3. sex chromosome: one of the pair of Teacher Resource Pagechromosomes that determine the sex of an individual
4. pedigree: a diagram that shows the occurrence of a genetic trait in several generations of a family

Section Review

SECTION: MENDEL AND HIS PEAS

1. Sample answer: Heredity is the passing of traits from parents to their offspring. A dominant trait is a trait that is present in the first generation when parents with different traits produce offspring. A recessive trait is a trait that is not present in the first generation but often reappears in the second generation.
2. B
3. Self-pollination occurs when pollen from a particular plant is deposited on a stigma from the same plant. Cross-pollination occurs when the pollen and stigma are from two different plants.
4. Sample answer: A characteristic is something that has different forms in a population, and a trait is each one of the possible forms. For example, eye color is a characteristic in humans, and brown-eyed, green-eyed, and blue-eyed are all possible traits.
5. Sample answer: During Mendel's first experiments he crossed two plants that were true breeding for different traits. In each case, the offspring had the dominant trait
6. During Mendel's second experiments he allowed the plants that were the offspring from his first experiments to self-pollinate. In these cases, some of the second-generation plants had the recessive trait.
7. 7:2, or 3.5:1, brown to green; 2:7, or 1:3.5,green to brown
8. Sample answer: If Mendel had used plants that were not true breeding, the dominant trait would not have been as clear for each characteristic, and he would not have gotten such a clear 3:1 ratio. The concept of dominant and recessive may have hidden for a longer period of time.
9. Curly ears are dominant because it is the trait that is represented in the first generation.
10. Sample answer: sociology, physics, and chemistry

SECTION: TRAITS AND INHERITANCE

1. Sample answer: Alleles are different versions of the same gene.
2. Sample answer: Genotype is the set of alleles an organism has inherited from its parents. Phenotype is what the organism looks like physically.
3. B
4. The genotype of an organism contains the two alleles for each characteristic. One allele of each pair was inherited from each of the organism's parents. The phenotype of the organism is the way the genotype affects the organism physically. For example, if an organism inherits one dominant allele for brown fur and one recessive allele for white fur, its phenotype will be brown fur.
5. incomplete dominance; one gene influencing more than one trait, and one trait being influenced by many genes
6. $1/6 \times 1/6 \times 1/6 = 1/216$
7. Approximately half of the offspring will have the phenotype of cleft chins (genotypes *Cc*) and half will not (genotypes *cc*).
8. *BB*, *bb*
9. Sample answer: a shade of gray

SECTION: MEIOSIS

1. Sample answer: At the end of meiosis, each sex cell will contain only one sex chromosome (either X or Y).
2. During meiosis, chromosomes are copied, and then the nucleus divides twice.
3. A pedigree is used to show how inherited traits move through a family.
4. During meiosis, homologous chromosomes line up in the middle of the cell.
5. A
6. 7
7. Answers may vary. Students' drawings should be similar to the diagram of meiosis in the student text.
8. Sample answer: yes; The disorder seems to be sex-linked because the females are carriers of the disease but only males have the disease itself.

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9. gene, chromosome, cell
10. Sample answer: Because the purple gene *(P)* is dominant over the white gene *(p)*, the genotype of the purple-flowered pea plant could be either *PP* or *Pp*. Thus, the possible alleles carried by the sex cells would be *P* or *p*.

Chapter Review

1. sex cells
2. phenotype, genotype
3. Meiosis
4. alleles
5. D
6. C
7. B
8. B
9. C
10. C
11. B
12. Females have two X chromosomes. Males have one X and one Y chromosome.
13. Sample answer: A recessive trait is a genetic trait that is expressed only if there is not a dominant allele present.
14. Sex cells have half the number of chromosomes as other body cells.
15. Sample answer: A sex-linked disorder is a disorder that is caused by a gene on one of the sex chromosomes and so is expressed in one sex more than the other. Color blindness is a sex-linked disorder found in humans.
16. An answer to this exercise can be found at the end of the Teacher Edition.
17. Sample answer: A genetic counselor could test my spouse to see if my spouse is also a carrier of the recessive allele. The counselor could then predict what the chances are that we could have a child with the recessive disorder.
18. The allele for blond hair is recessive.
19. *PP*
20. *TT*
21. All the parents and offspring are tall pea plants.
22. Students should make two new Punnett squares. Self-fertilization of *TT* (*TT* × *TT*) will yield offspring that are all *TT*. Self-fertilization of *Tt* (*Tt* × *Tt*) will yield offspring that are *TT*, *Tt*, and *tt*.
23. *TT* has a 100% probability with a *TT* parent and a 25% probability with a *Tt* parent. *Tt* has a 50% probability with a *Tt* parent, and a 0% probability with a *TT* parent. The genotype tt has a 25% probability with a *Tt* parent, and a 0% probability with a *TT* parent.

Reinforcement

DIMPLES AND DNA

1. *Dd* in three squares
2. Only the genotype *Dd* is possible for the offspring of Parent A and Parent B.
3. The probability that the offspring of Parent A and Parent B will have dimpled cheeks is 25% + 25% 1 25% + 25% = 100%.
4. Top row: *DD*, *Dd*
   Bottom row: *Dd*, *dd*
5. *DD*: 25%
   Dd: 25% + 25% = 50%
   dd: 25%
6. The probability of these offspring having nondimpled cheeks is 25 percent.
7. The probability of these offspring having dimpled cheeks is 75 percent.

Critical Thinking

A BITTERSWEET SOLUTION

1. The hybrid produced larger, more bitter fruit. The original orange trees had smaller, sweeter fruit.
2. Eighty percent of the hybrid orange trees grew quickly and produced larger fruit that tasted bitter. These characteristics came from the P'tooey plant. We know that these traits are dominant because a high percentage of the hybrid plants exhibit those traits.
3. Answers may vary. Sample answer: The genes donated by the original kiwi plant—sweet taste and average growth—produce dominant traits in the new kiwi hybrid. Rapid growth and bitter taste are recessive traits.
4. Answers may vary. Sample answer: If the first hybrid generation is crossed with itself, the recessive sweet trait could reappear and could occur with the trait for rapid growth.

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