1. What is the maximum number of different alleles a diploid organism can have for one specific gene?
   A) 1
   B) 2
   C) 4
   D) It depends on the number of chromosomes
   E) It depends on the number of mutations in the organism

2. If an organism has a diploid number of 6 chromosomes (2n = 6), how many different combinations of maternal and paternal chromosomes are possible in its gametes?
   A) 6
   B) 8
   C) 12
   D) 16
   E) 3

3. Which of the following can NOT contribute to genetic variation in offspring arising from sexual reproduction?
   A) crossing over during meiosis in the parents
   B) independent assortment during meiosis in the parents
   C) random fertilization
   D) errors during DNA replication before meiosis
   E) mutations in DNA caused by UV rays hitting a parent’s dividing skin cells

4. During which of the following does the separation of sister chromatids occur?
   A) Mitosis only
   B) Meiosis I only
   C) Meiosis II only
   D) Mitosis and Meiosis I
   E) Mitosis and Meiosis II

5. During which of the following does the separation of homologous chromosomes occur?
   A) Mitosis only
   B) Meiosis I only
   C) Meiosis II only
   D) Mitosis and Meiosis I
   E) Mitosis and Meiosis II

6. When true-breeding purple flowers were crossed with true-breeding white flowers (P generation), ALL the offspring (F1 generation) were PURPLE. From this you would conclude
   A) The purple allele is dominant and the white allele is recessive
   B) The white allele is dominant and the purple allele is recessive
   C) answers A and B are equally likely to be right
7. Which of Mendel’s four hypotheses can, on its own, directly explain why there are NO white flowers in the F1 generation and why the purple F1’s look just as purple as the purple P’s?
A) Alternative versions of heritable “factors” (i.e., alleles)
B) For each character an organism inherits two alleles, one from each parent
C) If the two alleles at a locus differ, then one (the dominant allele) determines the organism’s appearance, and the other (the recessive allele) has no noticeable effect on appearance.
D) The “law of segregation” --- Mendel did not know about genes or chromosomes per se. However, in modern terms, Mendel’s “law of segregation” can be phrased as stating that the TWO alleles an individual possesses for a given gene SEPARATE during gamete formation.

8. If the two alleles an individual possesses for a given gene “segregate” (i.e., separate) during gamete formation, what is happening at the chromosomal level during the process of this separation?
A) diploid cells are arising from haploid ones
B) haploid cells are arising from diploid ones
C) could be either A or B
D) not enough information to choose between A and B

9. Mendel’s “law of segregation” finds its mechanistic basis most clearly in the behavior of chromosomes during
A) S phase of Interphase
B) mitosis
C) meiosis I
D) meiosis II
E) all of the above

10. A male frog has two copies of Chromosome 12. One copy carries a green eye allele and the other carries an orange eye allele. Which of the following sperm types will he produce?
A) Only green gene sperm
B) Only orange gene sperm
C) 1/2 green and 1/2 orange gene sperm
D) 3/4 green and 1/4 orange gene sperm
E) An indeterminate frequency of green and orange gene eggs