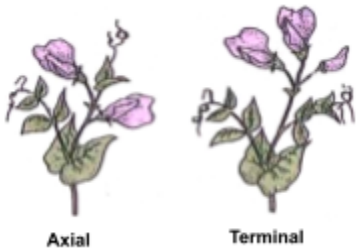
Name:_____Period:_____Date:_____

Biology Unit 5 Macrogenetics

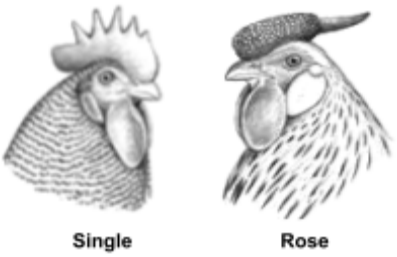
5.1 Mendelian Inheritance Practice

1. Mendel crossed a purebred pea plant with axial flowers with a purebred pea plant with terminal flowers. All of the offspring had axial flowers. Which trait is dominant, and which trait is recessive?



2. In peas, green **pod** color is a dominant allele (G), and yellow pod color is recessive (g). If two plants with green pods are crossed and some of the offspring have yellow pods, what genotypes do the parents have?

3. In poultry, a rose shaped comb is controlled by a dominant allele (R), and a recessive allele controls a single comb (r).



   a. What are the genotypes and phenotypes produced from crossing a homozygous rose comb rooster with a homozygous single comb hen? Include the fraction or percentage for each genotype and phenotype.

   b. What are the genotypes and phenotypes produced from crossing a hybrid rose comb rooster with a purebred single comb hen? Include the fraction or percentage for genotype and phenotype.

4. In mice, black fur color is controlled by dominant allele (B) and brown by recessive allele (b). You cross a black male with a brown female and produce 1/2 black offspring and 1/2 brown offspring.
    a. What are the genotypes of each parent?

    b. What are the genotypes of the offspring?

5. In peas, one pair of alleles controls the height of the plant and a second pair of alleles controls flower color. The allele for tall (T) is dominant to the allele for dwarf (t), and the allele for purple (P) is dominant to the allele for white (p).
    a. A homozygous tall plant that is heterozygous for purple flowers is crossed with a dwarf plant with white flowers. What are the genotypes and phenotypes of the offspring? Include fractions or percentages for each genotype and phenotype.

    b. A hybrid tall plant that is also hybrid for purple flowers is crossed with a dwarf plant with white flowers. What are the genotypes and phenotypes of the offspring? Include fractions or percentages for each genotype and phenotype.

    c. A tall plant with purple flowers is crossed with a tall plant with white flowers. The cross produces 3/8 tall purple, 3/8 tall white, 1/8 dwarf purple, and 1/8 dwarf white. What are the genotypes of the parents?

6. A man has brown eyes and is homozygous for this trait. His wife has blue eyes and is homozygous for this trait. Brown eyes are dominant over blue eyes. How many of their offspring would you expect to have blue eyes if they have four children?

7. A fruit fly (*Drosophila*) has long wings and is heterozygous for this trait. Another fruit fly has small, vestigial wings and is homozygous for this trait. Long wings are dominant to vestigial wings. If these two flies mate, how many of their offspring would you expect to have long wings and how many would you expect to have vestigial wings, provided they have 80 offspring?

Long wings Vestigial wings

8. In garden peas, yellow peas and round peas are dominant over green peas and wrinkled peas.
    a. If a plant that is homozygous for yellow peas and round peas is crossed with a plant with green, wrinkled peas, what type of peas will be expected in the next generation? Include the fraction or percentage for each genotype and phenotype.

    b. If the offspring peas were crossed among themselves, what would be expected in the next generation? Include the fraction or percentage for each genotype and phenotype.

9. Some dogs bark when trailing the scent of a fox and others are silent. The barking trait is due to dominant genes. Erect ears are dominant to drooping ears. What kind of puppies would be expected from a heterozygous erect-eared, hybrid barker mated to a drooping, silent trailer?

Droopy Ears Erect Ears

10. Albinism in humans is inherited as a recessive trait. For the following families, determine the genotypes of the parents and offspring.
    a. Two non-albino (normal) parents have five children. Four are normal and one is albino.

    b. A normal male and an albino female have six children, all are normal.

11. Pigeons may exhibit a checkered or plain pattern. In a series of controlled matings, the following data were obtained:

Parents	**Offspring**	
	Checkered	**Plain**
Checkered **x** Checkered	36	0
Checkered **x** Plain	38	0
Plain **x** Plain	0	35

Which trait is dominant and which is recessive?

12. A parent passes one allele for each trait through their gametes (sperm or egg). How many different types of gametes can be formed by individuals of the following genotypes?

    a. AABB

    b. AaBb

    c. AaBB

    d. AaBbCc

13. The polled (hornless) trait in cattle is dominant. The horned trait is recessive. A polled bull is mated to three cows.

    - Cow A, which is horned, gives birth to a polled calf.
    - Cow B, which is also horned, produces a horned calf.
    - Cow C, which is polled, produces a horned calf.

    What are the genotypes of the four parents (the bull and cows A, B, and C)?

14. In horses, black coat color is dominant (B) and chestnut coat color is recessive (b). Trotting gait is due to a dominant gene (T) and pacing gait to the recessive allele (t).

    a. Predict the phenotypes and genotypes of the offspring of a heterozygous black, heterozygous trotting horse with a chestnut pacing horse. Include the fraction or percentage for each genotype and phenotype.

    b. Predict the phenotypes and genotypes of the offspring of a homozygous black, heterozygous trotting horse with a chestnut pacing horse. Include the fraction or percentage for each genotype and phenotype.