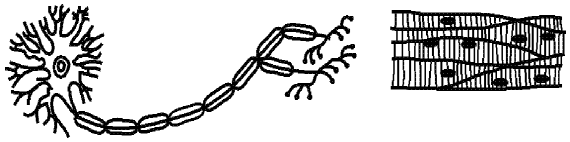
Genetics 2 star

Name: _____ **Date:** _____

1. Two different types of cells from an organism are shown.



Explain how these two different types of cells can function differently in the same organism even though they both contain the same genetic instructions.

2. The chart below shows relationships between genes, the environment, and coloration of tomato plants.

Inherited Gene	Environmental Condition	Final Appearance
A	Light	Green
B	Light	White
A	Dark	White
B	Dark	White

Which statement best explains the final appearance of these tomato plants?

A. The expression of gene *A* is not affected by light.

B. The expression of gene *B* varies with the presence of light.

C. The expression of gene *A* varies with the environment.

D. Gene *B* is expressed only in darkness.

3. Plants inherit genes that enable them to produce chlorophyll, but this pigment is not produced unless the plants are exposed to light. This is an example of how the environment can

A. cause mutations to occur

B. influence the expression of a genetic trait

C. result in the appearance of a new species

D. affect one plant species, but not another

4. When the bacterium *Serratia marcescens* is grown on a sterile culture medium in a petri dish at 30°C, the bacterial colonies are cream colored. When this same bacterium is cultured under identical conditions, except at a temperature of 25°C, the colonies are brick red. This difference in color is most likely due to the

A. type of nutrients in the culture medium

B. sterilization of the culture medium

C. effect of temperature on the expression of the gene for color

D. effect of colony size on the synthesis of color pigments

5. To determine the identity of their biological parents, adopted children sometimes request DNA tests. These tests involve comparing DNA samples from the child to DNA samples taken from the likely parents. Possible relationships may be determined from these tests because the

A. base sequence of the father determines the base sequence of the offspring

B. DNA of parents and their offspring is more similar than the DNA of nonfamily members

C. position of the genes on each chromosome is unique to each family

D. mutation rate is the same in closely related individuals

6. The accompanying photographs show some physical similarities between John Lennon and his son Julian.

Lewis, Ricki *Life* 3rd edition WCB/McGraw Hill

Which conclusion can be drawn regarding these similarities?

A. The DNA present in their body cells is identical.

B. The percentage of their proteins with the same molecular composition is high.

C. The base sequences of their genes are identical.

D. The mutation rate is the same in their body cells.

7. Scientific studies show that identical twins who were separated at birth and raised in different homes may vary in height, weight, and intelligence. The most probable explanation for these differences is that

A. original genes of each twin increased in number as they developed

B. one twin received genes only from the mother while the other twin received genes only from the father

C. environments in which they were raised were different enough to affect the expression of their genes

D. environments in which they were raised were different enough to change the genetic makeup of both individuals

8. Which event occurring in the life cycle of a bacterium most directly involves the replication of DNA?

A. The bacterium copies its single chromosome.

B. As the cell grows, the two copies of the chromosome separate.

C. The cell divides as a partition separates it into equal halves.

D. Each new cell receives one copy of the chromosome.

9. Which phrases best identify characteristics of asexual reproduction?

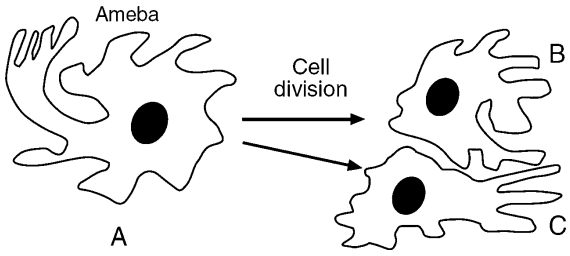
A. one parent, union of gametes, offspring similar to but not genetically identical to the parent

B. one parent, no union of gametes, offspring genetically identical to parents

C. two parents, union of gametes, offspring similar to but not genetically identical to parents

D. two parents, no union of gametes, offspring genetically identical to parents

10. The accompanying diagram represents a cell process.



Which statement regarding this process is correct?

