**CELL CYCLE: HOW CELLS MAKE MORE CELLS**

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| The cell cycle is the regular pattern of growth, DNA duplication, and cell division that occurs in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells  Image result for eukaryote cells | | | | | | | | | | |  | | | **Cell Cycle Main Idea:**  C:\Users\lawrimore.cassie\Desktop\ghsd.pngThe cell cycle has 4 main stages and the an end action  #1. Gap 1 (G1)  #2 Synthesis (S)  #3 Gap 2 (G2)  #4 Mitosis (M)  END Cytokinesis | | | | | | | | | | | | |
| **INTERPHASE: Gap 1, Synthesis and Gap 2 together make up\_\_\_\_\_\_\_\_\_\_\_\_\_\_.** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| During interphase, when a cell is not dividing, the DNA is loose and stringy. It is called \_\_\_\_\_\_\_\_\_\_\_ | G1 | | | | | | |  | | S | | | | | | |  | | G2 | | | | |  | | |
| During Gap1, the cell carries out its normal activities, grows and makes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | | | | | | |  | | During the Synthesis phase, the cell makes a \_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_. | | | | | | |  | | In the Gap 2 phase, the cells continue normal function, undergo additional growth, double checks for damage to DNA and prepare to divide. | | | | | |  | |
|  | **MITOSIS: Mitosis is the division of the cell \_\_\_\_\_\_\_\_\_\_\_\_and its contents** | | | | | | | | | | | | | | | | | | | | | | |  | | |
| 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | 3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | | | 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | |
|  | **CYTOKINESIS** | | | | | | | | | | | | | | | | | | | | | | |  | | |
|  | After division of the nucleus, the cell undergoes\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Cytokinesis is the division of the cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, resulting in two daughter cells that are genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to the original cell. | | | | | | | | | | | | | | | | | | | | | | |  | | |
| **INTERPHASE** | | | | **MITOSIS** | | | | | | | | |  | | **CYTOKINESIS** | | | | | | | | | | | |
| Image result for INTERPHASE | | | |  | | | | | | | | |  | |  | | | | | | | | | | | |
| **Cell Cycle Main Idea: Cells divide at different rates** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Prokaryotes generally divide much faster than  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | | | |  | | The rate at which your cells divide depends upon your body’s \_\_\_\_\_\_\_\_for those cells. | | | | | | |  | | The rate of cell division in embryos and children is \_\_\_\_\_\_\_\_\_\_than that of adults. | | | | | | |  | The rate of cell division in an adult varies within the different \_\_\_\_\_\_\_\_\_\_\_. | | | |
| **Cell Cycle Main Idea: Cell Size is Limited** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| If cells were too small, they could not contain all the needed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and molecules. | | | | | |  | If cells were too big, materials could not be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in and out of the cell membrane efficiently. | | | | | | | | | | |  | | | When cells increase in size, their \_\_\_\_\_\_\_\_\_\_\_\_ increases faster than their \_\_\_\_\_\_\_\_\_area. | | | | | |
| **BACK TO MITOSIS…** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Mitosis Main Idea: Chromosomes condense at the start of mitosis** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A chromosome is a long strand of \_\_\_\_\_\_that consists of a number of\_\_\_\_\_\_\_\_\_\_.  Image result for histonesYou have \_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ in each of your body cells. | |  | Before the cell undergoes mitosis, the chromatin “condenses” or becomes tightly \_\_\_\_\_\_\_\_\_\_\_\_  around certain protein molecules called \_\_\_\_\_\_\_\_\_\_\_.  (Circle the histones) | | | | http://classconnection.s3.amazonaws.com/821/flashcards/2042821/png/chromosomes1365901578668.png | | After the chromatin \_\_\_\_\_\_\_\_\_\_\_, they form chromosomes.  Remember, the chromosome was \_\_\_\_\_\_\_\_during the S phase of the cell cycle.  The chromosome now has an “X” shape with each side consisting of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | | | | | | |  | | | | One half of a duplicated chromosome is called a \_\_\_\_\_\_\_\_\_\_\_\_\_  The two identical chromatids are called \_\_\_\_\_\_\_\_\_\_\_\_\_chromatids.  Sister chromatids are held together at the  \_\_\_\_\_\_\_\_\_\_\_\_ | | | | | |  |
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| **Mitosis Main Idea:** **Mitosis and cytokinesis produce two genetically identical daughter cells.** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mitosis is the division of the cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_and its contents. | | | | | | |  | | Purposes: To produce two new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_with the exact same kind and number of chromosomes as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(parent) cell. | | | | | | | | | | |  | During\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, because the DNA is still loose chromatin, the chromosomes are not\_\_\_\_\_\_\_\_\_\_\_\_. | | | | | |

