

LECTURE 22 – Mitosis & Meiosis**QUESTIONS TO TRY FOR PRACTICE**

- 1) Egg and sperm, involved in sexual reproduction, are formed through a process called
 - A) binary fission.
 - B) mitosis.
 - C) meiosis.
 - D) fertilization.

- 2) Somatic cells of roundworms have four chromosomes. How many chromosomes would you find in an ovum from a roundworm?
 - A) four
 - B) two
 - C) eight
 - D) a diploid number

- 3) Sister chromatids separate during
 - A) anaphase I.
 - B) metaphase I.
 - C) anaphase II.
 - D) interkinesis.

- 4) Meiosis involves the creation of haploid cells from diploid cells. The haploid chromosome number is created when
 - A) homologous chromosomes separate.
 - B) the S phase of the cell cycle is bypassed during meiotic interphase.
 - C) sister chromatids separate.
 - D) ova and sperm go through their respective maturation processes.

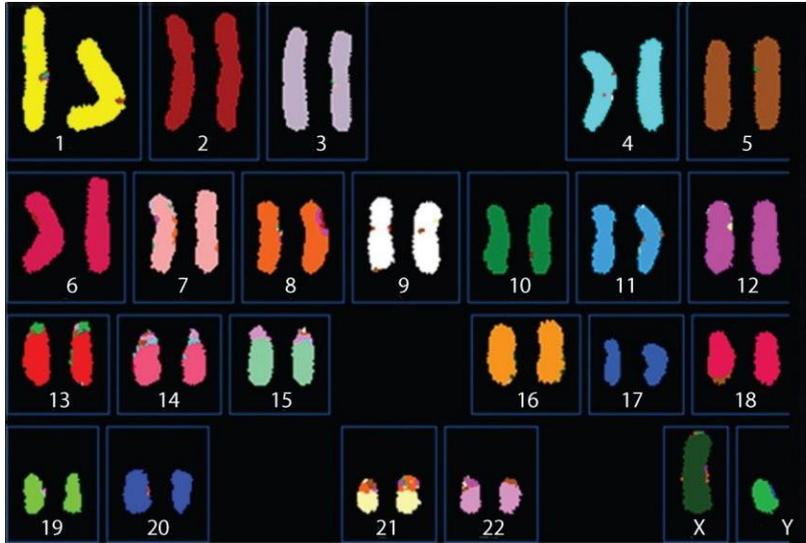


Figure 13.1

- 5) What can you infer from the karyotype shown in Figure 13.1?
- There is a translocation in one of the chromosome 8 homologues.
 - This individual has a single sex chromosome.
 - This individual has an abnormal number of autosomes.
 - This is a karyotype of a male.
- 6) What is a major difference between meiosis II and mitosis?
- Homologues align on the metaphase plate in meiosis II.
 - Sister chromatids separate in mitosis, and homologues separate in meiosis II.
 - Meiosis II takes place in a haploid cell, while mitosis takes place in diploid cells.
 - Crossover takes place in meiosis II.
- 7) What is a major difference between mitosis and meiosis I?
- Sister chromatids separate in mitosis, and homologues separate in meiosis I.
 - DNA replication takes place prior to mitosis, but not before meiosis I.
 - Prophase is longer and more complex in mitosis.
 - Only meiosis I results in daughter cells that contain identical genetic information.
- 8) Crossover, the exchange of segments of homologous chromosomes, takes place during which of the following processes?
- DNA replication
 - cytokinesis
 - anaphase I
 - synapsis

