

Biology Note-taking Handout
Meiosis

A Brief Review of Mitosis

1. What was mitosis?
2. What was the “goal” of mitosis?
3. Do you remember what occurred during each of the 4 mitotic phases???

5. A little vocabulary review...
chromatin

chromosome

sister chromatids

homologous chromosomes

6. Each species has a characteristic chromosome number. Humans have _____
chromosomes.

The diploid chromosome number is _____

The haploid chromosome number is _____

Fill in the fourth column in the table below.

Common Name	Scientific Name	Diploid Chromosome Number	Haploid Chromosome Number
Human	<i>Homo sapiens</i>	46	
Pig	<i>Sus scrofa</i>	38	
a type of fern	<i>Ophioglossum reticulatum</i>	1260*	
Cabbage	<i>Brassica oleracea</i>	18	
Gorilla	<i>Gorilla gorilla</i>	48	
Dog	<i>Canis familiaris</i>	78	
Horse	<i>Equus caballus</i>	64	
Duck-billed platypus	<i>Ornithorhynchus anatinus</i>	52	
Oat	<i>Avena sativa</i>	42	
Potato	<i>Solanum tuberosum</i>	48	
Donkey	<i>Equus asinus</i>	62	
a semi-aquatic rodent	<i>Ichthyomys pittieri</i>	94**	
Corn	<i>Zea mays</i>	20	

* highest number for a plant

** highest number for a mammal

7. Is there any apparent relationship between chromosome number and complexity?
8. Do you think that organisms with the same chromosome number must be related?
9. Do you think organisms in the same genus (like the horse and donkey) are related?
10. Mares (female horses) are sometimes inseminated with donkey sperm. The resulting hybrid is called a mule. Mules show “hybrid vigor”. The characteristics of mules include

11. What would be the diploid chromosome number of a mule?

What types of problems might arise from this??

12. The number of chromosomes in a diploid cell is sometimes represented by the symbol _____. The $2N$ number for a dog would be _____ and the N number would be _____.

13. Sexual vs asexual reproduction:

Gametes are

A zygote is

14. Meiosis is _____

PHASES OF MEIOSIS

1. How are haploid (N) gamete cells produced from diploid (2N) cells?

Meiosis is a process of _____ in which the number of chromosomes per cell is _____ through the _____ of _____ chromosomes in a diploid cell.

2. Meiosis usually involves _____, called _____ and _____. By the end of meiosis II, the diploid cell that started the process has become _____

3. Meiosis I:

a. Before meiosis I, _____

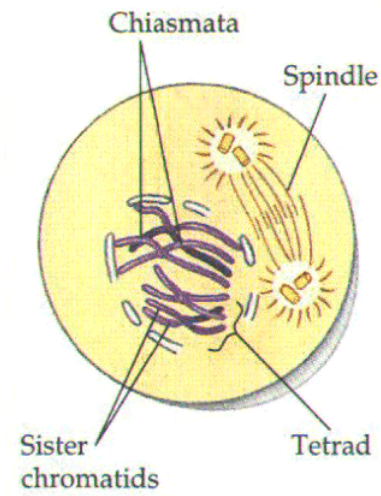
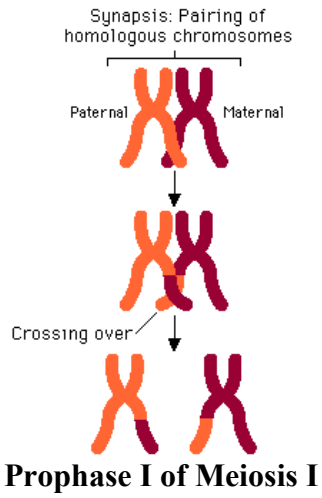
b. The cell begins to divide in a way that looks similar to _____.

c. Meiosis I will consist of 4 phases: _____, _____, _____, and _____.

