

Genetics Practice Problems

1. Assume that in a series of experiments, plants with round seeds were crossed to plants with wrinkled seeds and the following offspring were obtained:
220 round and 180 wrinkled.
 - a. What is the most likely genotype of each parent?
 - b. What F2 offspring genotypic and phenotypic ratios are expected if you cross a round by a wrinkled?
2. Pattipan squash are either yellow or white. You begin growing these squashes and realize that in order to produce a white squash, one of the parents must be white. Which allele is dominant?
3. Grey seed color in peas is dominant to white. Assume that Mendel conducted a series of experiments where plants with grey seeds were crossed among themselves and the following progeny were produced: 320 grey, 80 white.
 - a. What is the most likely genotype of each parent?
 - b. Based on your answer to (a) what are the expected genotypic and phenotypic ratios of the offspring?
4. Assume that you have a garden and some pea plants have solid leaves and some have striped leaves. You conduct a series of experiments and obtain the following results:
 - a. solid x striped = 55 solid 60 striped
 - b. solid x solid = 36 solid 0 striped
 - c. striped x striped = 0 solid 65 striped
 - d. solid x solid = 92 solid 30 striped
 - e. solid x striped = 44 solid 0 striped

Define the symbols for the alleles and give the genotypes for the individuals shown above. What is the Mode of Inheritance of the gene responsible for leaf pattern?

5. In *Drosophila melanogaster*, the recessive allele, *p*, when homozygous, determines pink eyes. *Pp* or *PP* results in wild-type eye color. Another gene, on a different chromosome, has a recessive allele, *s*, which produces short wings when homozygous. Consider a cross between females of genotype *PPSS* and males of genotype *ppss*. Describe the phenotypes and genotypes of the F1 generation and of the F2 generation.
6. Assume that *R* is a dominant allele, which produces red flowers, and *r* is a recessive allele that produces white flowers. Also assume that *T* is an allele on another chromosome that produces tall plants and *t* is an allele that produces short plants. What are the possible genotypes and phenotypes in the F1 generation derived from parents with the genotypes *RrTT* and *RrTt*? Choose two F1 individuals to cross. What are the possible genotypes and phenotypes in the F2

generation? How would the ratios of possible genotypes and phenotypes differ in the F1 generation if flower color genes and plant height were on the same chromosome (if they are linked)?

7. In the above question, assume that R and T are both incompletely dominant to r and t respectively. The heterozygotes would produce pink flowers and be of medium height. Now what are the possible genotypes/phenotypes of F1?
8. In rabbits, the homozygous CC is normal, Cc results in rabbits with deformed legs and cc is lethal. For a gene for coat color, genotype BB produces black, Bb brown, and bb white. Give the phenotypic proportions of offspring from a cross of a deformed-leg, brown rabbit with a deformed-leg white rabbit.
9. In dogs, black, B is dominant to chestnut, b and solid color S is dominant to spotted, s. What are the genotypes of the parents that would produce a cross with 3/8 black solid, 3/8 black spotted, 1/8 chestnut solid, and 1/8 chestnut spotted puppies?
10. For the following crosses determine the probability of obtaining the indicated genotype in an offspring.

Cross	Offspring
a. Aabb x AaBb	Aabb
b. AaBB x AaBb	aaBB
c. AABbcc x aabbCC	AaBbCc
d. AaBbCc x AaBbcc	aabbcc