

Genetics Problems

Name: _____

Answer all questions on another sheet of paper

1. a) You want to produce a variety of dog that is brown and cannot bark. Black color and the ability to bark are dominant in dogs. You have a male and female dog both of which are black and can bark. Is it possible to produce any puppies that are brown and cannot bark? **Develop a Punnett Square to support your answer.**

b) If a litter of 8 puppies is produced, about how many might be brown and silent? (if any). Are the parents heterozygous or homozygous?
2. How does a dihybrid cross differ from a monohybrid cross?
3. a) Why were Mendel's experiments with pea plants successful while those of other scientists were not? What was important about the traits he was observing?

b) How did Mendel explain why one of the traits seemed to disappear in a monohybrid cross in the F1 generation yet reappear in the F2 generation?
4. What is the difference between genotype and phenotype? Give examples.
5. What kinds of gametes could be produced by organisms having the following genotypes?
 - a) AaBB
 - b) aaBB
 - c) AaBb
 - d) AA bb
6. What are some of the similarities and differences that exist in sperm cells and egg cells?

For problems 7 – 9, set up a pedigree to support your answer. Set up a key for each gene trait.

7. The polled (hornless) trait in cattle is dominant. The horned trait is recessive. A certain polled bull is mated to three cows. Cow A, which is horned, gives birth to a polled calf. Cow B, also horned, produces a horned calf. Cow C, which is polled, produces a horned calf. Name the genotypes of all parents.
8. a) In humans normal skin pigmentation is due to a dominant gene (C), and albinism to its recessive allele (c). A normal man marries an albino woman. Their first child is an albino. What are the genotypes of these three people?

b) If they have more children, what could they probably be like?
9. An albino man marries a normally pigmented woman. They have nine children, all normally pigmented. What are the genotypes of this family?

10. Polydactyly (extra fingers and toes) is due to a dominant gene (P). When one parent is polydactylous, but heterozygous, and the other parent is normal, how many times in families of three children would you expect all normal children?
11. Albinism frequently skips generations while polydactyly does not. How do you explain these facts?
12. A family has three children. What is the chance that:
 - a) the first child is a boy?
 - b) the second child is a girl?
 - c) the first is a boy, the second is boy, and the third is a girl?
13. In a certain family there are six girls. What are the chances of the next child being another girl?
14. In summer squash, white fruit color is dominant and yellow is recessive. A squash plant that is homozygous for white is crossed with a homozygous yellow one. Predict the appearance of:
 - a) the F1 generation.
 - b) the F2 generation.
 - c) the offspring of a cross between an F1 individual and a homozygous white individual.
15. If base pairs in DNA molecules can consist only of adenine-thymine or cytosine-guanine, what must be the ratio of the amount of adenine to thymine? Of the amount of cytosine to guanine? Of adenine to cytosine?
16. The Punnett square below represent the self-fertilization of a pea plant that is heterozygous for yellow peas. Fill in the missing alleles to predict the resulting offspring.

	Y	—
—	Y	
y	Y y	_ y

17. In a certain animal, a breed is known that always has a hairy tail; another breed is known that always has a naked tail. How would you determine which trait is dominant?