What is Meiosis?

A division of the nucleus that reduces chromosome

number by half.

- Important in sexual reproduction
- Involves combining the

genetic information of one parent with that of the the other parent to produce a

genetically distinct individual

- ***Diploid*** - two sets of chromosomes

(2n), in humans 23 pairs or 46 total

- ***Haploid*** - one set of chromosomes

(n) - gametes or sex cells, in humans 23 chromosomes

●

Homologous pair

– each chromosome in pair are identical to the

other (carry genes for same trait)

– only one pair differs - sex

chromosomes X or Y

Phases of Meiosis

- A diploid

cell replicates its chromosomes

- Two stages of meiosis

- Cells divide twice but only replicate their DNA once

Synapsis -

pairing of homologous chromosomes forming a ***tetrad***.

- ***Crossing over*** - chromatids of tetrad exchange

parts.

Prophase I

- Chromosomes condense

Homologous chromosomes pair

w/

each other

- Each pair contains four sister

chromatids - tetrad

- Crossing over occurs

homologous chromosome

pair
As the chromosomes

move closer together, synapsis occurs.
Chromatids break,

and genetic information is exchanged.

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Metaphase I

Tetrads or homologous

chromosomes

move to

center of cell

Metaphase I

The homologous chromosomes line up in the **center** of the cell **and** are still held together

Anaphase

Homologous chromosomes pulled to opposite poles

Anaphase I

Spindle fibers shorten

- The homologous chromosomes are separated (the sister chromatids are still paired)

Independent assortment **-** random chromosomes move to each pole; some may be

maternal and some may be paternal

Telophase I

Daughter

nuclei formed

.

These are

haploid (1n)

88

Telophase I

- The nuclear membrane reforms **around** each

daughter nucleus

- Each new cell now contains **two** sister

chromatids that are NOT identical **due** to

crossing over

[b]

At the end of Meiosis I...

- You have made **2 cells**

- Each cell contains **a** haploid number of chromosomes **- 1 copy of** each chromosome

(for humans, each haploid cell has 23 chromosomes)

Meiosis II

Daughter cells undergo a second division; much like mitosis

NO *ADDITIONAL*

REPLICATION OCCURS

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Spindle

Prophase II

fibers form

again

S

Prophase I

Nuclear membrane breaks down again

Metaphase II

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Sister

chromatids

move to the

center

Metaphase II

The chromosomes line **up** in the middle of the cell.

M

Ba

Anaphase II

Centromeres

split

.

Individual

chromosomes

are pulled to

poles

Coor
Brooks
Learning

Anaphase II

- The spindle fibers shorten and the sister chromatids move to

opposite poles.

2

W

Foor
Learning

Telophase II &

Cytokinesis

Four haploid

daughter cells

results from

one original diploid

cell

Telophase II

Nuclear envelope re-forms around the four

sets of daughter

chromosomes.

Four haploid daughter cells

5842

At the end of Meiosis II...

At the end of Meiosis II, there are 4 haploid cells. (only 1 copy of each chromosome)

- (for humans, each

haploid cell has 23 chromosomes

.

No two of these haploid cells are alike due to crossing over.

This is why you and your siblings are genetically unique!

Review Mitosis & Meiosis

Both are forms of nuclear division

Both involve replication

Both involve disappearance of the nucleus, and nucleolus, nuclear membrane

.

Both involve formation of spindle fibers

DIFFERENCES

Meiosis

produces daughter cells that have **1/2** the number of chromosomes as the parent. Go from 2n to 1n.

Daughter *cells* produced by meiosis are **not** genetically **identical** to one another.

- In ***meiosis*** cell

division takes place **twice** but replication occurs only **once**.