

I. Matching: Fill in the blank with the letter of the correct answer from the word box. (2 points each)

- A. Change in chromosome number B. True breeding C. Genetic disease carrier
 D. monohybrid cross E. autosomes F. change in chromosome structure
 G. Sex-linked inheritance H. Autosomal inheritance I. Sex chromosomes

- _____ 1. A situation in which abnormal cellular events in meiosis lead to either none of a particular chromosome in the gamete or more than one chromosome in the gamete
- _____ 2. A person who is heterozygous in a recessive genetic disorder
- _____ 3. Inheritance of a genetic trait not on a sex chromosome
- _____ 4. Chromosomes that determine the sex of an individual
- _____ 5. The term given an organism having a certain characteristic that is always passed on to its offspring.
- _____ 6. A situation in which a chromosome loses or gains genes during meiosis.
- _____ 7. Chromosomes that do not determine the sex of an individual
- _____ 8. Inheritance of a genetic trait located on the sex chromosomes.
- _____ 9. A cross between two individuals concentrating on only one definable trait.

II. Multiple Choice: Circle the correct answer. (2 points each)

1. The ability for a person to taste PTC is a dominant genetic trait (“T”), while the inability to taste PTC is recessive (“t”). A man who is heterozygous in that trait would have (a) TT (b) tt (c) Tt (d) Pt as his genotype.
2. If a woman cannot taste PTC, her genotype would be (a) TT (b) tt (c) Tt (d) Pt .
3. If the man in question 1 and the woman in question 2 married and had children the percentage of the offspring that would be heterozygous tasters would be (a) 100% (b) 75% (c) 25% (d) 50%.
4. For a given trait, how many alleles does a normal gamete have? (a) 1 (b) 2 (c) 3 (d) 4

5. The only time a 1x1 Punnett square can be used is when both the parent organisms are (a) heterozygous (b) monohybrid (c) homozygous (d) dihybrid for a particular trait.
6. The interaction of several genes to produce a specific trait is called (a) polygenetic inheritance (b) epistasis (c) antigens (d) incomplete dominance.
7. When two alleles share dominance but are not dominant over each other, such as the AB blood type, it is called (a) polygenetic inheritance (b) autosomal inheritance (c) co-dominance (d) incomplete dominance.
8. An example of (a) polygenetic inheritance (b) incomplete dominance (c) multiple alleles (d) epistasis is seen when a plant with red flowers is crossed with a plant with white flowers, and it produces a plant with pink flowers.

III. Short Answer: Write the correct answer in the blank (2 points each)

1. The scientists known as the founder of modern genetics is _____.
2. A(n) _____ is a protein that, when introduced to blood, triggers the production of an antibody.
3. A genotype in which both alleles are identical is _____.
4. A cross between two individuals, concentrating on two definable traits is a _____.
5. A _____ is an allele that will determine phenotype if just one is present in the genotype.
6. A _____ is a diagram that follows a particular phenotype through several generations.
7. An allele that will not determine the phenotype unless the genotype is homozygous in that allele is known as a _____.

8. In humans, the ability to roll one's tongue is a dominant genetic trait. If "R" represents this allele and "r" represents the recessive allele, what are the possible genotypes for a person who can roll his tongue? _____
9. A chart drawn to predict the likelihood that an offspring would have a given genotype and phenotype relative to a given trait is known as a _____.

IV. True/False: (2 points each)

- ____ 1. Recessive phenotypes in sex-linked traits affect males significantly more often than females because the Y chromosome does not have the allele for the trait, meaning that males have only one allele for the trait.
- ____ 2. Because identical twins have identical DNA, they are identical in every way.
- ____ 3. For a given trait, a non-gamete cell will have four alleles.
- ____ 4. Down's syndrome occurs when there has been a change in the number of chromosomes in the gamete.

V. Listing and Definitions:

List the four basic principles of Mendelian Genetics in modern terminology. (1 point each)

1. The _____ of an organism are determined by its _____.
2. Each organism has _____ that make up the _____ for a given _____.
3. In sexual reproduction, each parent contributes _____ of its alleles to its offspring.
4. In each genotype, there is a _____ allele. If it exists in an organism, the _____ is determined by that allele.

Write out the definition for the following words: (3 points each)

1. genotype -

2. phenotype –

3. allele –

4. mutation –

5. heterozygous genotype –

VI. Punnett Square Problems: Follow the directions to answer the questions below.

Problem A: A pea plant is heterozygous in both the color of the pea produced (“Y” for yellow and “y” for green) and the height of the plant (“T” for tall and “t” for short).

1. What possible combinations of alleles exists in its gametes? (5 points)
2. On the back of this page, draw the resulting Punnett square for this self-pollinating plant, and list the possible phenotypes and their percentages. (10 points)

Problem B: Hemophilia is a sex-linked, recessive trait. Draw the Punnett square for a non-hemophilic man having children with a woman who carries the gene for the disease but does not have the disease. What percentage of the boys will have the disease? What percentage of the girls will have the disease? (Do your work on the back of this page.) (5 points)