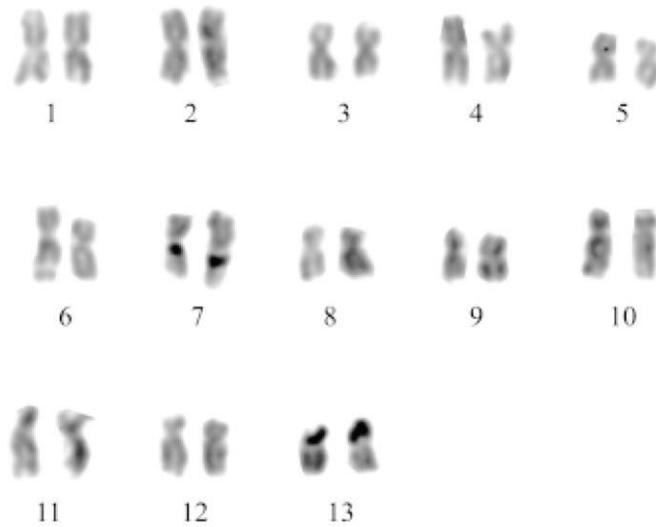


Figure 13.2

9) The karyotype shown above is that of a snail, *Pomacea patula catemacensis*. What is the diploid number for this organism?

- A) 13
- B) 26
- C) 46
- D) 7

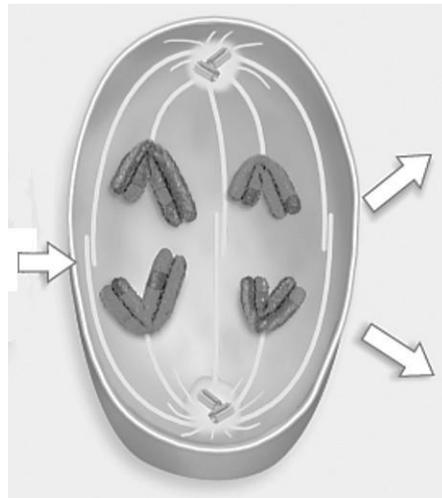


Figure 13.3

10) In Figure 13.3, what major event is taking place during this phase of meiosis?

- A) synapsis
- B) crossing over
- C) homologues separate
- D) separation of sister chromatids

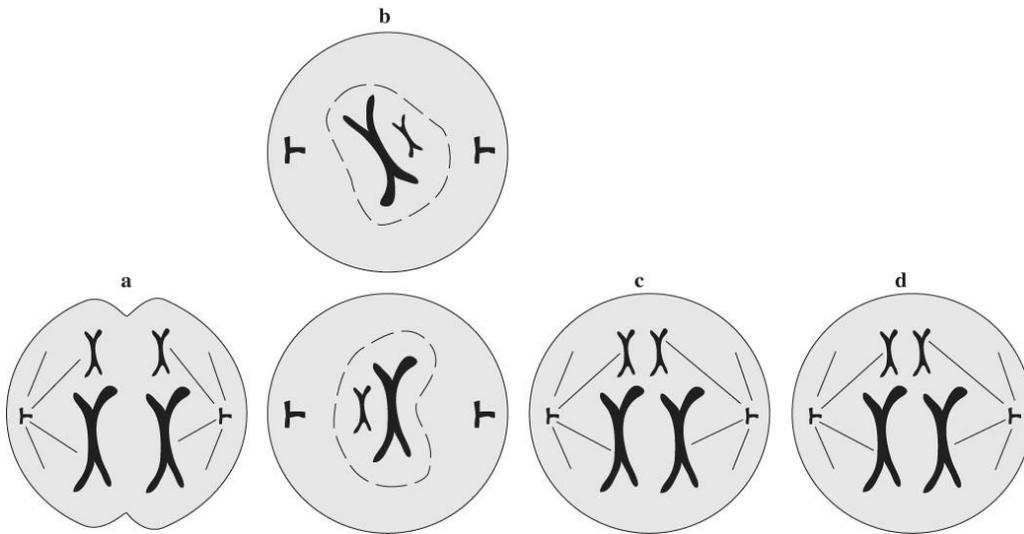


Figure 13.4

11) Refer to Figure 13.4. Put the stages of meiosis shown here in the order that they would occur in a cell.

