Name ______________________________ Date ______________ Class ______________

CHAPTER 8 TEST PREP PRETEST

Mendel and Heredity

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

_______ **1.** *Pisum sativum*, the garden pea, is a good subject to use in studying heredity for all of the following reasons EXCEPT

a. Several varieties of *Pisum sativum* are available that differ in easily distinguishable traits.
b. *Pisum sativum* is a small, easy-to-grow plant.
c. *Pisum sativum* matures quickly and produces a large number of offspring.
d. A *Pisum sativum* plant with male reproductive parts must cross-pollinate with a plant having female reproductive parts for reproduction to take place.

_______ **2.** Step 1 of Mendel's garden pea experiment, allowing each variety of garden pea to self-pollinate for several generations, produced the

a. F_1 generation. **c.** P generation.
b. F_2 generation. **d.** P_2 generation.

_______ **3.** In the F_2 generation in Mendel's experiments, the ratio of dominant to recessive phenotypes was

a. 1:3. **c.** 2:1.
b. 1:2. **d.** 3:1.

_______ **4.** The trait that was expressed in the F_1 generation in Mendel's experiment is considered

a. recessive. **c.** second filial.
b. dominant. **d.** parental.

_______ **5.** Mendel's law of segregation states that

a. pairs of alleles are dependent on one another when separation occurs during gamete formation.
b. pairs of alleles separate independently of one another after gamete formation.
c. each pair of alleles remains together when gametes are formed.
d. the two alleles for a trait separate when gametes are formed.

_______ **6.** A series of genetic crosses results in 787 long-stemmed plants and 277 short-stemmed plants. The probability that you will obtain short-stemmed plants if you repeat this experiment is

a. $\frac{277}{1,064}$. **c.** $\frac{787}{277}$.
b. $\frac{277}{787}$. **d.** $\frac{787}{1,064}$.

_______ **7.** Crossing a snapdragon that has red flowers with one that has white flowers produces a snapdragon that has pink flowers. The trait for flower color exhibits

a. multiple alleles. **c.** incomplete dominance.
b. complete dominance. **d.** codominance.

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_______ **8.** Which of the following is NOT considered a genetic disorder?

a. sickle cell anemia
b. hemophilia
c. AIDS
d. cystic fibrosis

_______ **9.** On which of the following chromosomes would a sex-linked trait most likely be found in humans?

a. X
b. Y
c. O
d. YO

_______ **10.** The roan color of a horse is an example of

a. homozygous alleles.
b. codominance.
c. incomplete dominance.
d. Both (a) and (c)

Questions 11 and 12 refer to the figure at right, which represents a monohybrid cross between two individuals that are heterozygous for a trait.

	D	*d*
D	*DD*	*Dd*
__	*D*__	*d*__

_______ **11.** If the resulting phenotypic ratio is 3:1, the missing parental allele is

a. *d.*
b. *D.*
c. *Dd.*
d. *DD.*

_______ **12.** The two unknown genotypes in the offspring are

a. *DD* and *dd.*
b. *Dd* and *Dd.*
c. *dd* and *DD.*
d. *Dd* and *dd.*

Circle* T *if the statement is true or* F *if it is false.

T F **13.** The transmission of traits from parents to offspring is called heredity.

T F **14.** When Mendel cross-pollinated two varieties from the P generation that exhibited contrasting traits, he called the offspring the second filial, or F_2, generation.

T F **15.** In Mendel's experiments, the recessive traits reappeared in the F_2 generation in approximately 25 percent of the plants.

T F **16.** What Mendel called factors are today called genes.

T F **17.** Each version of a gene is called an allele.

T F **18.** Mendel's law of independent assortment holds true for all genes, regardless of location.

T F **19.** When you toss a coin, the probability that it will land heads up is $\frac{1}{4}$, or 25 percent.

T F **20.** In a test cross, one individual has a dominant phenotype and unknown genotype and the other is homozygous recessive.

T F **21.** Genes with more than two alleles are referred to as having multiple alleles.

T F **22.** Hemophilia is caused by a mutated allele that produces a defective form of the protein hemoglobin.

