

## AP Biology Practice Genetics Problems

Answer ALL questions and Show ALL work for questions on a separate sheet of paper. Put a box around your answers.

### Monohybrid Crosses

1. What is the genotypic ratio and phenotypic ratio for a monohybrid cross between heterozygotes that follow Mendel's laws?
2. A certain breed of dogs, a gene (D) codes for hair length. The dominant trait is short hair and the recessive is long hair. Suppose a heterozygous dog and a homozygous recessive dog mate. What will be the genotypic ratio of the offspring? What will be the phenotypic ratio?
3. In tribles coat texture is an inherited trait with two phenotypes known to occur as follows: 1) stiff bristles; 2) soft short fine hairs. As a geneticist, you are doing the following cross: male parental phenotype is soft short fine hairs; female parental phenotype is stiff bristles. In looking at the offspring of these matings you note that all F1 are phenotypically stiff bristles. a) Were the parents heterozygous or homozygous? b) Which is the dominant allele? c) Are the F1 heterozygous or homozygous? d) If you now mate males to females within the F1 generation, what would expect the phenotype ratio to be?
4. If long floppy ears (E) is dominant to short spiked ears (e), and you find a puppy with long floppy ears, how would you determine the puppy's genotype? Explain.
5. Chin fissure is controlled by a dominant allele and smooth chin by a recessive allele. If the parents were heterozygous for the trait, the chance of producing a child with a chin fissure would be \_\_\_\_\_.
6. The urine of some persons has a distinctive odor after eating asparagus (use A and a for alleles). This appears to be a recessive trait. If a person with aromatic urine marries a person heterozygous for this trait, what phenotypic and genotypic ratio will their children theoretically exhibit?
7. A man and a woman have 24 children. Of the children, 17 have brown eyes and 7 of the children have blue eyes. What are the genotypes of the parents? The genes for dark eyes (black and brown) usually dominate over genes for light eyes (blue and gray).

### Dihybrid Crosses

8. What is the phenotypic ratio for a dihybrid cross between heterozygotes for both traits that follows Mendel's laws?
9. If an individual has the genotype RrTt, what are the possible gametes that could be produced?
10. If tall is dominant to short, and purple flowers are dominant to white flowers, what is the phenotypic ratio of the potential offspring if you cross a short, white flower with a homozygous dominant tall, heterozygous purple flower?
11. In Venetian newts, skin color (royal blue(B) verses hunter green) and ruffle patterns (fringed red (R) verses spiked yellow ) are genetically inherited. A royal blue, fringed red ruffled female whose father was hunter green with a spiked yellow ruffle is mated to a royal blue, fringed red ruffled male.
  - a) In looking at all of the offspring from their matings, one finds that roughly 56% are royal blue with fringed red ruffles; roughly 6% are hunter green with spiked yellow ruffles; roughly 18% are royal blue with spiked yellow ruffles; roughly 18% are hunter green with fringed red ruffles. What were the genotypes of the parents?
  - b) If a royal blue with spiked yellow ruffles, homozygous for both alleles, was mated with a hunter green with fringed red ruffles, also homozygous for both alleles, from this generation, what are the possible phenotypic and genotypic ratios of the offspring?
12. *Phenylketonuria* (PKU) is an inherited disease determined by a recessive allele. If a woman and her husband are both carriers, what is the probability of each of the following? (*Note*: Remember that the probabilities of all possible outcomes always add up to 1.)
  - a. All three of their children will be normal.
  - b. One *or* more of the three children will have the disease.
  - c. All three children will be afflicted with the disease.
  - d. *At least* one child will be normal.