The Chromosomal Basis of Inheritance
Chapter 15

1. a) Which one of Mendel's laws describes the inheritance of alleles for a single trait?
b) Which law relates to the inheritance of alleles for two traits in a dihybrid cross?

2. Use the steps in meiosis to explain why alleles obey Mendel's laws of segregation and independent assortment.

3. State the phenotype and genotype of the offspring of a cross between a white-eyed female fruit fly and a red-eyed male fruit fly.

4. Neither Jim nor Suzanne have Duchenne muscular dystrophy, but their firstborn son does.
a) What is the probability that, if their second child is a boy, it will have the disease?
b) What is the probability that, if their second child is a girl, it will have the disease?

5. a) If alleles are supposed to assort independently into gametes, how would you explain linked genes?
b) How would you explain genes that are only partially linked (*i.e.*, incomplete linkage)?

6. Why are new combinations of genes important for natural selection?
7. a) How can gametes with an abnormal number of chromosomes be formed?
b) About 5% of individuals with Down syndrome have a chromosomal translocation in which a third copy of chromosome 21 is attached to chromosome 14. If this translocation happened in a parent's gonad, how could it cause Down syndrome in a child?

8. The ABO blood type locus has been mapped to chromosome 9. A father who has type AB blood and a mother who has type O blood have a child with trisomy 9 and type A blood. From this information, can you tell in which parent the nondisjunction occurred? Justify your answer.

9. Gene dosage ensures the correct number of copies of a gene are actively being expressed. The process is important for normal development. Explain how X-inactivation and genomic imprinting establish the proper dosage of certain genes.

10. What are extranuclear genes and how are they inherited?