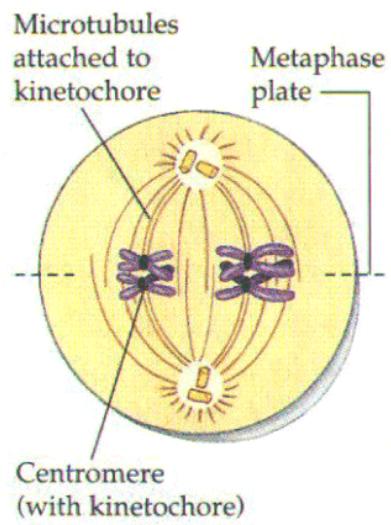
d. During *prophase I* many of the events occur just as they do in mitosis. Among the events occurring in both prophase of mitosis and prophase I of meiosis I include:

e. Other events occur only in prophase I of meiosis I. The events unique to prophase I include:

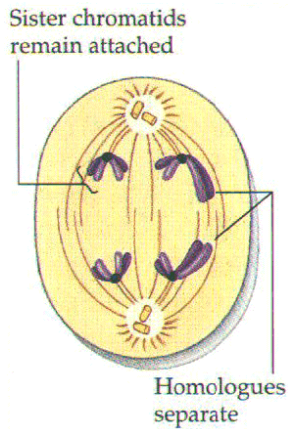
f. "Crossing-over" is a phenomenon unique to prophase I. During this process _____



g. Metaphase I: During this phase of meiosis I,



h. Anaphase I During this phase of meiosis I,



i. Telophase I During this phase of meiosis I



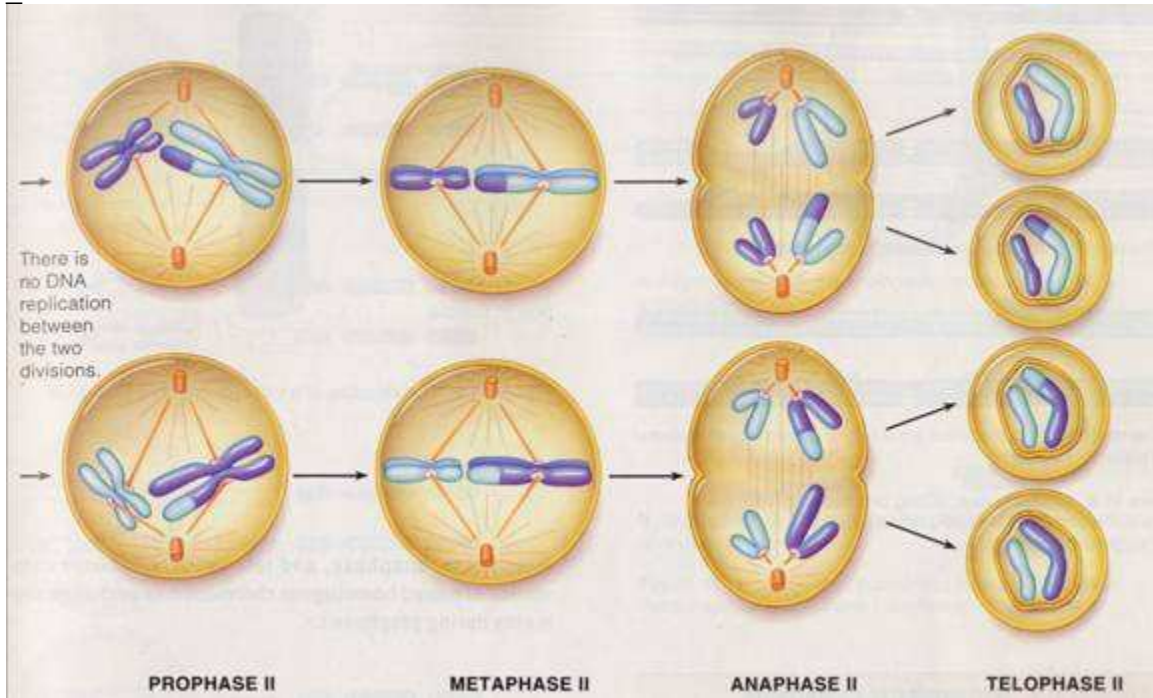
Because each pair of homologous chromosomes was _____
neither of the daughter cells has the _____
that it would have in a _____ cell. Those two sets have been shuffled and
sorted almost like a _____. The two cells
produced by meiosis I have sets of chromosomes and alleles that are _____
from each other and from _____