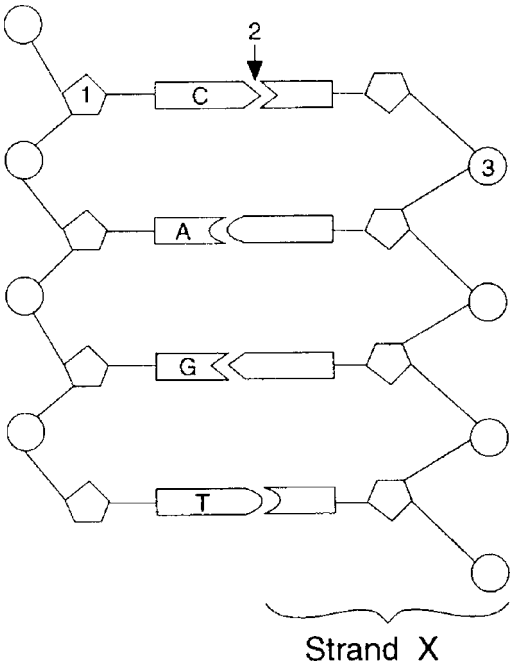
A. Cell *B* contains the same genetic information that cells *A* and *C* contain.

B. Cell *C* has DNA that is only 50% identical to cell *B*.

C. Cell *A* has DNA that is only 75% identical to cell *B*.

D. Cells *A*, *B*, and *C* contain completely different genetic information.

11. Base your answer(s) to the following question(s) on the diagram below of a DNA molecule and on lyour knowledge of biology.



What is the base sequence of strand *X*?

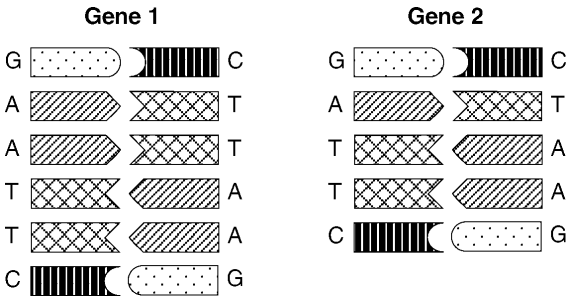
A. G-T-A-C

B. T-G-C-A

C. G-T-C-A

D. A-T-C-G

12. The accompanying diagrams represent portions of the genes that code for wing structure in two organisms of the same species. Gene 1 was taken from the cells of a female with normal wings, and gene 2 was taken from the cells of a female with abnormal wings.



The abnormal wing structure was most likely due to

A. an insertion
B. a substitution
C. a deletion
D. normal replication

13. Base your answer(s) to the following question(s) on the information and chart below and on your knowledge of biology.

In DNA, a sequence of three bases is a code for the placement of a certain amino acid in a protein chain. The table below shows some amino acids with their abbreviations and DNA codes

Amino Acid	Abbreviation	DNA Code
Phenylalanine	Phe	AAA, AAG
Tryptophan	Try	ACC
Serine	Ser	AGA, AGG, AGT, AGC, TCA, TCG
Valine	Val	CAA, CAG, CAT, CAC
Proline	Pro	GGA, GGG, GGT, GGC
Glutamine	Glu	GTT, GTC
Threonine	Thr	TGA, TGG, TGT, TGC
Asparagine	Asp	TTA, TTG

Describe how a protein would be changed if a base sequence mutates from GGA to TGA.

