases of discrimination because of genes carried by individuals
  - D. The U.S. Department of Defense destroys DNA samples upon request when an individual leaves military service
- 4) April 16. Cpl. John C. Mayfield and Cpl. Joseph Vlasovsky were found guilty of disobeying a lawful order. The U.S. Department of Defense requires DNA samples for a database that could be used to identify soldiers' remains. The two Marines refused.

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DNA Information is Private and Personal

The use of DNA for personal identification by the military may be justified. An individual's genetic information, however, is a private matter. A recent study at Harvard and Stanford universities turned up more than 200 cases of discrimination because of genes individuals carried or were suspected of carrying. Employers with DNA information might use it to discriminate against workers who carry genes they suspect might cause medical or behavioral problems. Individuals must have the right to control their own DNA and to withhold samples from such databases.

Which of the following statements can be tested?

- A. The DNA database is an invasion of privacy
  - B. DNA samples are not private and personal
  - C. DNA information could accurately identify future medical or behavioral problems
  - D. An employer has a right to take and use DNA information
- 5) Read the following excerpt about Embryo Transfer. Answer the question that follows.

Embryo Transfer allows a producer to get several progeny from one female at the same time. Hormones are given to the animal to induce the ovulation of several eggs. Artificial Insemination of the animal follows. The fertilized eggs are then flushed from the donor, evaluated for quality, and implanted into recipient females. This practice was first done commercially in the cattle industry in the early 1970's. Today many cattle are bred using the practice of Embryo Transfer.

What is the most important variable in Embryo Transfer success?

- A. Selection of recipient cows
  - B. Selection of donor cow and sire
  - C. Follow the proper procedure in Embryo Transfer
  - D. Proper handling of fertilized egg
- 6) Genetic engineering can be used to produce:
- A. human growth hormone
  - B. insulin
  - C. interferon
  - D. all of these
- 7) What equipment can be used to determine the genetic fingerprint of a suspect?
- A. Photospectrometer

- B. Microscope  
C. Gel Electrophoresis  
D. Centrifuge
- 8) You are a genetic counselor and a very distraught couple comes into your office with a child who has cystic fibrosis. The husband accuses the wife "You caused this! It's well known that mothers who drink have sick babies!"
- What would be the most accurate information you could give this couple?
- A. We don't know how this disease is caused, but research is making progress every day  
B. It is our theory that this disease is based on many factors that are too complicated to understand  
C. Cystic fibrosis is caused by both parents who contribute a faulty gene  
D. The facts of science are too complicated and you don't have the training to comprehend it clearly  
E. The two of you must be closely related
- 9) Which of these is used as a source of fetal cells for analysis and subsequent genetic counseling?
- A. amniotic fluid  
B. aqueous fluid  
C. blood plasma  
D. urine
- 10) What is the process called when an egg is removed, fertilized outside of the body, and then implanted in the womb?
- A. artificial insemination  
B. cloning  
C. in vitro fertilization  
D. surrogate motherhood
- 11) Sickle cell anemia is caused by an abnormal type of hemoglobin, the oxygen-carrying protein in blood cells. The cause of the abnormal hemoglobin protein is the replacement of the amino acid valine with the amino acid lysine. What is this kind of alteration called?
- A. malnutrition  
B. transgenic  
C. radiation  
D. nondisjunction  
E. mutation

- 12) Read the following excerpt about Embryo Transfer. Answer the question that follows.

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Which of the following is NOT a genetic advantage of embryo transfer?

- A. Use sires of superior genetic quality without cost of maintaining a bull  
B. Superior cows able to produce more offspring than with classic breeding  
C. Genetic diversity is increased  
D. Faster genetic herd improvement
- 13) Chemically inserting genes from one organism into another is an example of
- A. crossbreeding  
B. genetic engineering  
C. hybridization  
D. inbreeding
- 14) Study the table and answer the question based on the information.

QUANTITY OF NUCLEOTIDES IN DNA				
SOURCE	ADENINE	THYMINE	GUANINE	CYTOSINE
CALF	1.13	1.11	0.86	0.85
RAT	1.15	1.14	0.86	0.82
MOTH	0.84	0.80	1.22	1.33
VIRUS	1.17	1.12	0.90	0.81
RAT SPERM	1.15	1.09	0.89	0.83

Which of the following conclusions can be determined from the table?

