**CH. 13: MEIOSIS AND SEXUAL LIFE CYCLES**

1. Draw a diagram that illustrates the relationship among the following terms:

GENE LOCUS DNA CHROMOSOME

1. Compare and contrast ASEXUAL and SEXUAL REPRODUCTION using a Venn diagram or a T-Chart.
2. How are somatic cells and gametes different?
3. What is a karyotype?
   1. How many chromosomes are in a normal karyotype?
   2. How do you determine the sex of an individual from looking at a karyotype?
4. Draw a diagram that would represent homologous chromosomes each carrying a different allele for eye color. Label the centromeres.
5. What is the only pair of chromosomes that are not homologous?
6. Chromosomes 1-22 are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, whereas pair 23 are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Why is fertilization important in sexually reproducing organisms?
8. Draw a diagram to show the relationship among the following terms:

FERTILIZATION ZYGOTE MEIOSIS MEIOSIS GAMETES (SPERM/EGG)

DIPLOID HAPLOID

1. Compare and contrast MEIOSIS and MITOSIS using a Venn diagram or a T-Chart.
2. Which stage of meiosis is called the “reduction division” stage? Explain why.
3. When does the cell go from “diploid” to “haploid”?
4. Draw Prophase 1 of Meiosis. In your drawing, label the following structures/events:
   1. Homologous chromosomes
   2. Tetrad
   3. Synapsis
   4. Crossing over
   5. Centrioles
   6. Nuclear envelope
   7. Spindle fibers
5. What are chiasmata?
6. Explain what happens during crossing over and *why it is important*.
7. How is cytokinesis different in plant cells vs. animal cells? How is it similar?
8. List (and explain) 3 events that occur during meiosis but NOT in mitosis.
9. An important difference between sexual and asexual reproduction is the greater genetic variation produced by the former. List and describe 3 process that occur only during sexual reproduction that contribute to genetic variation.

**Test Practice Questions:**

1) At which stage of mitosis are chromosomes usually photographed in the preparation of a karyotype?

A) prophase

B) metaphase

C) anaphase

D) telophase

E) interphase

2) Which of the following is *true* of a species that has a chromosome number of 2*n* = 16?

A) The species is diploid with 32 chromosomes per cell.

B) The species has 16 sets of chromosomes per cell.

C) Each cell has eight homologous pairs.

D) During the S phase of the cell cycle there will be 32 separate chromosomes.

E) A gamete from this species has four chromosomes.

3) Eukaryotic sexual life cycles show tremendous variation. Of the following elements, which do all sexual life cycles have in common?

I. Alternation of generations

II. Meiosis

III. Fertilization

IV. Gametes

V. Spores

A) I, IV, and V

B) I, II, and IV

C) II, III, and IV

D) II, IV, and V

E) I, II, III, IV, and V

4) Which of the following is an example of alternation of generations?

A) A grandparent and grandchild each have dark hair, but the parent has blond hair.

B) A diploid plant (sporophyte) produces, by meiosis, a spore that gives rise to a multicellular, haploid pollen grain (gametophyte).

C) A diploid animal produces gametes by meiosis, and the gametes undergo fertilization to produce a diploid zygote.

D) A haploid mushroom produces gametes by mitosis, and the gametes undergo fertilization, which is immediately followed by meiosis.

E) A diploid cell divides by mitosis to produce two diploid daughter cells, which then fuse to produce a tetraploid cell.

5) If a cell has completed the first meiotic division and is just beginning meiosis II, which of the following is an appropriate description of its contents?

A) It has half the amount of DNA as the cell that began meiosis.

B) It has the same number of chromosomes but each of them has different alleles than another cell from the same meiosis.

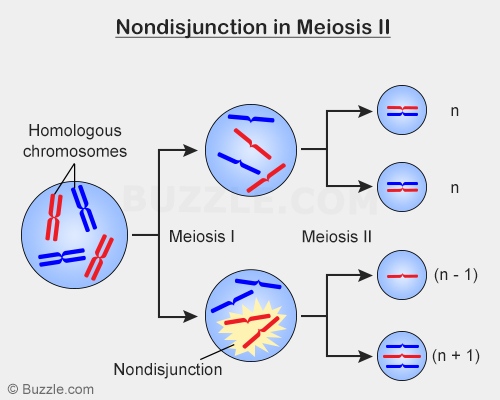
C) It has half the chromosomes but twice the DNA of the originating cell.

D) It has one-fourth the DNA and one-half the chromosomes as the originating cell.

E) It is identical in content to another cell from the same meiosis.

**From Pearson Test Prep Book p. 114-116**

1. Which of the following is NOT true of meiosis?
   1. During anaphase, spindle microtubules firs come into contact with chromosomes.
   2. The chromosome number in the newly formed cells is half that of the parent cell.
   3. The homologous chromosomes line u along the metaphase plate, or equator of the cell.
   4. The cytoplasm of the cell and all its organelles are divided approximately in half.
   5. In anaphase II, the sister chromatids travel to opposite ends of the cell.
2. All of the following contribute to genetic recombination EXCEPT:
   1. Random fertilization
   2. Independent assortment
   3. Crossing over
   4. Gene linkage
   5. Random gene mutation
3. The restoration of the diploid chromosome number after halving in meiosis is due to
   1. Synapsis
   2. Fertilization
   3. Mitosis
   4. DNA replication
   5. Chiasmata
4. During the first meiotic division (meiosis I),
   1. Homologous chromosomes separate
   2. The chromosome number becomes haploid
   3. Crossing over between non-sister chromatids occurs
   4. Paternal and maternal chromosomes assort randomly
   5. All of the above occur
5. The DNA content of a diploid cell is measured in the G1 phase. After meiosis I, the DNA content of the two cells produced would be
   1. Equal to that of the G1 cell.
   2. Twice that of the G1 cell
   3. One-half that of the G1 cell
   4. One-fourth that of the G1 cell.
   5. Impossible to estimate due to independent assortment of homologous chromosomes.
6. A synaptonemal complex would be found during
   1. Prophase I of meiosis
   2. Fertilization or syngamy of gametes
   3. Metaphase II of meiosis
   4. Prophase of mitosis
   5. Anaphase I of meiosis
7. Meiosis II is similar to mitosis because
   1. Sister chromatids separate
   2. Homologous chromosomes separate
   3. DNA replication precedes the division
   4. They both take the same amount of time
   5. Haploid cells are produced
8. Which of the following is NOT true of homologous chromosomes?
   1. They behave independently in mitosis.
   2. They synapse during the S phase of meiosis.
   3. They travel together to the metaphase plate in prometaphase of meiosis I.
   4. Each parent contributes one set of homologous chromosomes to an offspring.
   5. Crossing over between non-sister chromatids of homologous chromosomes is indicated by thepresence of chiasmata.
9. If these four cells resulted from cell division of a single cell with diploid chromosome number 2n=4, what best describes what just occurred?



Gametes

n+1

n-1

n

n

* 1. Normal meiosis
  2. Translocation
  3. Inversion
  4. Non-disjunction

1. Independent orientation of chromosomes at metaphase I results in an increase in the number of
   1. Gametes
   2. Homologous chromosomes
   3. Possible combinations of characteristics
   4. Sex chromosomes