**Name Period**

**Chapter 13: Meiosis and Sexual Life Cycles**

***Concept 13.1 Offspring acquire genes from parents by inheriting chromosomes***

1. Let’s begin with a review of several terms that you may already know. Define:

**gene**:

**locus**:

**gamete**:

**male gamete**:

**female gamete**:

**asexual reproduction**:

**sexual reproduction**:

2. How many chromosomes are in human cells? What *is* a chromosome?

3. Which type of reproduction will result in genetically identical offspring?

***Concept 13.2 Fertilization and meiosis alternate in sexual life cycles***

4. What is a *somatic cell*? Give examples of two human somatic cell types.

5. How does a somatic cell compare to a gamete in terms of chromosome number?

6.

|  |  |  |
| --- | --- | --- |
|  | Description | # in Human Cells |
| Sex chromosome |  |  |
| Autosome |  |  |

7. What is a *karyotype*? How is it prepared?

8. What are three things that can be determined from a karyotype? (Study the Research Method, Figure

13.3, in your text carefully for this information.)

9. Explain what is meant by *homologous chromosomes*.

10. Cells that have only one of each homologous pair are said to be *haploid*, a condition that is represented by *n*. Cells that have two of each homologous pair are said to be *diploid* or 2*n*. For each of the following, is the cell haploid or diploid?

**liver cell** **gamete egg zygote skin cell sperm somatic cell**

11. The muscle cells of a dog have 78 chromosomes. Fill in the correct chromosome number in a bone cell , sperm , haploid cell , somatic cell , and zygote .

12. In the space to the right, draw six chromosomes similar to the ones on page 251 of your text . On this sketch, label the following:

a. sister chromatids

b. homologous chromosomes c. centromere

d. replicated chromosome e. maternal chromosomes

14. Where are the *gametes* of an animal produced? Be specific as to male and female gametes.

15. By what process are gametes produced?

16. What is another term for a fertilized egg? What is the chromosome number of the fertilized egg? (Answer this in general terms, haploid, *n*, or diploid, 2*n*).

17. What is the purpose of *meiosis*?

***Concept 13.3 Meiosis reduces the number of chromosome sets from diploid to haploid***

20. What are *alleles*? Give an example.

21. In meiosis, the DNA is replicated during interphase, followed by two divisions. The first division is meiosis I. Study the events of *prophase I* as they are significant. Explain each of these events:

**synapsis**:

**crossing over**:

**chiasmata**:

22. How is the arrangement of chromosomes in metaphase I of meiosis different from metaphase of mitosis?

23. There are two divisions in meiosis. What will separate in the first division in meiosis I?

24. Now study the chromosomes in *anaphase I* and *telophase I* carefully. How many chromosomes are n each cell at the end of the first meiotic division?

Are the resultant daughter cells haploid, or diploid?

25. During meiosis I, homologous chromosomes separate. What separates during meiosis II?

26. To check that you have the big picture, here are some quick review questions. a. What happens to chromosome number in meiosis?

b. During which division is the chromosome number reduced?

c. What is the purpose of meiosis?

d. How many times does the cell divide in meiosis?

e. How many times do the chromosomes duplicate? f. How many daughter cells are formed?

g. What is the chromosome number?

h. What are *homologs* (*homologous chromosomes*)?

1. What occurs in *synapsis*?

j. What is *crossing over*?

28. Students often get confused about the differences between mitosis and meiosis. To help with this, work through the following chart:

|  |  |  |
| --- | --- | --- |
|  | Mitosis | Meiosis |
| Role in the animal body |  |  |
| Number of DNA replications |  |  |
| Number of divisions |  |  |
| Number of daughter cells |  |  |
| Chromosome number of  daughter cells |  |  |

29. Synapsis and crossing over are unique to meiosis. During what specific phase do these occur?

30. Explain the physical events of crossing over. You may wish to make a sketch of the event.

Include these terms: *synaptonemal complex*, *chiasmata*, *homologs*, *sister chromatids*.

***Concept 13.4 Genetic variation produced in sexual life cycles contributes to evolution***

31. An important idea for you to understand is that new alleles arise by changes in the DNA or mutation, but genetic diversity occurs when the deck that is dealt is simply reshuffled. So, there are three ways that sexually reproducing organisms “shuffle the deck.” They are listed below. On the back of this page, explain what occurs in each, and *how this increases diversity*. Be as thorough as possible, this has been an essay question on the AP Biology exam multiple years.

**independent assortment of chromosomes**:

**crossing over**:

**random fertilization**:

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