- A. Thymine and cytosine are pyrimidines
- B. The ratio of adenine and thymine is similar in the rat's body cells and sperm cells
- C. The diameter is determined by the purine-pyrimidine base-pairing rule
- D. A nucleotide is composed of deoxyribose, phosphate, and a nitrogen base

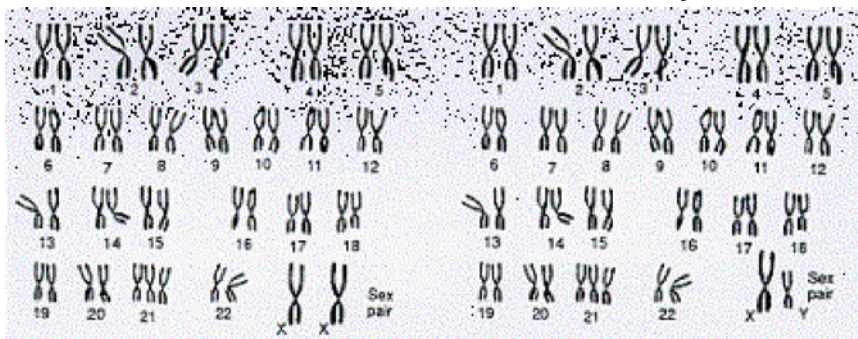
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Which of the following conclusions can be reasonably inferred from the table?

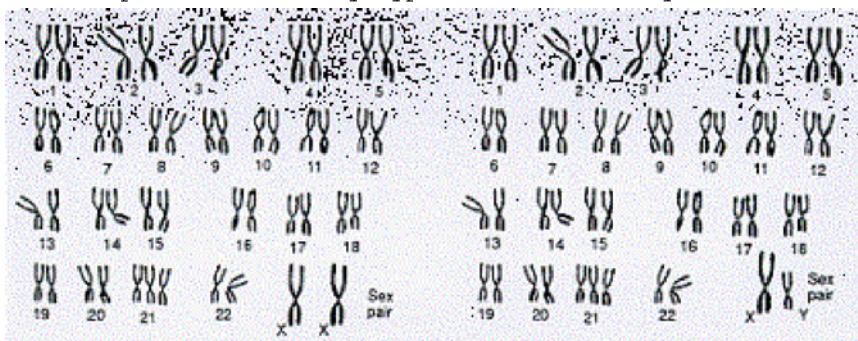
- A. The nitrogen bases guanine and cytosine bond with each other
- B. The ratio of adenine is constant for all different species
- C. The amount of adenine is always greater than the amount of guanine
- D. The moth is an evolutionary descendant of the rat

16) Which chromosome is abnormal or carries a genetic mutation?



- A. 23rd pair
- B. 21st pair
- C. 18th pair
- D. 13th pair

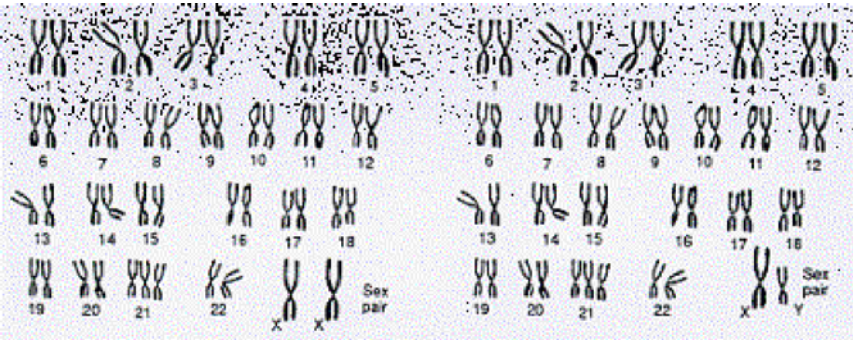
17) Compare the two karyotypes. Where are they different?