- A) a, c, d, b
- B) c, a, b, d
- C) c, a, d, b
- D) a, b, c, d

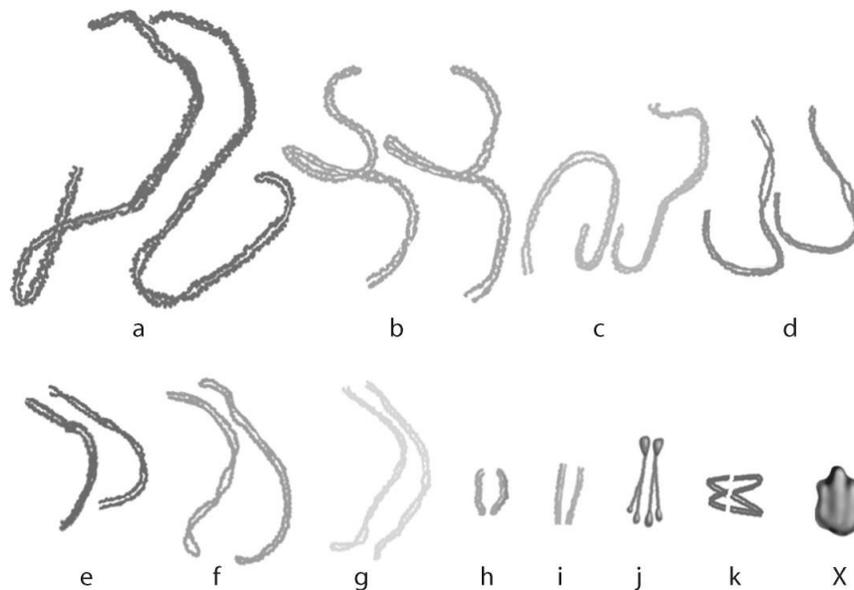


Figure 13.5

12) Grasshoppers have 11 pair of autosomes, and one sex chromosome. Which chromosome in Figure 13.5 is the sex chromosome?

- A) e
- B) X
- C) j
- D) k

13) Homologous chromosomes

- A) are identical.
- B) carry information for the same traits.
- C) carry the same alleles.
- D) align on the metaphase plate in meiosis II.

14) For the duration of meiosis I, each chromosome is

- A) in the form of a tetrad.
- B) two sister chromatids joined by a centromere.
- C) a chromosome and its homologue.
- D) undergoing synapsis.

15) The egg of a fruit fly has 4 chromosomes. How many chromosomes are in a somatic cell of a fruit fly?

- A) 4
- B) 2
- C) 8
- D) 16

16) Chromosomes and their homologues align at the equator of the cell during

- A) prophase I.
- B) metaphase I.
- C) prophase II.
- D) metaphase II.

17) Centromeres split and sister chromosomes migrate to opposite poles in

- A) anaphase I.
- B) prophase II.
- C) anaphase II.
- D) telophase II.

18) Chromosome number of hexaploid wheat, *Triticum aestivum*, can be represented by which of the following?

- A) n
- B) $2n$
- C) $4n$
- D) $6n$

19) Hexaploid wheat was produced synthetically by He and coworkers. They mated the diploid species, *Aegilops tauschii*, and the tetraploid species, *T. turgidum*. Which of the following is an accurate statement about the relative contribution of each parent to the genome of the hexaploid offspring?

- A) Each parent contributed equally to the genome of the offspring.
- B) *Aegilops tauschii* contributed four chromosomes by failing to complete meiosis after chromosome replication, and *T. turgidum* contributed two chromosomes.
- C) *Aegilops tauschii* contributed two chromosomes, and *T. turgidum* contributed four chromosomes.
- D) The hexaploid number appeared following mitosis with no subsequent cell division.

20) At what stage of meiosis does DNA replication take place?

- A) DNA replication does not take place in cells destined to undergo meiosis.
- B) prophase I
- C) between meiosis I and meiosis II
- D) None. DNA replication occurs before meiosis I begins.