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| **Main Idea: Mitosis and cytokinesis produce two genetically identical daughter cells.**  **REMEMBER: PMAT**  What’s going on? What does it look like? | |
| **PROPHASE** | |
| The chromatin condenses into tightly coiled \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  The nuclear membrane (envelope) breaks down.  http://www.google.com/url?source=imgres&ct=img&q=http://rushartsbiology.wikispaces.com/file/view/chromatid.jpg/127923837/chromatid.jpg&sa=X&ei=-mLdTO2BG8P78AbJg8WKDw&ved=0CAQQ8wc&usg=AFQjCNHp-_WhgD8xNU2TKQkgzheXBn37_ACentrioles move to opposite \_\_\_\_\_\_\_\_\_\_\_of the cell. Spindle \_\_\_\_\_\_\_\_form.  The chromosome was copied during\_\_\_\_\_\_\_\_\_\_\_\_\_, and now looks like an “X”. | http://www.google.com/url?source=imgres&ct=img&q=http://image.wistatutor.com/content/feed/u1330/Mitotic_Prophase.png&sa=X&ei=rTXgTOPQDsL48Abxt8WIDw&ved=0CAQQ8wc4Dw&usg=AFQjCNGW7fsFx-hlgXS3DEmHqzozBzigvA |
| **METAPHASE** | |
| Chromosomes line up along the cell’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Spindle fibers attach to each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | **Late metaphase** |
| **ANAPHASE** | |
| What’s going on:  \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to opposite sides of the cell. | **Anaphase** |
| **TELOPHASE** | |
| A complete set of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_chromosomes are positioned at each pole of the cell.  Nuclear membranes form.  Chromosomes \_\_\_\_\_\_\_\_\_\_\_\_\_back into chromatin.  Spindle \_\_\_\_\_\_\_\_\_\_\_\_\_fall apart. | **Telophase** |
| **CYTOKINESIS** | |
| Following mitosis, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_pinches the cell membrane (in animal cells) and divides the cytoplasm into two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_.  Each new cell has a genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ nucleus.  During cytokinesis in plant cells, a \_\_\_\_\_\_\_\_\_forms between the two nuclei which becomes a new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | http://www.google.com/url?source=imgres&ct=img&q=http://www.phschool.com/science/biology_place/labbench/lab3/images/cytokin.gif&sa=X&ei=djngTN-4OIOB8gauwomHDw&ved=0CAQQ8wc&usg=AFQjCNELd4DFO_mWiNGHYY8Wj1MIupXKQA |

