**MITOSIS AND MEIOSIS FURTHER ANALYSIS Name:**

**Mitosis Questions**

1. What is the overall **purpose** of *mitosis*?   
   ***To produce more identical somatic cells.***
2. Give examples of why an organism might need to be able to produce more cells.  
    ***Growth of an organism. To heal injuries. To prevent the cell from becoming too large.***

*In the space provided, write the letter of the description that best matches each term.*

1. ***E***\_\_ **First gap (G1) phase**

A. division of the nucleus

B. cytoplasm divides and daughter cells become physically separated

C. final preparations are made for the cell to divide

D. DNA is copied

E. cell grows and carries out its routine functions

1. ***D***\_\_ **Synthesis (S) phase**
2. ***C***\_\_ **Second gap (G2) phase**
3. ***A***\_\_ **Mitosis**
4. ***B***\_\_ **Cytokinesis**
5. What function do ***spindle fibers*** perform during mitosis?  
   ***They attach to chromosomes, moving them to the middle (metaphase) and then pulling them apart (anaphase)***
6. What function do ***centrioles*** perform during mitosis?  
   ***They produce spindle fibers.***

*In the space provided, write the letter of the description that best matches each term.*

1. \_\_***C***\_\_ **Prophase**

a. Chromosomes align in center of cell.

b. Nuclei reform. Chromosomes unwind. Spindle fibers break down.

c. Chromatin condenses into chromosomes. Nucleus disappears.

d. Chromatids are pulled by spindle fibers to opposite poles of the cell.

1. \_\_***B***\_\_ **Telophase**
2. \_\_***A***\_\_ **Metaphase**
3. \_\_***D***\_\_ **Anaphase**

*Complete each statement by* circling or highlighting *the correct term or phrase in the brackets.*

1. Cytokinesis takes place [ prior to / following ] mitosis.
2. During cytokinesis in **animal cells**, a cleavage furrow is formed by [ a cell wall / a belt of proteins ].
3. In **plant cells**, a new cell wall is formed by [ vesicles / cell plates ] holding cell wall materials.
4. Following cytokinesis, the new daughter cells enter the [ G1 / G2 ] phase of [ prophase / interphase ].
5. **Mitosis** results in [ two / four ] daughter cells which are genetically [ identical to / different from ] the parent.
6. In the space below, *draw a chromosome* and label the following terms: ***chromosome***, ***chromatid***, ***centromere***.

***x***

***Chromosome***

***Centromere***

***Chromatid***

***Chromatid***

**Mitosis vs. Meiosis Questions**

*Fill in following tables for Mitosis and Meiosis…*

|  |  |  |
| --- | --- | --- |
|  | MITOSIS | MEIOSIS |
| **Purpose of process** | ***To produce somatic cells.***  ***Diploid 🡪 Diploid*** | ***To produce gametes (sex cells).***  ***Diploid 🡪 Haploid*** |
| **Type of parent cell**  **(haploid or diploid)** | ***Diploid*** | ***Diploid*** |
| **Chromosomes of parent cell**  **(haploid or diploid)** | ***Same as above*** | ***Same as above*** |
| **Type of daughter cell**  **(somatic or gamete)** | ***Somatic*** | ***Gamete*** |
| **Chromosomes of daughter cells (haploid or diploid)** | ***Diploid*** | ***Haploid*** |
| **Number of daughter cells following the complete process** | ***2*** | ***4*** |
| **Number of times DNA replicates prior to cell division** | ***1*** | ***1*** |
| **Number of times nucleus divides** | ***1*** | ***2*** |

|  |  |  |  |
| --- | --- | --- | --- |
| EVENT | MITOSIS | MEIOSIS I | MEIOSIS II |
| **Does crossing over occur?**  **(yes or no)** | ***No*** | ***Yes*** | ***no*** |
| **How do chromosomes *line up* in the middle during metaphase?** | ***Single file*** | ***In homologous pairs*** | ***Single file*** |
| **What *separates* in anaphase?** | ***Chromatids*** | ***Full chromosomes*** | ***Chromatids*** |
| **Do homologous chromosomes pair up in prophase?** | ***No*** | ***Yes*** | ***no*** |
| **Is genetic variation produced?** | ***No*** | ***Yes*** | ***yes*** |

**Application Questions**

1. Explain the connection between **mitosis and cancer**. How does your body try to prevent cancer from forming?

***Cancer results when cells no longer receive the signal to stop dividing. In other words, cancer is uncontrolled mitosis. Apoptosis (programmed cell death) is one way your body prevents cancer from forming.***

1. ***The diploid cell of a polar bear has 74 chromosomes.***
   1. Following **mitosis**…

74

**\_\_\_**

**74**

74

**\_\_\_**

37

* 1. Following **meiosis**… Following **fertilization**….

**\_\_\_**

37

37

**\_\_\_**

**\_\_\_**

**74**

37

**74**

**\_\_\_**

37

37

**\_\_\_**

**\_\_\_**

1. The \*\*starred\*\* cell in the question above represents a **zygote**, or fertilized egg.  
   1. This is also known as the first \_\_\_\_\_\_\_\_\_***somatic***\_\_\_\_\_\_\_\_\_\_\_ cell.
   2. This cell will now begin to undergo which process in order to develop into a baby?

***Mitosis***

1. An error during **mitosis** *cannot* be passed on to future generations. An error during **meiosis**, however, *CAN* be passed on to future generations of offspring. *Defend the truth of this statement*.

***Mitosis is the reproduction of somatic cells. If an error occurs, it doesn’t matter because somatic cells aren’t passed on from parent to offspring.***

***Meiosis is the production of gametes, or sex cells. Sex cells are what become people. Therefore, if an error occurs in meiosis it will be given to the baby when the egg is fertilized.***

1. Down Syndrome is a genetic disorder that results when a person’s cells have an extra 21st chromosome (instead of the normal two 21st chromosomes, there are three). *Explain the connection between Down Syndrome and meiosis.*

***When eggs and sperm are produced following meiosis, they should each end up with one 21st chromosome. That way the cell has two when the egg is fertilized. If an egg or a sperm somehow ends up with two 21st chromosomes, there will be a total of three 21st chromosomes when the egg is fertilized.***

***The fertilized egg with three 21st chromosomes will then begin going through mitosis and every single new cell will also have three 21st chromosomes.***