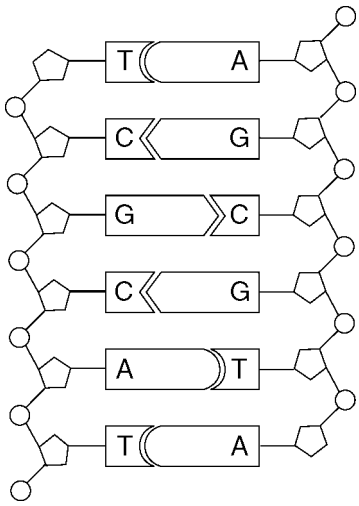
14. The function of the coded instructions contained in the body cells of an organism is to

A. form a variety of gametes that will pass on hereditary information
B. direct the synthesis of proteins necessary for proper cell function
C. synthesize different kinds of amino acids in a specific sequence
D. produce the inorganic molecules needed for normal cell growth

15. Which statement best describes the relationship between cells, DNA, and proteins?

A. Cells contain DNA that controls the production of proteins.
B. DNA is composed of proteins that carry coded information for how cells function.
C. Proteins are used to produce cells that link amino acids together into DNA.
D. Cells are linked together by proteins to make different kinds of DNA molecules.

16. The diagram below represents a portion of an organic molecule.



This molecule controls cellular activity by directing the synthesis of

A. carbohydrates
B. minerals
C. fats
D. proteins

17. When a person's teeth are being x rayed, other body parts of this person are covered with a protective lead blanket to prevent

A. loss of hair
B. increase in cell size
C. changes in DNA molecules
D. changes in glucose structure

18. New inheritable characteristics would be least likely to result from

A. mutations which occur in muscle cells and skin cells
B. mutations which occur in male gametes
C. mutations which occur in female gametes
D. the sorting and recombination of existing genes during meiosis and fertilization

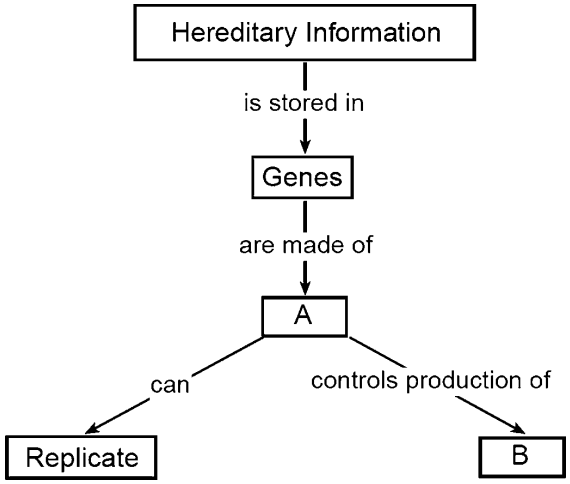
19. As a result of sexual reproduction, an organism can pass a gene mutation to its offspring if the mutation occurs in

A. a body cell
B. a gamete
C. liver tissue
D. white blood cells

20. The shape of a protein molecule is influenced by

A. whether it is organic or inorganic
B. the sequence of amino acids in it
C. the number of genes found in the nucleus
D. the number of chromosomes in the cell

21. Base your answer(s) to the following question(s) on the diagram, which provides information related to heredity, and on your knowledge of biology.



Which molecules are represented by box *B*?

A. bases
B. proteins
C. amino acids
D. simple sugars

22. The sequence of subunits in a protein is most directly dependent on the

A. region in the cell where enzymes are produced
B. DNA in the chromosomes in a cell
C. type of cell in which starch is found
D. kinds of materials in the cell membrane

23. After a series of cell divisions, an embryo develops different types of body cells such as muscle cells, nerve cells, and blood cells. This development occurs because

A. the genetic code changes as the cells divide
B. different segments of the genetic instructions are used to produce different types of cells
C. different genetic instructions are synthesized to meet the needs of new types of cells
D. some parts of the genetic materials are lost as a result of fertilization

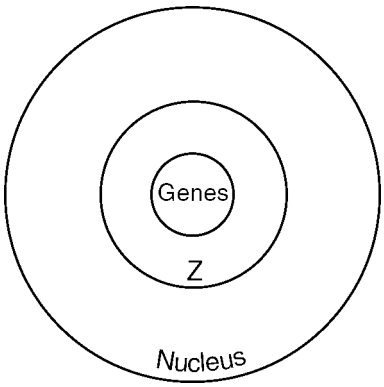
24. Research has shown that certain body cells, known as stem cells, can develop into a variety of specialized cells. Various factors can cause stem cells to develop into different types of mature cells. These different types of mature cells result from

A. different antibodies and mitotic cell division
B. identical genetic codes and meiotic cell division
C. different environments of the cells and the functioning of different parts of the genetic code
D. similar steps in the development of the cells and a reduction in the number of chromosomes in each cell

25. Which statement best describes the relationship between the number of genes and the number of chromosomes in human skin cells?

