

## GENETIC PROBLEMS

- Instructions: Show all work on a separate sheet of notebook paper.

### MONOHYBRID INHERITANCE- Crosses of this type involve only a single pair of alleles.

1. In fruit flies (*Drosophila melaogaster*) red-eye is dominant to pink-eye. By crossing a heterozygous red-eyed male fly to a pink-eyed female fly, 60 offspring resulted. How many would you expect to be red-eyed and how many pink-eyed?
2. Albinism occurs commonly in animals, and it is always recessive to the normal. Six brown and five albino mice were born to parents which were likewise brown and albino. What is the genotype of the brown parent?
3. Supposing brown eyes in people (B) is dominant to blue (b), could a marriage between two blue-eyed people produce a brown-eyed child? Could a marriage between a homozygous brown-eyed person and a blue-eyed person result in blue-eyed children? Could two brown-eyed people have a blue-eyed child? Explain all of your answers by supplying the proper symbol.
4. Crosses between red and white shorthorn cattle result in roan offspring. (See text for explanation of incomplete dominance.) Is it possible to produce a true breed in strain of roan cattle? Why?
5. Diabetes is thought to be inherited (at least in some cases) as a recessive (d). Two people without diabetes have a diabetic child. What are the genotypes of the parents and of the offspring.
6. Short hair is dominant over long hair in guinea pigs. A short-haired guinea pig, one of whose parents was long-haired, was mated with a long-haired animal. What types of offspring could be produced? In what ratio?
7. Rh<sup>+</sup> blood type is dominant to Rh<sup>-</sup> blood. How may two Rh<sup>+</sup> parents have an Rh<sup>-</sup> child? What is the probability of their child having a child with this genotype? If a woman who is Rh<sup>-</sup> marries an Rh<sup>+</sup> man whose father was Rh<sup>-</sup>, what blood group (or groups) could their children belong to?
8. Polydactyly (presence of an extra finger) is due to a dominant factor. When one parent is polydactylous, but heterozygous, and the other parent is normal, what would be the probability of their having a child without Polydactyly.

**DIHYBRID INHERITANCE-In these crosses two pairs of alleles are involved.**

9. In cattle, polled (P) (hornless) is dominant over horned (p), and black (B) is dominant over yellow (b). What will be the condition of the offspring from several matings of homozygous polled black bulls with horned yellow cows? When these  $F_1$ 's are permitted to inbreed (mate with one another) and form a considerable number there are 18 polled black cattle, how many horned black should there be, assuming the ideal ratio?
10. A solid-colored, short-haired female rabbit (ssLL) is mated to a spotted, long-haired male (SSll). The  $F_1$  offspring are allowed to interbreed and 64 offspring are produced. How many will be expected to be spotted with long hair? How many solid-colored and short-haired?

**SEX-LINKED INHERITANCE**

11. Normal vision in man is dominant to color-blindness and the alleles are on the sex chromosome. A normal man whose father was color-blind marries a color-blind woman. What would be the chance of their sons and daughters being color-blind?
12. A boy, whose parents and grandparents had normal vision, is color-blind. Give the genotype for his mother and his maternal grandparents.
13. A brown-eyed man whose mother was color-blind and whose father had blue eyes is engaged to marry a woman whose color-blind mother had blue eyes and whose normal visioned father had blue eyes. What is the genotype of the young gentlemen? Of his fiancée? If they marry and have a family what are the chances of having: a brown-eyed normal-visioned child? A blue-eyed color-blind child? A brown-eyed normal-visioned daughter? A blue-eyed color-blind son?