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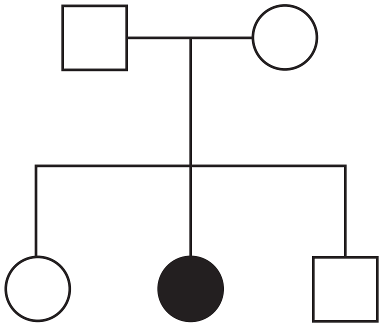
Questions 23 and 24 refer to the figure below, which shows the inheritance of sickle cell anemia in a family.



T F **23.** The figure above is referred to as a pedigree.

T F **24.** Both parents in this diagram carry a recessive allele for sickle cell anemia but do not exhibit the symptoms of this disorder.

Complete each statement by writing the correct term or phrase in the space provided.

25. The study of heredity is called ______________________ .

26. A flower fertilizes itself through a process called ______________________

______________________ .

27. The ______________________ , or physical appearance, of an individual is determined by the alleles that code for traits. The set of alleles that an individual has is called its ______________________ .

28. The likelihood that a specific event will occur is called ______________________ .

29. A genetic cross can be represented graphically in the form of a(n)

______________________ ______________________ .

30. A cross between a pea plant that is true breeding for green pod color and one that is true breeding for yellow pod color is an example of a(n)

______________________ cross.

31. Characteristics such as eye color, height, weight, hair and skin color are examples of ______________________ ______________________ because several genes act together to influence a trait.

32. Mutations in genetic material may cause ______________________

______________________ , such as cystic fibrosis and muscular dystrophy.

33. ______________________ is a condition that impairs the blood's ability to clot.

34. ______________________ , a genetic disorder that can cause severe mental retardation results because an enzyme that converts one amino acid into another is missing.

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Read each question, and write your answer in the space provided.

35. In step 1 of his experiments, how did Mendel ensure that each variety of garden pea was true breeding for a particular trait?

36. What approximate ratio of plants expressing contrasting traits did Mendel calculate in his F_2 generation of garden peas? What steps did he take to calculate this ratio?

37. Name Mendel's two laws of heredity.

38. Give an example of how the environment might influence gene expression.

39. Describe how persons who are heterozygous for sickle cell anemia are protected against malaria.

40. Describe one sex-linked genetic disorder.

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CHAPTER 7

Meiosis and Sexual Reproduction

MULTIPLE CHOICE

1. b
2. c
3. d
4. a
5. b
6. d
7. c
8. b
9. c
10. a

VOCABULARY

11. b
12. g
13. k
14. m
15. a
16. l
17. h
18. d
19. e
20. c
21. o
22. i
23. p
24. j
25. f
26. n

COMPLETION

27. genetic
28. four
29. Random fertilization
30. budding, fission
31. mitosis, fusion
32. crossing-over
33. oogenesis
34. gametophyte
35. evolution
36. spores
37. genetic recombination
38. meiosis
39. prophase I
40. telophase I, cytokinesis
41. metaphase II

ESSAY

42. The formation of male and female gametes in animals involves meiosis. In spermatogenesis meiosis produces four sperm cells. In oogenesis, however, the cytoplasm divides unequally and meiosis produces three polar bodies that do not survive and one egg cell.
43. In fission, the parent divides into two or more individuals of the same size. In fragmentation, the parent's body breaks into several pieces that grow into complete individuals. In budding, new individuals split off from existing ones. The new individuals may be independent or attached to the parent.
44. In anaphase I, the two chromatids of each chromosome remain attached at their centromeres as the homologous pairs move to the poles of the cell. In anaphase II, the centromeres divide and the chromatids move to opposite poles of the cell. If the centromeres did not divide and split the paired chromosomes during anaphase II, the new cells would not be haploid.
45. In the haploid life cycle, haploid cells develop into haploid multicellular individuals that produce gametes through mitosis. A diploid zygote forms through fusion of opposite gametes, undergoes meiosis immediately, and creates new haploid cells. In the diploid life cycle, gametes are produced through meiosis, and they create a diploid zygote through fertilization. The individual that results from the zygote remains diploid and occupies most of the diploid life cycle.
46. Plants alternate between a diploid and a haploid phase. Growth of a zygote produces a multicellular sporophyte. Through meiosis, cells in the sporophyte produce haploid reproductive cells called spores. The spores grow into multicellular gametophytes. Gametophytes produce haploid gametes by mitosis, which fuse and develop into zygotes.
47. Crossing-over increases the numerical possibilities of genetic recombinations in individuals. Genetic diversity is what enables some members of a population to survive changing conditions. Increased genetic variation seems to increase the pace of evolution.