A. There are more genes than chromosomes in skin cells.
B. There are more chromosomes than genes in skin cells.
C. There are equal numbers of genes and chromosomes in skin cells.

26. The accompanying diagram represents the organization of genetic information within a cell nucleus.



The circle labeled *Z* most likely represents

A. amino acids
B. chromosomes
C. vacuoles
D. molecular bases

27. When DNA separates into two strands, the DNA would most likely be directly involved in

A. replication
B. fertilization
C. differentiation
D. evolution

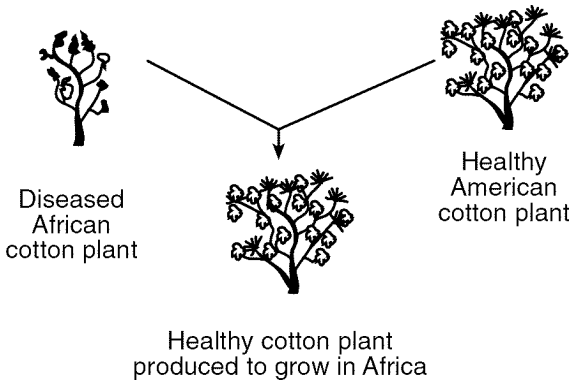
28. When humans first domesticated dogs, there was relatively little diversity in the species. Today, there are many variations such as the German shepherd and the dalmatian. This increase in diversity is most closely associated with

A. cloning of selected body cells
B. selective breeding
C. mitotic cell division
D. environmental influences on inherited traits

29. Research applications of the basic principles of genetics have contributed greatly to the rapid production of new varieties of plants and animals. Which activity is an example of such an application?

A. testing new fertilizers on food crops
B. selective breeding of plants and animals that exhibit high resistance to disease
C. developing new irrigation methods to conserve water
D. using natural predators to control insect pests

30. Which statement provides accurate information about the technique illustrated below?



A. This technique results in offspring that are genetically identical to the parents.
B. New varieties of organisms can be developed by this technique known as selective breeding.
C. This technique is used by farmers to eliminate mutations in future members of the species.
D. Since the development of cloning, this technique is no longer used in agriculture.

31. A woman has a gene that causes a visual disorder. To prevent the disorder from appearing in future generations, the defective gene would have to be repaired in the mother's

A. nervous system
B. reproductive cells
C. eye
D. uterus

32. Which statement best describes the result of some of the processes involved in genetic engineering?

A. They alter the arrangement of hereditary material.
B. They provide energy for mitosis and meiosis.
C. They are necessary for normal gamete formation.
D. They reduce variation in organisms that reproduce asexually.

33. 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

A. natural selection
B. asexual reproduction
C. genetic engineering
D. habitat modification

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1.
Answer: Different types of cells express different genes. OR They contain different proteins.

2.
Answer: C

3.
Answer: B

4.
Answer: C

5.
Answer: B

6.
Answer: B

7.
Answer: C

8.
Answer: A

9.
Answer: B

10.
Answer: A

11.
Answer: C

12.
Answer: C

13.
Answer: The shape of the protein may be changed. OR The amino acid sequence would be different. OR The protein would contain threonine instead of proline. OR The protein being synthesized may not work correctly. OR The protein will not be able to function.

14.
Answer: B

15.
Answer: A

16.
Answer: D

17.
Answer: C

18.
Answer: A

19.
Answer: B

20.
Answer: B

21.
Answer: B

22.
Answer: B

23.
Answer: B

24.
Answer: C

25.
Answer: A

26.
Answer: B

27.
Answer: A

28.
Answer: B

29.
Answer: B

30.
Answer: B

31.
Answer: B

32.
Answer: A

33.
Answer: C