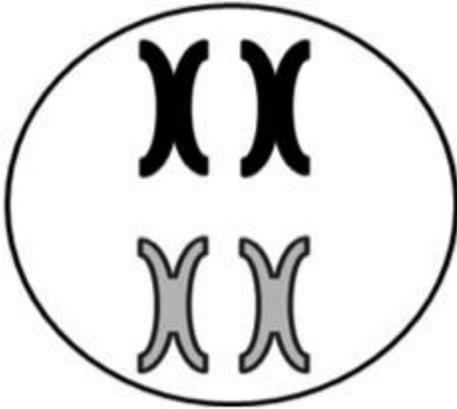


Figure 13.6

- 21) In the diploid cell above there are _____ chromosomes and _____ chromatids.
- A) 2; 2
 - B) 4; 4
 - C) 2; 4
 - D) 2; 8
 - E) 4; 8
 - F) 8; 8
- 22) Just prior to meiosis, DNA is replicated. Each resulting piece of replicated DNA is considered to be _____ chromosome(s) and is made up of _____ chromatid(s).
- A) 1; 1
 - B) 1; 2
 - C) 2; 2
 - D) 1; 4
 - E) 2; 4
- 23) In which phase of meiosis do sister chromatids separate?
- A) Metaphase I
 - B) Anaphase I
 - C) Metaphase II
 - D) Anaphase II
- 24) Quaking aspen can send out underground stems. New trees can sprout from these stems. This is an example of what type of reproduction?
- A) sexual
 - B) alternation of generations
 - C) haploid
 - D) asexual

25) The diploid number of a roundworm species is 4. You have a male and a female roundworm that are planning a family. Assuming random segregation of homologues during meiosis and no crossover, how many different possible combinations of chromosomes might there be in the offspring?

- A) 4
- B) 8
- C) 16
- D) 64

26) Genetic recombination takes place in which of the following processes?

- A) anaphase I of meiosis
- B) alignment of tetrads in metaphase I
- C) crossing over
- D) random alignment of homologous chromosomes in meiosis I

27) If meiosis produces haploid cells, how is the diploid number restored for those organisms that spend most of their life cycle in the diploid state?

- A) DNA replication
- B) reverse transcription
- C) synapsis
- D) fertilization

28) Which of the following types of reproduction is associated with the most genetic variation among offspring?

- A) binary fission
- B) asexual reproduction
- C) budding
- D) sexual reproduction

29) The bulldog ant has a diploid number of two chromosomes. Therefore, following meiosis, each daughter cell will have a single chromosome. There is/are _____ different possible combination(s) of genes in the daughter cells of meiosis because _____.

- A) one; there is only one chromosome per cell
- B) two; there are two homologous chromosomes per cell prior to meiosis
- C) more than 2; the two homologues cross over

30) Asexual reproduction takes place by which of the following processes?

- A) meiosis
- B) fertilization
- C) chromosome exchange between organisms of the same species
- D) mitosis

31) In sexual reproduction, the variation among offspring, and the fact that they are genetically different from their parents, is due to which of the following?

- A) random alignment of homologues during meiosis I
- B) crossing over
- C) random process of fertilization
- D) all of the above contribute to genetic variability in sexual reproduction

32) Adaptation to a changing environment is likely to occur most quickly through which of the following processes?

- A) mutation
- B) asexual reproduction and genetic recombination
- C) sexual reproduction

33) When we first see chiasmata under a microscope, we know that

- A) asexual reproduction has occurred.
- B) meiosis II has occurred.
- C) anaphase II has occurred.
- D) prophase I is occurring.
- E) separation of homologs has occurred.

34) Sexual reproduction

- A) allows animals to conserve resources and reproduce only during optimal conditions.
- B) can produce diverse phenotypes that may enhance survival of a population in a changing environment.
- C) yields more numerous offspring more rapidly than is possible with asexual reproduction.
- D) enables males and females to remain isolated from each other while rapidly colonizing habitats.
- E) guarantees that both parents will provide care for each offspring.

35) An advantage of asexual reproduction is that it

- A) allows the species to endure long periods of unstable environmental conditions.
- B) enhances genetic variability in the species.
- C) enables the species to rapidly colonize habitats that are favorable to that species.
- D) produces offspring that respond effectively to new pathogens.
- E) allows a species to easily rid itself of harmful mutations.