

GENETICS PRACTICE EXERCISES

I. Identification

Direction: Read each statement or question carefully. Identify what term or concept is being referred to by each statement. Write the answer in the space provided.

1. Austrian monk (Augustinian friar) who was the first to explain how heredity works.

2. Term that refers to the alternative form of a trait (ex. hair texture can be curly or straight.)

3. Law of heredity which states that genes separate during gamete formation.

4. When do the gametes separate? (what process?)

5. Law that states that when the alleles of an individual is heterozygous, only the dominance is physically expressed while the recessive is not expressed.

6. Law that states that the separation of alleles of one trait is independent of the separation of the alleles of another trait.

7. When the alleles are both dominant or both recessive.

8. When one allele is dominant and the other is recessive.

9. The genetic makeup of an individual represented by two letters

10. Observable characteristics of an individual



II. Problem Solving

Direction: Read and analyze each word problem carefully. Solve what is being asked in the problem. Place your answers in the space provided. Show your solutions through the Punnett square provided. Use the letters assigned to each trait.

Problem 1: In hamsters, brown fur color is dominant over albino. Alex has one brown male hamster and one brown female hamster. He allowed his brown hamsters to mate and was shocked to see that three of the hamster babies were brown and one was an albino!

- a. What are the **genotypes** of the parents? Use the **letter B** for the genotypes.

Show how this happened with a **Punnett square** (the shaded area is for the parents' genotype). If there is a heterozygous parent, always place their genotype in the **top row**.

- b. What is the **genotypic ratio**?



Problem 2: In cats, long hair is recessive to short hair. A pure-breeding short-haired male is mated to a long-haired female.

- a. What will be the **genotypes** of the offspring? Use **letter H** for the genotypes.

Show how this happened with a **Punnett square**. If there is a heterozygous parent, always place their genotype in the **top row**.

- b. What is the **genotypic ratio**?

- c. What is the **phenotypic ratio**?



Problem 3: In humans, albinism is recessive over normal skin pigmentation. A male albino man marries a woman who is normal-skinned, but has a mother who is an albino.

- a. What is the genotype of the female? Use **letter A** for the genotypes.

- b. What are the possible **genotypes** of their offspring?

Show how this happened with a **Punnett square**. If there is a heterozygous parent, always place their genotype in the **top row**.

- c. What are the **chances** that their offspring will have albino children?



Problem 4: In humans, widow's peak is dominant over straight hairline. Mrs. And Mr. Smith both have widow's peaks. Their first child also has a widow's peak, but their second child has straight hairline. Mr. Smith accuses Mrs. Smith of being unfaithful to him.

- a. Is he correct in accusing his wife?

- b. Justify your answer by making a Punnett square showing a scenario in which having a child with straight hair is possible. Use the **letter W**. If there is a heterozygous parent, always place their genotype in the **top row**.

- c. What is the **possibility** that the offspring of Mr. and Mrs. Smith will have straight hairline?



Problem 5: In humans, ability to roll the tongue is dominant over not having this ability. At the same time, having a convex (Roman) nose is dominant over having a straight nose.

Marsha is married to John, and they have four children. Marsha is able to roll her tongue and has a straight nose. John is also able to roll his tongue, but he has a convex nose. Their four children exhibit the following traits:

- **Ellen**- able to roll tongue, convex nose
- **Dan**- able to roll tongue, straight nose
- **Anne**- cannot roll tongue, convex nose
- **Peter**- cannot roll tongue, straight nose

Use the following letters for the traits: **letter B** for nose shape, and **letter L** for tongue rolling.

- a. What are the **genotypes** of Marsha and John?

John:

Marsha:

- b. What are the genotypes of Elizabeth and John's offspring?

Show how this happened with a **Punnett square**.

- c. What are the possible **genotypes** of their daughter **Ellen**? List all the possible genotypes.

Problem 6: In fruit flies, long wings is dominant over short wings. On the other hand, gray body color is dominant over ebony color.

What type of offspring would you expect from a cross between a short-winged ebony female and a double heterozygous long-winged ebony male?

Represent the traits with the following letters: **letter S** for wing size, and **letter G** for body

Show how this happened with a **Punnett square**.

a. What is the **possibility** that the offspring will have:

- Long wings and gray body color
- Long wings and ebony body color
- Short wings and gray body color
- Short wings and ebony body color