- A. 23rd pair
- B. 21st pair
- C. 5th pair
- D. 11th pair

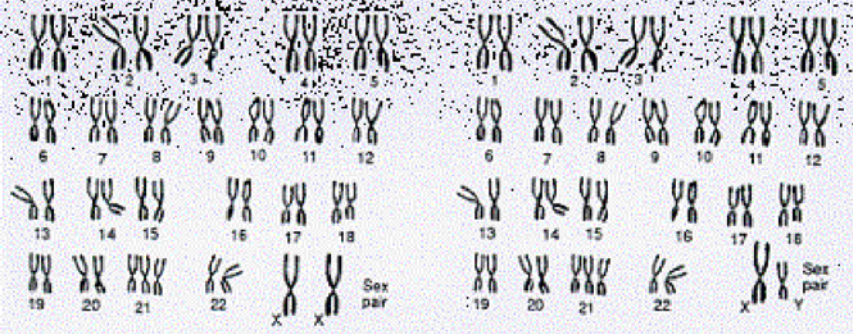
18) These karyotypes are of





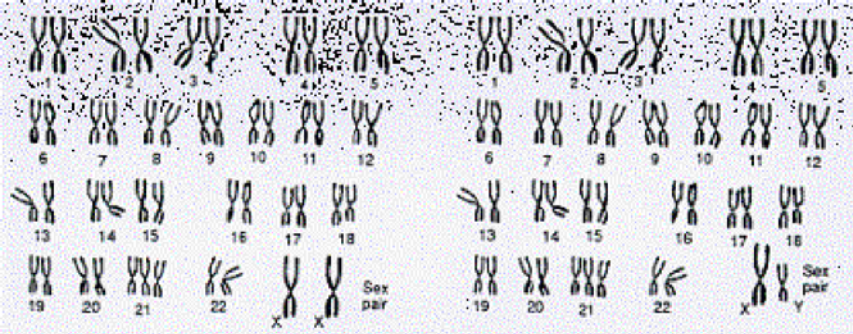
- A. 2 females
- B. 2 males
- C. 1 female, 1 male
- D. You can't tell from the information

19) What is this genetic condition known as?



- A. a. Trisomy 18
- B. b. Down Syndrome
- C. c. Klinefelter Syndrome
- D. d. Trisomy 21
- E. e. Answers b & d

20) The general characteristics of this genetic condition are



- A. broad chest, webbed neck skin, short stature
- B. underdeveloped sex organs, heart impairment
- C. mental retardation, rounded faces, almond-shaped eyes
- D. aggressive behavior, tall, thin

21) A crime was committed in the 1970s. The investigators collected evidence at the scene including a hair found on the carpet near the victim and which did not appear to have come from anyone known to have been at the scene. At the time, investigators did not have enough evidence to link the crime to a suspect. The case went to the "Cold Case Files." Several years later, a similar crime is committed. The investigators collect evidence at the new crime scene. They collect blood samples from the victim and the suspect. Because of this crime's similarity to the other crime, investigators re-open the first case and run tests on the hair sample. The hair from the first crime matches the suspect. The suspect was charged with both crimes. How has science allowed the investigators to determine that the same person committed both crimes?

- A. If the method by which the two crimes were committed is the same, it is enough to convict the suspect of both crimes.
- B. Gene splicing allows new genes to be inserted to determine differences between the victim's and the criminal's blood.
- C. Genetic engineering created new computer data files to be able to link one suspect with both crimes.
- D. Technology has improved so DNA from the evidence can be sequenced and matched to the suspect's DNA.

