**MENDELIAN GENETICS PROBLEMS**

Dr. Haberyan, Bio 102 (7/20/2020)

Note: This assignment is not to be turned in, but completing it will increase student performance on the next exam. Solutions will be presented in class.

Hint: A general strategy in solving such problems is:

a. If possible, determine which alleles are dominant or codominant and decide on symbols. Write down your symbols and their meanings.

b. Write out the genotypes as completely as possible for all individuals.

c. See what's asked in the problem.

d. Take steps to find the answer (maybe Punnett square or backtracking).

e. Check to make sure the result is consistent with the conditions of the problem.

1. In the fruit fly, vestigial wings and hairy body are produced by recessive alleles on two different chromosomes. If a vestigial winged, hairy male is crossed with a homozygous normal female, what ratios of phenotype and genotype do you expect in the F1 and F2 generations?

F1- 1:1 VvHh

F2- 1:3:3:9

vvhh – vvH\_ – V\_hh – V\_H\_

2. When two short-tailed cats mate, about half of the kittens have short tails, a quarter have long tails, and a quarter have no tails. What is the simplest genetic explanation for the inheretance of this trait?

Monohybrid codominance. Or

3. In peas, the allele for tall plants (T) is dominant over the allele for short plants (t). On a separate chromosome, the allele for smooth peas (S) is dominant over the allele for wrinkled peas (s). Calculate phenotypic ratios for the following crosses:

TtSs x TtSs TtSs x ttss ttSs x Ttss TTss x ttSS

1. 1:3:3:9
2. 1:1:1:1
3. 1:1:1:1
4. 1:1

4. In roses, flower color is determined by red and white alleles, which are codominant. If a breeder wants to produce off­spring that are all pink, what types of plants should he cross? Why aren't these pink plants true breeding?

A red (RR) and a white (rr) will produce all pink (Rr). Idk why not true breeding.

5. What is the probability of having four children of the same sex?

%50 chance.

6. Allele "b" is sex-linked, recessive, and lethal. Suppose a man marries a woman who is heterozygous for this gene. What is the chance that the next son or the next daughter will carry the allele? What will be the ratio of surviving boys to surviving girls?

There is a 50% chance the girl will carry the gene. There is a 50% chance the boy will have the gene. The lethality rate for girls is 0%, and for boys it is 50%.

7. In the "ABO" blood system, alleles A and B are each dominant to O, but codominant with each other (remember that a single person has two alleles, so the possible phenotypes are A, B, AB, and O). In a paternity suit, a woman with the A blood type claims her son (type O blood) was fathered by a man with type AB blood. As a geneticist called to testify, what do you tell the judge? What are the possible genotypes of the mother and father?

The child cannot be fathered by someone with AB blood. The mother can have AA or AO. The father can only have AB.

8. Marge, a woman whose maternal grandfather had hemophilia, has parents who seem to be normal. Marge, too, seems normal, as does her husband Homer. As completely as possible, determine the genotypes of Marge, her parents, her maternal grandparents, and her husband Homer. What is the probability that her next son will have hemophilia?

Gpa : X^h Y

Gma: X^H X^?

Mom: X^H X^?

Dad: X^? Y

Marge: X^H X^?

Husband: X^H Y

Son: ???