4. Meiosis II

The two cells produced by meiosis I now enter a _____

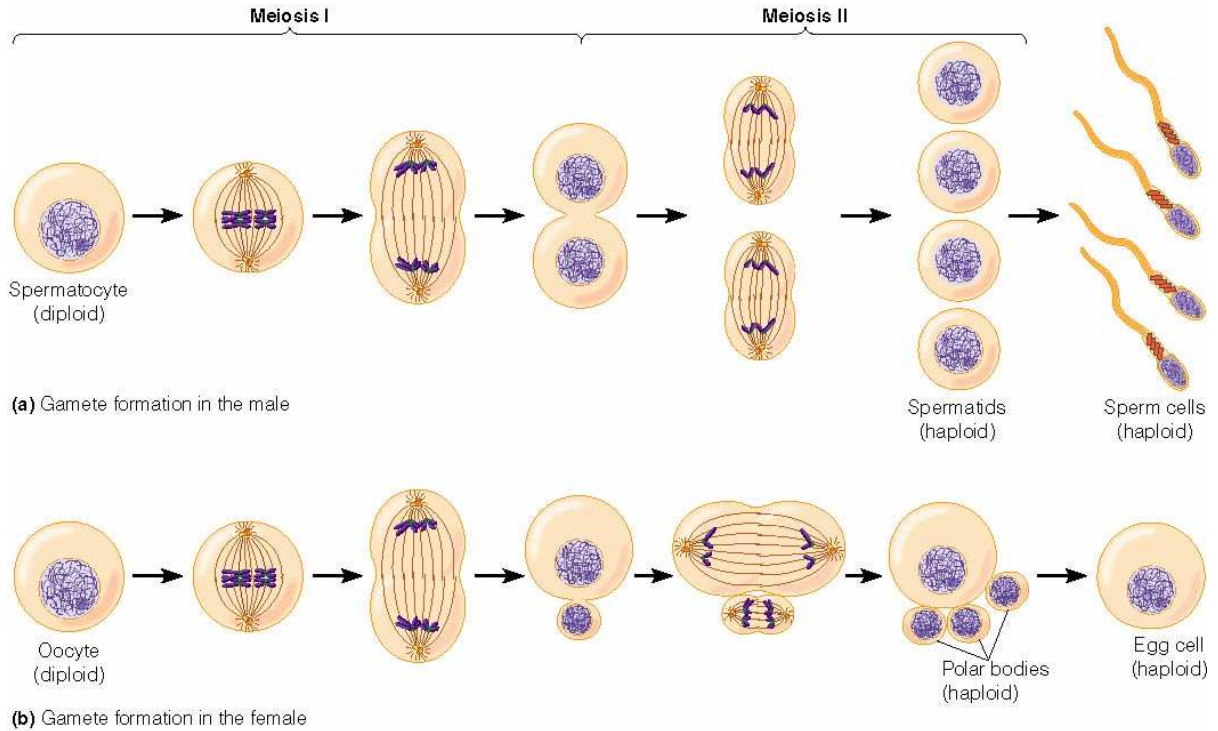
However **unlike** the first meiotic division, _____

Each of the cell's chromosomes consists of _____. During metaphase II of meiosis II the _____ line up on the cell's equator. In anaphase II, _____



GAMETE FORMATION

1. In male animals, the _____ produced by meiosis are called _____. In plants, pollen grains contain _____.



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2. In female animals, the cell divisions at the end of meiosis I and II are _____ so that a single cell, which becomes an _____ receives almost all of the _____. The three other cells produced in the female are known as _____ and do not take part in reproduction.

Comparing Mitosis and Meiosis

In a way it's too bad that the words *mitosis* and *meiosis* sound so much alike, because the two processes are very different.

MITOSIS results in the production of _____

whereas **MEIOSIS** produces _____

A diploid (2N) cell that divides by mitosis gives rise to _____

Mitosis allows an organism's body to _____

In asexual reproduction, a _____ is produced by
_____ of the cell or cells of the parent organism.

Meiosis on the other hand, begins with a _____ but
produces _____. These cells are
genetically different from the _____ and
from _____.

Meiosis is how sexually reproducing organisms _____

In contrast, asexual reproduction involves only _____.