- 22) If two people who want to have children think they might be carrying genes for a genetic disorder such as cystic fibrosis, they could get a test called a DNA probe which can detect the presence of the disease-causing genes. What does this demonstrate?
- A. Using genetic testing can help anyone, not just scientists.
  - B. Using genetic testing is too expensive and should be done only if the parents know they are carrying genes for genetic disorders.
  - C. Genetic testing should only be done after the baby is born.
  - D. Genetic testing should never be done because people shouldn't be interfering with nature.
- 23) The Human Genome Project (HGP) was an international effort to completely map and sequence all genes found in the 46 human chromosomes. Which of the following is NOT a beneficial use of the information learned in HGP?
- A. Improved abilities for genetic testing of babies before birth.
  - B. Use of gene therapy to treat current genetic diseases and conditions.
  - C. Identification of bacteria which can penetrate human cells and cause disease.
  - D. Develop of new methods of crime research to identify suspects in particular cases.
- 24) In 1973, Stanley Cohen and Herbert Boyer isolated DNA from an African Clawed Frog and inserted it into bacteria. The bacteria started making frog RNA instead of the bacteria RNA, making Cohen and Boyer the first to produce genetically altered bacteria. What is this process of manipulating DNA known as?
- A. Translation
  - B. Genetic Engineering
  - C. DNA replication
  - D. Mutation
- 25) In 1973, Stanley Cohen and Herbert Boyer isolated DNA from an African Clawed Frog and inserted it into bacteria. Instead of producing bacteria, the bacteria started producing frog RNA making the first to produce genetically altered bacteria. Other scientists had the idea of putting human genes into bacteria in order to making things faster than humans can. How does the technique of this recombinant DNA affect human life?
- A. We are able to clone ourselves to have spare parts just in case we get sick or injured.
  - B. We are able to alter bacteria in order to make insulin to treat people who are sick with diabetes.
  - C. We will be better able to use the earth's resources in order to provide more food for people and animals.
  - D. We will be better able to improve the oxygen in the air we breathe which will help us to make more energy.
- 26) In 1973, Stanley Cohen and Herbert Boyer isolated DNA from an African Clawed Frog and inserted it into bacteria. The bacteria started making frog RNA instead of the bacteria RNA, making Cohen and Boyer the first to produce genetically altered bacteria. Since that time, there has been much debated over genetic engineering. What is the role of science in this debate?
- A. Genetic engineering is a religious issue for which science should perform more research to relieve human suffering.
  - B. Genetic engineering is a field in which science should not have entered.
  - C. Science must continue to conduct research to provide society with all of the answers about genetic engineering.
  - D. Science can provide information about genetic engineering but by itself cannot answer all of the questions.
- 27) Which statement best describes the likely future of our knowledge about cloning?
- A. Knowledge about cloning will probably stay the same because American society is uneasy with new advances in cloning.
  - B. Knowledge about cloning will probably stay the same because scientists have learned all there is to know about cloning.
  - C. Knowledge about cloning will probably change because information about genetics will most likely increase.
  - D. Knowledge about cloning will probably change because scientists like to revise their theories and hypotheses.
- 28) In 1944 Oswald Avery and his collaborators determined that genes are composed of DNA. In 1952 Rosalind Franklin studied DNA using a technique called X-ray diffraction. In 1953 Watson and Crick developed the double helix model for the structure of DNA. What does this scenario tell us about the scientists who discovered the structure of DNA?
- A. Important knowledge about DNA was contributed by a woman.
  - B. The knowledge learned by scientists before the 1920s was not useful in determining the structure of DNA.

- C. The experiments conducted by earlier scientists on DNA were not able to be verified, so they were discounted and not used.
- D. The experiments conducted by scientists on mouse DNA were so unrelated that they did not contribute to the model of DNA.
- 29) In 1928, Frederick Griffith discovered that harmless bacteria can be transformed chemically into harmful bacteria. In 1944, Oswald Avery and his co-workers determined that genes are composed of DNA. In 1952, Rosalind Franklin studied DNA using a technique called X-ray diffraction. In 1953, Watson and Crick developed the double helix model for the structure of DNA. What does this scenario tell us about the scientists who discovered the structure of DNA?
- A. The knowledge learned by scientists over the years helped Watson and Crick to determine the structure of DNA.
- B. The knowledge learned by scientists before the 1920s was not useful in determining the structure of DNA.
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- 30) In 1928 Frederick Griffith discovered harmless bacteria can be transformed chemically into harmful bacteria. In 1944 Oswald Avery and his co-workers determined that genes are composed of DNA. In 1952 Rosalind Franklin studied DNA using a technique called X-ray diffraction. In 1953 Watson and Crick developed the double helix model for the structure of DNA. In 2000 the Human Genome Project, (the mapping and sequencing of human DNA), was basically completed. What does this scenario tell us about how the Human Genome Project was even possible?
- A. The knowledge learned by scientists over the years helped scientists to determine the precise structure of human genes.
- B. The knowledge learned by scientists in the 1920s was NOT useful in determining the structure of DNA, since Griffith did not have appropriate scientific technology.
- C. The experiments conducted by earlier scientists were not able to be verified, so they were discounted and not used.
- D. The experiments conducted by scientists on DNA were unrelated and did not contribute to the human genome project.
- 31) In 1973 Stanley Cohen and Herbert Boyer isolated a section of DNA from an African Clawed Toad and inserted it into bacteria. The bacteria started producing toad RNA instead of the bacteria RNA, making Cohen and Boyer the first to produce bacteria genetically for an isolated gene from another species. What is this process of manipulating DNA called?
- A. Translation
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- 32) In 1973 Stanley Cohen and Herbert Boyer isolated DNA from an African Clawed Toad and inserted it into bacteria. The bacteria started producing toad RNA instead of bacteria RNA, making Cohen and Boyer the first to produce bacteria genetically altered for an isolated gene from another species. Since that time, there has been much debate over genetic engineering. What is the role of science in this debate?
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- C. We will be better able to use the earth's resources in order to provide more food for people and animals.
- D. We will be better able to improve the oxygen in the air we breathe which will help us to make more energy.



