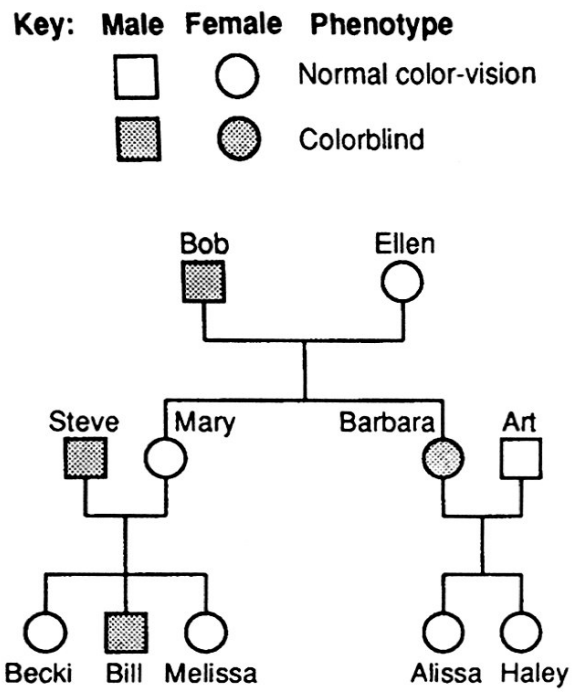
Pedigree Practice

Base your answers to questions **1** and **2** on the diagram below.



____1. If Alissa marries a man who is colorblind, what is the chance that their offspring will be colorblind?

A) 0%
B) 25%
C) 50%
D) 75%
E) 100%

____2. Bill marries a woman who is neither color blind nor is a carrier for the gene. What is the chance that their offspring will be colorblind?

A) 0%
B) 25%
C) 50%
D) 75%
E) 100%

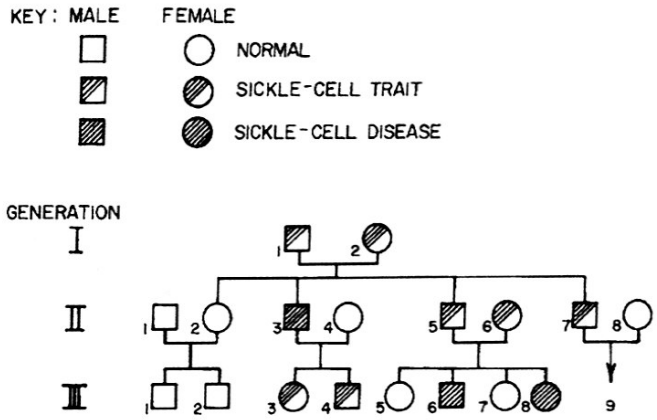
____3. A couple is considering having a child and would like to be tested beforehand for any chromosomal defects. The best method for this is

A) amniocentesis
B) bacterial transformation
C) gene therapy
D) electrophoresis
E) karyotyping

____4. In humans, hemophilia is a sex-linked recessive trait. If two parents produce a son with hemophilia, which of the following statements must be true?

A) The mother carries the allele for hemophilia
B) The mother has hemophilia
C) The father carries the allele for hemophilia
D) The father has hemophilia
E) Both parents carry the allele for hemophilia

Base your answers to questions **5** through **7** on the pedigree below.



____5. If individuals 5 and 6 from generation II have another child, what is the probability that the child would have the sickle cell trait?

A) 0
B) 1/4
C) 1/2
D) 3/4
E) 1

____6. What is the most likely phenotype of a child of individuals 7 and 8 from generation II?

A) normal
B) sickle-cell disease
C) either normal or sickle cell disease
D) sickle-cell carrier
E) normal or sickle cell carrier

____7. What is the pattern of inheritance of sickle-cell anemia?

A) Autosomal dominant
B) Autosomal codominant
C) Sex-linked dominant
D) Sex-linked recessive
E) Nondisjunction of chromosomes

____8. Color blindness is a disease caused by a sex-linked recessive gene on the X chromosome. Which of the following statements are true about color blindness?

A) Males have half the likelihood of having the disease, since they have only one X chromosome.
B) A color blind son is always produced if his father has the gene.
C) Mothers can pass the gene with equal probability to either a son or daughter
D) Females can only be carriers of the disease, they can never have the disease
E) Inbreeding has no effect on the incidence of the disease

Pedigree Practice

____9. If a woman is a carrier of the sex-linked colorblindness trait and she has a male child with man who has normal vision, what is the probability that their first son will be colorblind?

A) 0%
B) 25%
C) 50%
D) 75%
E) 100%

____10. If a male with an X-linked recessive trait marries a normal female, which of the following can be predicted about the genetic status of their progeny?

A) Half of their children would have the disease.
B) Half of their sons would have the disease.
C) Half of their daughters would be carriers.
D) All of their children would have the disease.
E) None of their children would have the disease.

____11. If a *Drosophila melanogaster* female who expresses a sex-linked recessive trait is mated with a wildtype *D. melanogaster* male, which of the following is expected to occur?

A) 100% of the males will express the trait and 0% of the females will express the trait.
B) 100% of the males will express the trait and 100% of the females will express the trait.
C) 50% of the males will express the trait and 50% of the females will express the trait.
D) 0% of the males will express the trait and 100% of the females will express the trait.
E) 0% of the males and 0% of the females will express the trait.

____12. A couple has two boys and two girls. If half of their sons are hemophiliacs and the father is normal, the mother must be

A) normal
B) a carrier
C) a hemophiliac
D) either a carrier or a hemophiliac
E) either normal or a carrier.

____13. In order for a female to express a sex-linked trait, she must have

A) a Y chromosome
B) nondisjunction
C) aneuploidy
D) autosomes
E) homozygous genes for the trait

____14. The sickle cell anemia allele

A) eventually causes homozygotes to suffer from hemophilia
B) is somewhat beneficial in that it offers heterozygotes resistance against malaria
C) is caused by nondisjunction of a pair of homologous chromosomes
D) is caused by a protozoan parasite
E) causes hemoglobin to gain affinity for CO

____15. In early embryonic development, aneuploidy of a single cell will be passed on to all of the cells of the developing organism through

A) mitosis
B) nondisjunction
C) translocation
D) meiosis
E) inversion

____16. After X inactivation in female mammals, what happens to the X chromosome?

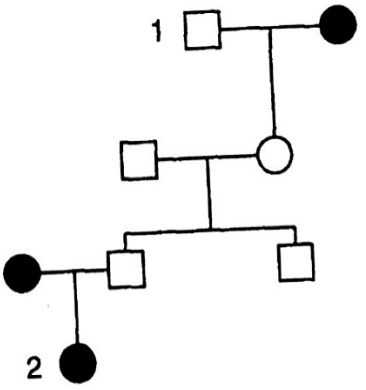
A) It divides and separates among each somatic cell.
B) It condenses into a Barr body.
C) It undergoes translocation.
D) It is altered and degraded by lysosomes.
E) It is deleted.

KEY

E = Allele for free ear lobes (dominant)
e = Allele for attached ear lobes (recessive)

□ = Male with free ear lobes
○ = Female with free ear lobes
■ = Male with attached ear lobes
● = Female with attached ear lobes

17. Base your answer to this question on the diagram below.



What is the genotype of the father of Individual 2?

A) It can be either Ee or EE.
B) It must be Ee.
C) It must be EE.
D) It must be ee.
E) It can either be Ee or ee.

1. C
2. A
3. E
4. A
5. C
6. E
7. B
8. C
9. C
10. C
11. A
12. B
13. E
14. B
15. A
16. B
17. B
18. A
19. C
20. B