

Name:

Date:

Practice Genetic Problems

Directions: Please read the following questions and answer them on this handout as indicated.

In guinea pigs, the allele for short hair is dominant.

1. What genotype would a heterozygous short haired guinea pig have? _____
2. What genotype would a purebred short haired guinea pig have? _____
3. What genotype would a long haired guinea pig have? _____
4. Using the punnett square below, illustrate the cross between a pure bred short haired guinea pig and a long haired guinea pig.

- a. What are the phenotypes of the F1 offspring? _____
- b. What are the genotypes of the F1 offspring? _____
- c. What Medelian law does this punnett square illustrate?

5. Illustrate the cross between F1 offspring of the above guinea pigs.

- a. Indicate the phenotypes of the F2 offspring _____
- b. What are the genotypes of the F2 generation? _____
- c. What Medelian law does this illustrate?

6. Two short haired guinea pigs are mated several times. Out of 100 offspring, 25 of them have long hair. What are the probable genotypes of the parents? _____ & _____ Use a punnett square to support your answer.

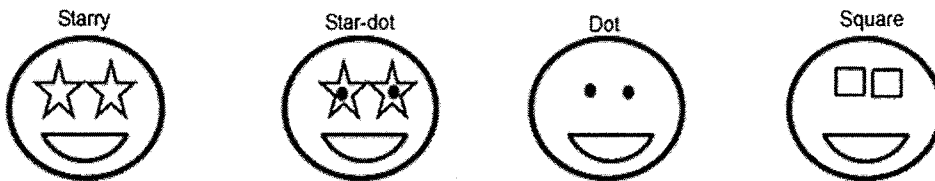
7. In humans, free earlobes (F) are dominant over attached earlobes (f). If one parent is homozygous dominant for free earlobes, while the other has attached earlobes, can they produce any children with attached earlobes? Explain your answer. _____

8. In radishes, the gene that controls color exhibits incomplete dominance. Pure-breeding red radishes crossed with pure-breeding white radishes make purple radishes. What are the genotypic and phenotypic ratios when you cross a purple radish with a white radish? Use the punnett square to help you!

a. Phenotype: _____

b. Genotypes: _____

9. Certain breeds of cattle show incomplete dominance in coat color. When pure breeding red cows are bred with pure breeding white cows, the offspring are roan (a pinkish coat color). Summarize the genotypes & phenotypes of the possible offspring when a roan cow is mated with a roan bull.



In smileys, the shape of the eye is controlled by multiple alleles, much like blood types. The smileys pictured show the four possible phenotypes. It is known that the star and dot eyes are co-dominant and the square eyes are a recessive trait. Assign genotypes to each of the smileys pictured. (Hint: Use blood type genotypes to help you)

10. If a star-eyed smiley (homozygous) is crossed with a dot-eyed smiley (also homozygous) what will all of their offspring look like?
11. If the pair in the cross above were both heterozygous, what percentage of the offspring will be:
 Starry _____ Star-dot _____ Dot _____ Square _____
12. If a starry-dot eyed smiley is crossed with a square eyed smiley what percentage of the offspring will be:
 Starry _____ Star-dot _____ Dot _____ Square _____
13. If two starry-dot eyes smileys are crossed, what percentage of the offspring will be:
 Starry _____ Star-dot _____ Dot _____ Square _____

In cats, the gene for calico (multicolored) cats is co-dominant. Females that receive a **B** and an **R** gene have black and orange splotches on white coats. Males can only be black or orange, but never calico. Here's what a calico female's genotype would look like: $X^B X^R$

14. Illustrate the cross of a female calico cat with a black male.

- What percentage of the kittens will be black and male? _____
- What percentage of the kittens will be calico and male? _____
- What percentage of the kittens will be calico and female? _____

15. Show the cross of a female black cat with a male orange cat.

- What percentage of the kittens will be calico and female? _____
- What color will all the male cats be? _____
- If you were a cat breeder, what type of parent should you choose to mate to have litters with the most number of calico kittens? _____

In fruit flies, eye color is a sex linked trait. Red is dominant to white.

16. Indicate the sexes and eye color of fruit flies with the following genotypes?

$X^R X^r$ _____ $X^R Y$ _____ $X^r X^r$ _____ $X^R X^R$ _____ $X^r Y$ _____

17. Indicate the genotypes of the following fruit flies.

white eyed, male _____ red eyed female (heterozygous) _____

white eyed, female _____ red eyed, male _____

Show a cross between a pure red eyed female and a white eyed male.

- What are the genotypes of the parents? _____ & _____

a. Phenotypes: _____

b. Genotypes: _____

