**SC.912.L.16.1 - Genetics**

- **SC.912.L.16.1** Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
- Also assesses **SC.912.L.16.2** Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
- Other related benchmark: **HE.912.C.1.4** Analyze how heredity and family history can impact personal health.

1. Hemophilia is a sex-linked, recessive trait. Which of the following describes the probability of hemophilia in the offspring of a man who does not have hemophilia and a woman whose father is a hemophiliac?
   - a. Each of their sons will have hemophilia.
   - b. None of their daughters will have hemophilia.
   - c. Their sons have a 25% chance of having hemophilia.
   - d. There is a 50% chance that their daughters will have hemophilia.

2. Alleles for the A and B blood cell antigens are codominant. The condition where no antigens are present on the blood cells (type O blood) is a recessive trait. Which set of parents can most likely produce a child with type O blood?
   - A. one parent with type AB blood and the other parent with type O blood
   - B. one parent with type AB blood, and the other parent with type A blood
   - C. one parent with heterozygous type A blood, and the other parent with type O blood
   - D. one parent with homozygous type A blood, and the other parent with Homozygous type B blood

3. One of the parents of a child has phenylketonuria (PKU), which is caused by recessive alleles. The other parent does not have the PKU alleles. What is the chance that the couple will have a child with phenylketonuria?
   - A. 0%
   - B. 50%
   - C. 75%
   - D. 100%
4 Hitchhiker's thumb (H) is dominant to no hitchhiker's thumb (h). A woman who does not have hitchhiker's thumb marries a man who is heterozygous for hitchhiker's thumb. What is the probable genotypic ratio of their children?
   A. 0% Hh: 100% hh
   B. 50% Hh: 50% hh
   C. 75% Hh: 25% hh
   D. 100% Hh: 0% hh

5 A human baby boy inherits a recessive allele from his mother. In which circumstance would he most likely show the trait coded for by the recessive allele?
   A. The allele is on the X chromosome.
   B. The allele is on the Y chromosome.
   C. The baby inherits the dominant allele from his father.
   D. The allele is on an autosomal chromosome and the baby is a twin.

6 This diagram shows a pedigree for a recessive genetic disorder.

[Pedigree diagram]

What is the genotype of individual 6?
   A. X^h^Y
   B. X^H^Y
   C. X^H^X^h
   D. X^H^X^H
7. This diagram shows a diploid cell with two pairs of homologous chromosomes.

Due to independent assortment, what is the possible genetic make-up of gametes produced by this organism?
A. SsTt
B. Ss, Tt
C. S, s, T, t
D. ST, St, sT, st

8. The table lists the trials for fruit color where allele R exhibits incomplete dominance over allele R'.

<table>
<thead>
<tr>
<th>Genotype</th>
<th>Phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR</td>
<td>Red</td>
</tr>
<tr>
<td>RR'</td>
<td>Yellow</td>
</tr>
<tr>
<td>RR'</td>
<td>Orange</td>
</tr>
</tbody>
</table>

Heterozygous fruit have orange phenotypes. What percent of offspring are expected to have an orange phenotype if the parent plants are orange (RR') and yellow (R'R')?
A. 25%
B. 50%
C. 75%
D. 100%
9. Mendel hypothesized that reproductive cells have only one factor for each inherited trait. This hypothesis is supported by which observation?
   A. Diploid cells are produced by mitosis.
   B. Diploid cells are produced by meiosis.
   C. Haploid cells are produced by mitosis.
   D. Haploid cells are produced by meiosis.

**ANSWER KEY**

1. B
2. C
3. A
4. B
5. B
6. A
7. D
8. B
9. D