**What Happens When the Cell Cycle Goes Wrong…?**

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| **Main Idea: Cell division is uncontrolled in cancer** | | | | | | | | | | | |
| \_\_\_\_\_\_\_\_\_\_\_is a class of diseases caused by \_\_\_\_\_\_\_\_\_\_\_\_  cell division.  Cancer cells form disorganized  clumps called \_\_\_\_\_\_\_\_\_. | | A tumor is \_\_\_\_\_\_\_\_\_if the cancer cells remain clustered together.  They are usually \_\_\_\_\_\_\_\_\_\_\_\_\_ and can be removed.  A tumor is  \_\_\_\_\_\_\_\_\_\_\_\_\_  if the cancer cells spread to other parts of the body. | |  | |  | Some of these mutations can be caused by exposure to environmental agents called  \_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Carcinogens are substances that \_\_\_\_\_\_\_\_\_\_\_  or \_\_\_\_\_\_\_\_\_\_\_\_  cancer |  | \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_: smog, industrial smoke, car fumes  Can cause- lung cancer, nose cancer, leukemia  \_\_\_\_\_\_\_\_\_\_\_\_:  Human Papillomavirus (HPV)  Hepatitis, HIV  Can Cause:  Organ failure, some cancers, decreased immune system | \_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:  Nuclear reactor meltdowns, sun and tanning bed exposure, X-rays  Can cause- genetic mutations, skin cancer, thyroid cancer, leukemia |  |
| **Types of Reproduction** | | | | | | | | | | | |
|  | | **Reproduction is a process that makes new \_\_\_\_\_\_\_\_\_\_\_\_\_from one or more \_\_\_\_\_\_\_\_\_\_\_\_organisms.**  **It happens in two ways: sexually & asexually** | | | | | | | |  |  |
| **Sexual**  Sexual reproduction involves the joining of two cells called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(eggs and sperm cells), one from each of two parents.  **There are Advantages and Disadvantages to both types of reproduction**  **Advantages Disadvantages** | | | | | | | **Asexual**  Asexual reproduction is the production of offspring from a \_\_\_\_\_\_\_\_\_\_parent and does not involve the joining of\_\_\_\_\_\_\_\_\_\_\_\_\_.  The offspring are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ to each other and the parent. | | | |  |
| **Sexual**  Lots of \_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_  Able to live in a \_\_\_\_\_\_\_\_\_\_ of environments  Can \_\_\_\_\_\_\_ to changes in conditions | **Asexual**  Does not require \_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_ or much energy.  Produces many offspring quickly.  In a favorable environment, creates thriving populations | | **Sexual**  Needs more \_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ (finding a mate, taking care of offspring)  Produces \_\_\_\_\_\_\_\_\_  populations | | **Asexual**  Population is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so there is a limited ability to adapt.  Population may face massive die-off if \_\_\_\_\_\_\_\_\_\_ changes. | | Asexual reproduction is the primary form of reproduction for single-celled organisms such as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Many\_\_\_\_\_\_\_\_\_, some animals and  fungi can reproduce \_\_\_\_\_\_\_\_\_\_\_\_\_as  well. | | | | |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is the asexual reproduction of a single-celled organism by division |  | Like mitosis, binary fission results in two daughter cells that are \_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_to the parent cell. |  |  |

