

Name: _____

Monohybrid Cross Problems

Directions: For each problem, draw a Punnett square and show the genotypes and phenotypes of the parents and offspring associated with the cross. Whenever possible, give the ratios of genotypes and phenotypes in the offspring.

Watch out for quirks (*)!

1. In peas, pod color is determined by Gene P, which has two alleles, P and p. The allele for green pod color (P) is dominant to the allele for yellow pod color (p). Cross a heterozygous plant with green pods with another heterozygous plant with green pods.

2. In humans, hair texture is determined by Gene T, which has two alleles, T and t. Allele T, which causes curly hair, is dominant to allele t, which causes straight hair. Cross a homozygous person with curly hair with a heterozygous person with curly hair.

3. *In Japan, it was discovered that four o'clock plants produced either red (RR) or white (WW) flowers. When red and white four o'clock flowers were cross-pollinated, a pink flower (RW) was produced. This is known as incomplete dominance. Neither allele is dominant over the other, but a blend of the two traits is produced.
 - a. Cross a red four o'clock flower with a pink four o'clock flower.

 - b. Cross a pink four o'clock flower with a pink four o'clock flower.

4. *In humans, gender is determined by the X and Y chromosomes: females are XX; males are XY. Genes located on these chromosomes are said to be sex-linked. One sex-linked trait, found only on the X chromosome, is the trait for color vision. Normal vision is dominant (N) to colorblindness (n).
 - a. Which gender needs only one allele for colorblindness to be expressed? Explain.

 - b. Cross a woman who is a carrier for colorblindness (XNXn) with a man with normal vision (XNY).

 - c. Is it possible for a colorblind man to have children with normal vision? Explain, and use a Punnett square to support your answer.

5. *Scenario: Mrs. Cave and Mrs. Jones gave birth to sons at the same time. Unfortunately, the nurses in the nursery mixed up the name tags of the babies. When the babies were brought to the mothers' rooms, one mother began to question the identity of her baby. To put her at ease, doctors recommended a blood test. Table 1 shows the results of the blood tests of the parents and the babies, and Table 2 identifies the alleles that contribute to blood type:

Table 1

Person	Blood Type
Mrs. Cave	O
Mr. Cave	AB
Mrs. Jones	A
Mr. Jones	B
Baby A	O
Baby B	A

Table 2

Blood Type Facts	
Blood Type	Possible Genotypes
A	Ai or AA
B	Bi or BB
AB	AB
O	ii
Note: blood types A and B are codominant	

- a. Using Punnett squares, determine which baby belongs to which couple, and explain why.
 - b. Is blood type an example of codominance, incomplete dominance, or multiple alleles?
6. Blue eye color is recessive to other eye colors in humans.
 - a. Could two blue-eyed parents have a brown-eyed child? Explain. Show your work.
 - b. Could two brown-eyed parents have a blue-eyed child? Explain. Show your work.
7. Albinism, the total lack of pigment in an organism, is due to a recessive gene. A man and a woman plan to marry and wish to know their probability of having albino children.
 - a. What could you tell them if both are normally pigmented, but each has one albino parent?
 - b. What could you tell them if the man is albino and the woman is normal, but the woman's father is albino?
 - c. What could you tell them if the man is albino and the woman's family includes no albinos?
 8. *Is it possible for someone with blood type O to have a child with blood type AB? Use Table 2 from Problem 5 and Punnett squares to support your answer.
 9. Cattle with red coats crossed with cattle with white coats produce roan (a mixture of red and white hairs) offspring. Cross a roan cow with a roan bull and show the outcome of the offspring.