

***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.  $45 + 2$
  - 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:
  - a. Two chromosomes of a homologous pair move to the same pole.
  - b. Two chromosomes of a homologous pair move to opposite poles.
  - c. Chromatids separate to form chromosomes.
  - d. 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
  
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 can 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 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 paired 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. A mixture of alleles  $R$  and  $r$  at each pole
  - b. Only  $R$  alleles at both poles
  - c.  $R$  alleles at one pole and  $r$  alleles at the other
  - d. Only  $r$  alleles at both poles
  
15. Name the correct sequence of sub-stages during prophase of meiosis.
  - a. Leptotene, zygotene, diplotene, pachytene, diakinesis
  - b. Leptotene, zygotene, pachytene, diplotene, diakinesis
  - c. Zygotene, leptotene, pachytene, diplotene, diakinesis
  - d. Leptotene, zygotene pachytene, diakinesis, diplotene
  - e. 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)  $n, x$

*Homologous chromosomes  
separate*

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*Sister chromatids  
separate*

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- |                    |                 |
|--------------------|-----------------|
| 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.

- a. Mitosis occurs in somatic cells; meiosis occurs in somatic and germ cells.
- b. Chromosomes normally pair and exchange in meiosis but not in mitosis.
- c. Mitosis, but not meiosis, is normally preceded by a period of DNA synthesis.
- d. After both mitosis and meiosis, cells have a diploid DNA content.

18. Which of the following normally occurs in both mitosis and meiosis?

- a. Pairing of homologous chromosomes
- b. Formation of the synaptonemal complex
- c. Crossing-over between non-sister chromatids of homologous chromosomes.
- d. Reduction division
- e. A division separating the two sister chromatids of a chromosome from each other.