CHAPTER 8

Mendel and Heredity

MULTIPLE CHOICE

1. d
2. c
3. d
4. b
5. d
6. a
7. c
8. c
9. a
10. b
11. a
12. d

TRUE/FALSE

13. T
14. F
15. T
16. T
17. T
18. F
19. F
20. T
21. T
22. F
23. T
24. T

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COMPLETION

25. genetics
26. self-pollination
27. phenotype, genotype
28. probability
29. Punnett square
30. monohybrid
31. polygenic traits
32. genetic disorders
33. Hemophilia
34. Phenylketonuria or PKU

ESSAY

35. Mendel allowed each variety of garden pea to self-pollinate for several generations, selecting plants from each generation that exhibited one form of a trait. He did this until all of the offspring of a given variety produced only one form of a particular trait.

36. Mendel calculated an approximate 3:1 ratio of contrasting traits. He derived this ratio by counting plants expressing each type of trait he was comparing. Using division, he found that the ratio of plants expressing the dominant trait to plants expressing the recessive trait was about 3:1.

37. the law of segregation and the law of independent assortment

38. In the winter, the genes of the arctic fox that code for enzymes involved in pigment production do not function because of the cold temperature. Thus, the coat of the fox is white, and the animal blends in well with its surroundings. In warmer weather, these genes function and the fox's coat darkens to a reddish brown. Fur color in Siamese cats is also influenced by temperature. The fur on the ears, nose, paws, and tail of Siamese cats is darker than the rest of their body. In plants, hydrangea flowers of the same genetic variety range in color from blue to pink, depending on the acidity of the soil. Hydrangea plants in acidic soil bloom blue flowers; those in neutral to basic soil bloom pink flowers.

39. Persons who are heterozygous for the sickle cell trait produce a defective form of hemoglobin that causes some of their red blood cells to bend into a sickle shape. If the parasitic protozoan that causes malaria infects an individual who is heterozygous for the sickle cell trait, the sickled red blood cells cause the death of the parasite.

40. The blood clotting disorder, hemophilia A, is a sex-linked trait. In hemophilia A, the mutation occurs on one of the genes on the X chromosome. The gene codes for a protein involved in blood clotting.

CHAPTER 9

DNA: The Genetic Material

MULTIPLE CHOICE

1. a
2. c
3. d
4. b
5. b
6. b
7. d
8. a
9. b

MATCHING

10. d
11. b
12. n
13. m
14. i
15. a
16. h
17. o
18. k
19. f
20. e
21. j
22. l
23. c
24. g

COMPLETION

25. virulence
26. genetic or hereditary
27. host or bacteria
28. two
29. base-pairing
30. diffraction
31. complementary
32. replication
33. replication fork
34. S or synthesis
35. proofread

ESSAY

36. The harmless *R* bacteria were transformed into virulent *S* bacteria, and the mice died.

37. His experiments showed that the activity of the material responsible for transformation was not affected by protein-destroying enzymes, but the activity was stopped when a DNA-destroying enzyme was present. Therefore, the genetic material was DNA.

38. Radioactive elements were used because they can be followed or traced. Hershey and Chase could use the radioactive elements to locate the genetic material of bacteriophages after they infected bacteria.

39. DNA polymerase proceeds along the new DNA strand only if the previous nucleotide is correctly paired to its complementary base. If a mismatched nucleotide occurs, the polymerase is able to backtrack along the new DNA strand. The mismatched nucleotide is removed, and the correct nucleotide is inserted.

40. DNA helicases are enzymes that unwind the double helix of the DNA molecule. The unwinding is accomplished by breaking the hydrogen bonds that link the complementary bases.

41. a piece of double-stranded DNA

42. A—hydrogen bonds; B—sugar-phosphate backbone; C—pyrimidine (or nitrogen base)

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