3 Master the Skill

Spotlighted Item: HOT SPOT

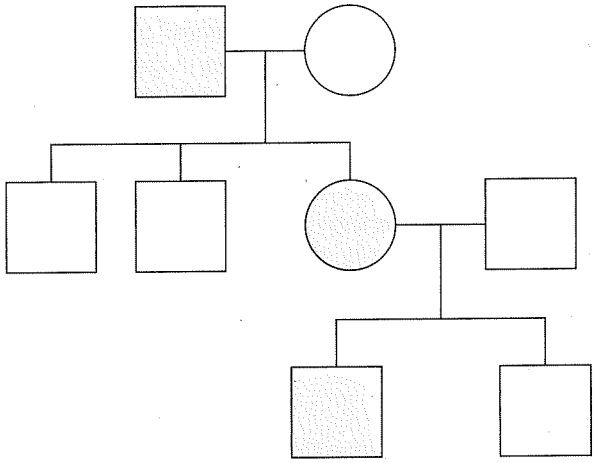
DIRECTIONS: Read the passage and question. Then answer by marking the appropriate hot spot or hot spots.

TRACKING TRAITS IN FAMILIES

Because pedigree charts are useful for tracking traits through multiple generations, a pedigree chart can show the inheritance of a particular trait in a family's history. Also, scientists and others use pedigree charts to study patterns of inheritance in humans.

Various formats are used to develop pedigree charts. In many pedigree charts, males are represented by squares, and females are represented by circles. In some pedigree charts, color is used to provide information. For example, colored shapes represent individuals having a particular trait, and white shapes represent individuals not having the trait.

5. Assume that the trait tracked in this pedigree chart is controlled by the dominant allele. Mark an *X* on the shape for each individual who definitely has a homozygous genotype for the trait.



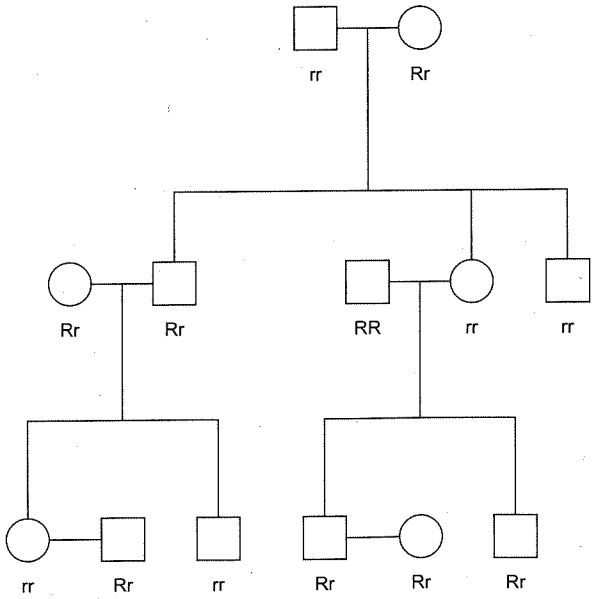
DIRECTIONS: Read the passage and question. Then answer by marking the appropriate hot spot or hot spots.

TRACKING INHERITABLE DISEASES

Many disorders and diseases are caused by recessive genes—that is, genes having two recessive alleles. Cystic fibrosis is an example of such a disease.

People having the recessive gene for cystic fibrosis have the disease. People having a gene with one dominant allele and one recessive allele do not have the disease but are carriers of it. Therefore, a child may inherit cystic fibrosis from his or her parents if each parent carries a recessive allele, even if neither parent has the disease. A child will not inherit the disease if one parent is a carrier and the other is not. Additionally, a child will be a carrier of the disease if one parent has the disease, even if the other parent neither has the disease nor is a carrier.

6. Pedigree charts showing genotypes can be used to track inheritable diseases. This pedigree chart shows the family history of a disease caused by a recessive gene. Mark an *X* on the shape for each individual who has this disease.



DIRECTIONS: Read the passage. Then read each question, and answer by marking the appropriate hot spot or hot spots.

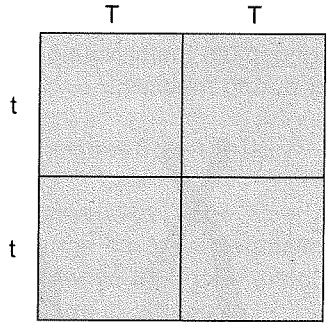
IDENTIFYING GENOTYPIC AND PHENOTYPIC RATIOS

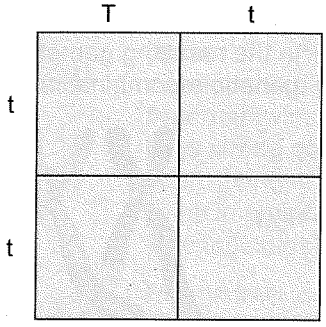
Punnett squares often are used to determine the percentage of offspring that likely will have a particular trait. They also can be used to predict ratios of genotypes and phenotypes in offspring.

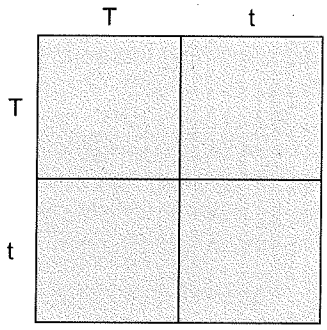
A genotypic ratio expresses the number of offspring having homozygous dominant genotypes, then the number of offspring having heterozygous dominant genotypes, and finally the number of offspring having homozygous recessive genotypes. For example, for a Punnett square showing offspring having one *GG*, two *Gg*, and one *gg* genotypes, the genotypic ratio is 1:2:1.

A phenotypic ratio expresses the number of offspring demonstrating the dominant trait and then the number of offspring demonstrating the recessive trait. For the example just given, the one *GG* and two *Gg* genotypes produce three offspring demonstrating the dominant trait, and the one *gg* genotype produces one offspring demonstrating the recessive trait. So the phenotypic ratio is 3:1.

7. Mark an *X* on each Punnett square that represents a cross producing offspring with a genotypic ratio of 0:4:0.







8. Mark an *X* on each Punnett square that represents a cross producing offspring with a phenotypic ratio of 3:1.