Basic Genetics Problems
Honors Biology
Lindemulder

Name: _____

Date: _____ Hour: _____

Directions: Solve the following problems. Show all work for full credit.

1. Assume tall (TT or Tt) is dominant over dwarf (tt) in garden pea plants. For each of the crosses below: Give the probable offspring by stating the genotypic and phenotypic ratios.
   a. Two heterozygous parents

   b. One heterozygous and one dwarf parent

2. Assume the color black (BB or Bb) is dominant over brown (bb) in guinea pigs. Write the possible F1 generation's genotype and phenotype ratios for each of the following crosses:
   a. Both homozygous black parents

(b)

   b. One homozygous black parent and one homozygous brown parent

   c. One homozygous black parent and one heterozygous black parent

3. Assume in guinea pigs that short hair (SS or Ss) is dominant over long hair (ss). Write the possible F1 generation's genotype and phenotype ratios for each of the following crosses:
   a. Both homozygous long-haired parents

   b. Both heterozygous short-haired parents

4. Curly hair is dominant over straight hair. A man with curly hair whose mother had straight hair marries a woman with curly hair whose father had straight hair. What is the chance of one of their children having curly hair?

5. Given the following genotypes. List what would go along the top and side of a Punnett square: DdBB x ddBb

   Along the top: _____ _____ _____ _____

   Along the side: _____ _____ _____ _____

6. Given the following genotypes. List what would go along the top and side of a punnett square: aaJJ x AAJj

   Along the top: _____ _____ _____ _____

   Along the side: _____ _____ _____ _____

7. Black wings (B) are dominant over silver wings (b). Skinny wings (Q) are dominant over fat wings (q). Set up a cross between a bug with Black fat wings (BBqq) and another with skinny silver wings (bbQQ).
   a. What is the genotypic ratio?

   b. What is the phenotypic ratio?

   c. What percent of the offspring are:
      i. Heterozygous for both traits?

      ii. Homozygous dominant for both traits?

      iii. Homozygous recessive for both traits?

8. Cross a tall green pea plant (TTGg) is crossed with a tall green pea plant (TtGg). List the genotypes and provide the ratio of phenotypes.

9. Cross a tall green pea plant (TtGg) is crossed with a Short yellow pea plant (ttgg). List the genotypes and provide the ratio of phenotypes.

10. Cross a heterozygous tall red flowered plant is crossed with a homozygous short white flowered plant. List the genotypes and provide the ratio of phenotypes.

11. Cross two heterozygous tall, green pea plants are crossed. List the genotypes and provide the ratio of phenotypes.

12. In Guinea pigs the allele for short hair (S) is dominant over the allele for long hair (s). (*Note that although short hair is "little hair" the allele symbol is "big S" because it's dominant.) The allele for black hair (B) is dominant over the allele for brown hair (b). Suppose two Guinea pigs, both heterozygous for both traits, are mated. What are the odds of any one of their pups being:

a. short-haired and black?

b. short-haired and brown?

c. long-haired and black?

d. long-haired and brown?

13. Suppose that a Guinea pig boar that is heterozygous for both traits is mated with a sow that is heterozygous for fur (Ss), but whose fur is brown (bb). What are the odds of any one of their pups being:

a. short-haired and black?

b. short-haired and brown?

c. long-haired and black?

d. long-haired and brown?