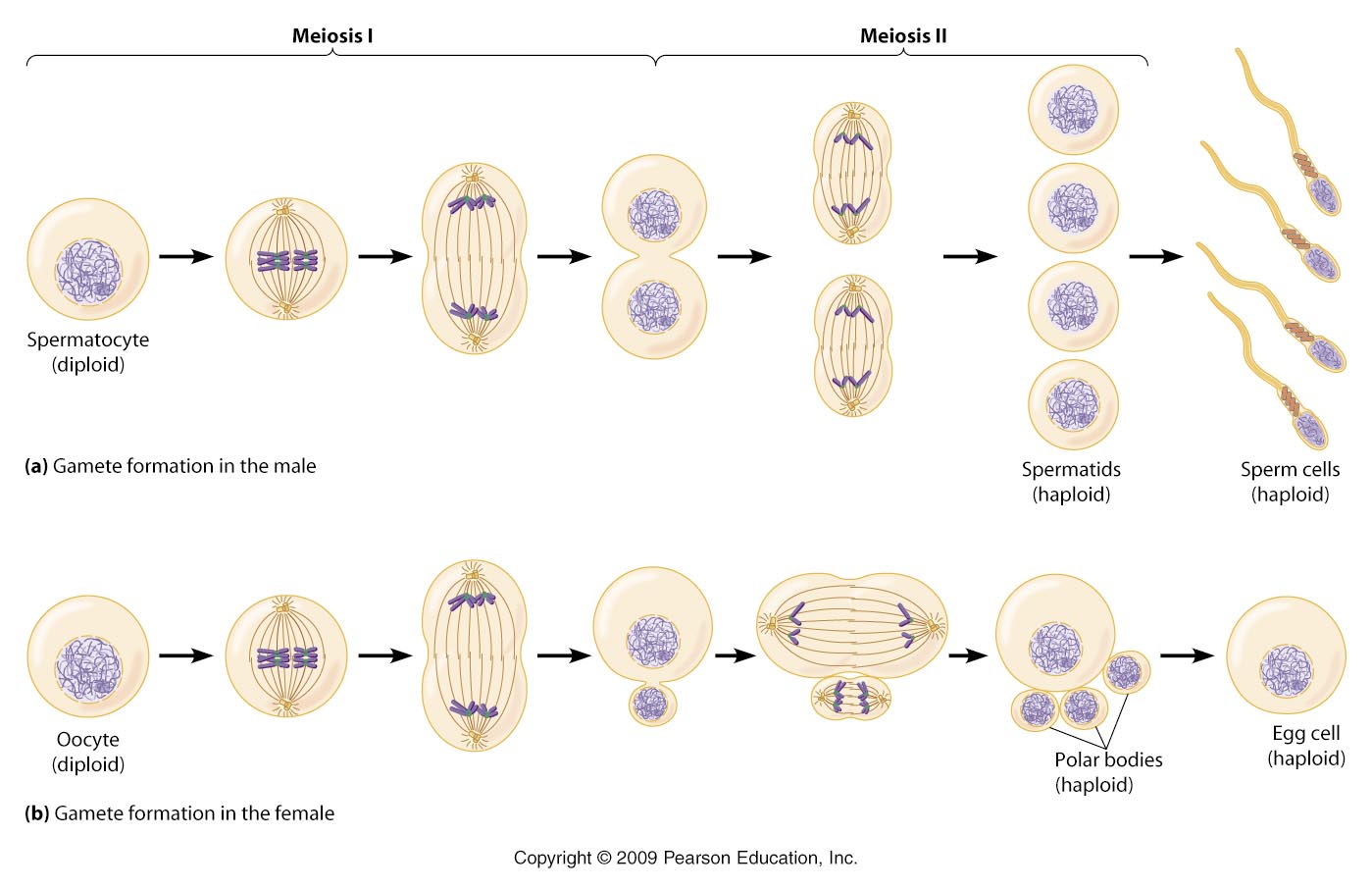
**Specific Types of Cells**

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| **Main Idea: Specialized cells perform specific functions** | | | | | | | | | | |
| To form the \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that make up your body and the body of other complex organisms, cells must \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | |  | The process by which unspecialized cells develop into their special forms and functions is called \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | |  | Almost every cell in your body has a full set of\_\_\_\_\_\_\_\_. | |  | Each type of cell uses only the DNA needed to carry out its \_\_\_\_\_\_\_\_\_\_\_\_ | |
|  | **Stem cells are a \_\_\_\_\_\_\_\_\_\_type of body cells that have the ability to** | | | | | | | |  |  |
| Divide and \_\_\_\_\_\_\_\_\_\_\_\_ themselves for a long period of time  Remain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Develop into almost \_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_of specialized cell | | | | | |  | Stem cells are used to \_\_\_\_\_\_\_\_ patients with leukemia and lymphoma (forms of cancer)  Stem cells may cure other diseases or replace \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ and organs | | | |
|  | **Main Idea: Human cells are divided into two types.** | | | | | | | |  |  |
| Somatic Cells | | | |  | Gametes | | | | | |
| Somatic cells, or \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_, make up body tissues and organs.  DNA in somatic cells is \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_on to offspring | | | |  | Gametes are \_\_\_\_\_\_\_\_cells  DNA in the sex cells \_\_\_\_\_\_\_ \_\_\_\_\_\_passed to offspring.  Males produce \_\_\_\_\_\_\_\_\_\_\_and females  produce\_\_\_\_\_\_\_\_\_\_\_. | | | | | |
| Body cells are\_\_\_\_\_\_\_\_\_\_\_\_, meaning each body cell has \_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_of each chromosome: one copy from the mother and one from the father.  \_\_\_\_\_\_\_\_\_\_\_\_cells are represented by (\_\_\_\_\_\_)    0051l | | | |  | Gametes are \_\_\_\_\_\_\_\_\_\_\_\_\_cells, meaning that they only have\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_of each chromosome.  Haploid cells are represented by (\_\_\_\_\_) | | | | | |

