**PRACTICE: MENDELIAN GENETICS**

UNFAMILIAR PROBLEMS

1. In humans, dimpled cheeks (D) are dominant and smooth cheeks (d) are recessive. A father is who is ***heterozygous dimpled***, and a mother who is ***homozygous smooth*** have children.
	1. What is the genotype of the father? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	What is the genotype of the mother? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Fill in the Punnett Square showing the cross and the combinations of
	genes possible in the children.
	3. According to chance, what fraction of their children will have dimples?
	4. What fraction of the children should be homozygous smooth?
	5. If these two people have four children, is it safe to assume that two will be dimpled and two will not?
2. A father is who is ***homozygous dimpled***, and a mother who is ***homozygous smooth*** have children.
	1. What is the genotype of the father? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	What is the genotype of the mother? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Fill in the Punnett Square showing the cross and
	the combinations of genes possible in the children.
	3. According to chance, what fraction of their children will have dimples?
	4. What fraction of the children should be homozygous smooth? (if any)
	5. What fraction of the children should be heterozygous dimpled? (if any)
	6. What fraction of the children should be homozygous dimpled? (if any)
3. A father is who is ***homozygous dimpled***, and a mother who is ***heterozygous dimpled*** have children.
	1. What is the genotype of the father? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	What is the genotype of the mother? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Fill in the Punnett Square showing the cross and the combinations of
	genes possible in the children.
	3. According to chance, what fraction of their children will have dimples?
	4. What fraction of the children should be ***homozygous smooth***? (if any)
	5. What fraction of the children should be ***heterozygous dimpled***? (if any)
	6. What fraction of the children should be ***homozygous dimpled***? (if any)
4. In humans, long eyelashes (L) are dominant and short eyelashes (l) are recessive.
	1. Draw a Punnett Square showing the cross between two
	***heterozygous*** ***long-eyelash*** parents in the space provided.
5. What fraction of the offspring should have long eyelashes?
6. What fraction of the offspring should have short eyelashes?
7. What fraction of the offspring will be ***homozygous long eyelash***?
8. What fraction of the offspring will be ***homozygous short eyelash***?
9. What fraction of the offspring will be ***heterozygous long eyelash***?
10. A cross is made between two *different* parents and ***all*** the offspring have the genotype Ll (*They are all heterozygous long eyelash.*). Determine the genotypes of both parents.

 Parent 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Parent 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. In mice, gray colour fur (G) is dominant over white (g). A mouse from a
population that *always* produces ***gray*** mice is mated with a ***white*** mouse.
	1. What is the genotype of the gray mouse? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	What is the genotype of the white mouse? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Draw a Punnett Square showing this cross.
	3. Describe the phenotype of all the first generation of mice from
	this cross: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. What is the genotype of each one of the offspring?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	5. These mice are all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_zygous.
2. A ***heterozygous gray*** mouse is mated with a ***white*** mouse. Use the following
Punnett Square to predict the possible offspring as asked below:
3. \_\_\_\_\_\_\_\_ of the offspring are gray and \_\_\_\_\_\_\_\_ of the offspring are white.
4. Are any of the offspring ***homozygous gray***?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_ of the offspring are ***homozygous white***.
6. Is it possible to have a ***heterozygous white*** mouse?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. In chimpanzees, straight fingers are dominant to bent fingers. Complete a Punnett square to show the genotypes and phenotypes expected for the following cross: **heterozygous straight fingers x homozygous bent fingers**.
8. In humans, the gene for brown eyes (B) is dominant to the gene for blue eyes and the gene for right handedness (R) is dominant to the gene for left handedness. Two individuals **heterozygous for both of these characteristics** marry. Complete a Punnett square to show the expected genotypes and phenotypes of the offspring.

 Summarize the ratio of the phenotypes:

\_\_\_\_ out of \_\_\_\_ are right handed and have brown eyes

\_\_\_\_ out of \_\_\_\_ are right handed and have blue eyes

\_\_\_\_ out of \_\_\_\_ are left handed and have brown eyes

\_\_\_\_ out of \_\_\_\_ are left handed and have blue eyes

1. A male who is homozygous right handed and heterozygous brown eyed marries a female who is heterozygous right handed and has blue eyes. Complete a Punnett square to show the expected genotypes and phenotypes of the offspring.

 Summarize the ratio of the phenotypes:

\_\_\_\_ out of \_\_\_\_ are right handed and have brown eyes

\_\_\_\_ out of \_\_\_\_ are right handed and have blue eyes

\_\_\_\_ out of \_\_\_\_ are left handed and have brown eyes

\_\_\_\_ out of \_\_\_\_ are left handed and have blue eye