

*The Genetic Perspective of Sexual Reproduction in Eukaryotes*

1. During meiosis when does synapsis occur:
  - a. Prophase I
  - b. Anaphase I
  - c. Metaphase I
  - d. Prophase II
  
2. During meiosis in a human male ( $2^n = 46$ ) what is the number of centromeres at metaphase I?
  - a. 92
  - b.  $46 + 2$
  - c. 23
  - d. 46
  
3. How many sperm are produced by 10 metaphase I cells?
  - a. 5
  - b. 20
  - c. 40
  - d. 30
  
4. During anaphase I the:
  7. Two chromosomes of a homologous pair move to the same pole.
  8. Two chromosomes of a homologous pair move to opposite poles.
  9. Chromatids separate to form chromosomes.
  10. Bivalents line up at the equator of the cell.
  
5. During meiosis homologous chromosomes begin to pair at:
  - a. Prophase I
  - b. Telophase II
  - c. Metaphase I
  - d. Anaphase I
  - e.
  
6. What number of chromosomes does a gamete contain?
  - a. The same number of chromosomes as an anaphase I cell
  - b. One-half the number of chromosome as a metaphase I cell
  - c. The same number of chromosomes as a telophase I cell
  - d. Twice the number of chromosomes of a telophase II cell

7. Crossing over during meiosis occurs between:
  - a. Chromatids of non-homologous chromosomes
  - b. Chromatids of homologous chromosomes
  - c. Centromeres of non-homologous chromosomes
  - d. Centromeres of homologous chromosomes
  
8. During meiosis, chromatids separate to form chromosomes at:
  - a. Anaphase I
  - b. Anaphase II
  - c. Metaphase I
  - d. Prophase II
  
9. How may anaphase I be distinguished from anaphase II of meiosis?
  - a. A haploid set of chromosomes moves to each pole
  - b. Spindle fibers attached to the centromeres pull (or push) the chromosomes to the poles
  - c. The centromeres divide and sister chromosomes move to opposite poles
  - d. Homologous chromosomes move to opposite poles
  
10. Metaphase II of meiosis can be distinguished from metaphase I of meiosis because the metaphase II chromosomes:
  - a. Are at the cell equator
  - b. Are short and thick
  - c. Are not paired
  - d. Contain chromatids
  
11. In a diploid organism two alleles of a given gene will be found on
  - a. Two non-homologous chromosomes
  - b. Two non-homologous chromatids
  - c. One paternal chromosome and its maternal homolog
  - d. Two paternal chromosomes
  
12. The two chromatids of a chromosomes are usually held together by the:
  - a. Nucleolar organizer regions
  - b. Spindle fibers
  - c. Centromere
  - d. Pairing

13. A plant possesses alleles  $R$  and  $r$  for a gene for disease reaction. Assuming no crossing over, a single meiotic anaphase I cell of this plant will contain:
- A mixture of alleles  $R$  and  $r$  at each pole
  - Only  $R$  alleles at both poles
  - $R$  alleles at one pole and  $r$  alleles at the other
  - Only  $r$  alleles at both poles
15. Name the correct sequence of sub-stages during prophase of meiosis.
- Leptotene, zygotene, diplotene, pachytene, diakinesis
  - Leptotene, zygotene, pachytene, diplotene, diakinesis
  - Zygotene, leptotene, pachytene, diplotene, diakinesis
  - Leptotene, zygotene pachytene, diakinesis, diplotene
  - Leptotene, pachytene, zygotene, diplotene, diakinesis
16. In meiosis, when do homologous chromosomes separate from each other, and when do sister chromatids separate? ( $n$  = number of chromosomes in a sperm,  $x$  = amount of DNA in a sperm)

Stages of meiosis

- 1)  $2n, 4x$
- 2)  $n, 2x$
- 3)  $n, x$

<i>Homologous chromosomes separate</i>	<i>Sister chromatids separate</i>
a. Between 1 and 2	Between 2 and 3
b. Between 2 and 3	Between 1 and 2
c. Before 1	Between 1 and 2
d. Before 1 and 2	Before 1
e. After 3	Between 2 and 3

17. Choose the correct statement comparing mitosis and meiosis.
- Mitosis occurs in somatic cells; meiosis occurs in somatic and germ cells.
  - Chromosomes normally pair and exchange in meiosis but not in mitosis.
  - Mitosis, but not meiosis, is normally preceded by a period of DNA synthesis.
  - After both mitosis and meiosis, cells have a diploid DNA content.
18. Which of the following normally occurs in both mitosis and meiosis?
- Pairing of homologous chromosomes
  - Formation of the synaptonemal complex
  - Crossing-over between non-sister chromatids of homologous chromosomes.
  - Reduction division
  - A division separating the two sister chromatids of a chromosome from each other.