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|  | **Main Idea: Each species of organism has a characteristic number of chromosomes in each body cell**. | | | | | | |  |
| The normal number of chromosomes in human body cells is \_\_\_\_ total or \_\_\_\_ homologous pairs. | |  | | Homologous pairs are like pairs of socks-two of the same thing. | Image result for socks cartoon |  | Homologous chromosomes are pairs of chromosomes, one inherited from the \_\_\_\_\_\_\_\_\_\_\_\_\_, one from the\_\_\_\_\_\_\_\_\_\_\_\_, that have the same length and appearance. | |
| Homologous chromosomes have copies of the same  \_\_\_\_\_\_\_\_\_, although the two copies may differ and are called alleles.  http://www.google.com/url?source=imgres&ct=img&q=http://library.thinkquest.org/C0118084/Gene/Genetic_variation/dominant_recessive_files/homologous_chromosomes.gif&sa=X&ei=HQ_sTKCsDMP48AbVxfH7AQ&ved=0CAQQ8wc4Bg&usg=AFQjCNG19rYSPVQIavUx2xTumg9BVRjwhA | | | | | Image result for human karyotype female**A karyotype looks at all of the homologous chromosome pairs in order.**  Does the below karyotype belong to a male or female?  Image result for human karyotype female | | | |
| Each pair of human \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  have been assigned a number-from biggest to  smallest. (1-23)  Human chromosome pairs 1 through 22 are called  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**  Autosomes are chromosomes that contain genes for characteristics \_\_\_\_ related to the \_\_\_\_\_of an organism.  The 23rd chromosome pair in humans is \_\_\_\_\_ chromosomes. | | | | |
| In mammals, including humans, an organism with two \_\_\_\_chromosomes is a \_\_\_\_\_\_\_\_\_\_\_\_.  The larger X chromosome contains\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_, many unrelated to sexual characteristics | |  | An organism with \_\_\_\_ and \_\_\_\_chromosome is a male.  The Y chromosome directs the development of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  characteristics and carries few genes. | |



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| **Main Idea: Gametes are formed by a process called\_\_\_\_\_\_\_\_\_\_\_\_\_.**    Meiosis \_\_\_\_\_\_\_\_\_\_\_the number of chromosomes in the  gamete to \_\_\_\_\_\_\_\_\_ the number of chromosomes in  the parents body cells.  Diploid (2n) → haploid (n)  During meiosis, diploid cells undergo \_\_\_\_\_\_\_\_cell  divisions that result in haploid cells. | | | | |
| **http://anthro.palomar.edu/biobasis/images/meiosis.gif**  Cells go through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of division in meiosis: meiosis I and meiosis II  Meiosis creates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | |  | | |
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| **Some REALLY IMPORTANT things happen during Prophase I** | | | | |
| 1. The homologous chromosomes line up to form a \_\_\_\_\_\_\_\_\_.   Tetra= 4   1. The inner most chromosomes then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   By crossing over, the cells have a higher genetic diversity!  In the picture below, the letters represent \_\_\_\_\_\_\_\_\_\_\_(different versions of the same gene). The inner most chromatids\_\_\_\_\_\_\_\_\_\_. When they separate, they have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_some their alleles. | | | | |
| Image result for crossing over meiosis | | | | |
| **Points to notice:** The gametes with chromosomes that have crossed over are called **recombinants** because they were “recombined” to become whole chromosomes.  Even though the chromosomes are crossing over, they all still end up with a **full set of genes** (the starting homolougous pair have an A and B and all of the ending products have and A and B-some are uppercse and some are lowercase, but they all have an A or B | | | | |
|  | **Main Idea: Meiosis is very similar to Mitosis** | |  | |
| During meiosis I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_pair up along the cell equator and are divided into separate cells. | | | | |
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| In meiosis II, sister chromatids are divided into separate cells making a total of four \_\_\_\_\_\_\_\_\_\_\_\_\_\_unique \_\_\_\_\_\_\_\_\_\_\_\_\_cells**.**  Notice how we went from a diploid cell with homologous chromosomes to haploid cells with only single sets of chromosomes. | | | | |
| Meiosis II | | | | |
| https://encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcS90R25RAPGN6MWOv7oQX576O6ZVqHDincIhtxsbigMxR8683-zhQ  Sister chromatids  are duplicated  chromosomes that  remain attached  to each other. | | | |  |

[](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=cgP7tKrjUZBzxM&tbnid=UstyYLY1vGor9M:&ved=0CAUQjRw&url=http://www.slideshare.net/PakLiam/spermatogenesis-vs-oogenesisgerminario&ei=wddqUq6oPIzqkAePioAw&bvm=bv.55123115,d.eW0&psig=AFQjCNG4kw8m7WB171Q4FSYdDplwCTsq8w&ust=1382820103421129)