**Cell Division Review Sheet Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**For questions 1-10 use the following word bank.**

|  |  |  |  |
| --- | --- | --- | --- |
| Cancer | Decreases | Interphase | Chromatid |
| Meiosis | Centromere | Increases | Gametes |
| Somatic | Mitosis | Chromosomes | Cytokinesis |

1. Sexual reproduction \_\_\_\_\_\_\_\_\_\_\_\_\_ genetic variation and is a process called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
2. The part of the chromosome that exchanges parts of itself in crossing over is the \_\_\_\_\_\_.
3. The stage of the cell cycle that is the “normal life” of the cell is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Unregulated, out of control cell division leads to \_\_\_\_\_\_\_\_\_
5. Asexual reproduction that ends in two, equally sized cells is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. Meiosis produces sex cells, which are called \_\_\_\_\_\_\_\_\_
7. The type of cell which requires copying the nucleus, along with the rest of the cell is \_\_\_\_\_\_\_\_\_\_
8. The \_\_\_\_\_\_\_\_\_\_\_\_\_ is the region that attaches two chromatids.
9. \_\_\_\_\_\_\_\_\_\_\_\_\_ is division of the cell cytoplasm, including any organelles.
10. A human has 46 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Match the experiments/ situations on the right with the terms on the left.**

|  |  |
| --- | --- |
| \_\_\_Regeneration\_\_\_Cytokinesis\_\_\_Centromere\_\_\_Diploid\_\_\_Haploid\_\_\_Meiosis\_\_\_Crossing Over | 1. When observing plant root cell division, a supportive structure will form during the last stage.
2. A fertility expert explains that the male’s body must undergo this process in order to make viable sperm.
3. The salamander’s tail was destroyed, but the vet said it could grow back as an identical copy.
4. The ovum cells were found to have 50% of the DNA as the skin cells.
5. The doctor explained that fraternal twins are different because the two eggs were created when information was switched between chromosomes.
6. When studying someone with too many chromosomes, the geneticist found that this structure didn’t separate.
7. Puppies have one chromosome from each parent, making chromosomes comes in pairs.
 |

**Cell Cycle**

1. What are the four parts of the cell cycle?
2. What happens during interphase?

**Mitosis**

1. What is the ultimate goal/purpose of mitosis?

2. SUMMARIZE the events of each phase in a single sentence. Focus on the KEY events, not every little detail.

* Prophase
* Metaphase
* Anaphase
* Telophase

3. Only cells that have a nucleus use mitosis since mitosis is the division of the nucleus. Animal cells undergo mitosis. Place a number below each picture to put the stages in the correct order, be sure to write the name of the phase.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Picture of the mitosis phase 🡪  |  |  |  |  |
| Name of the phase |  |  |  |  |
| Order of the phases (1st, 2nd, 3rd, 4th) |  |  |  |  |

**Asexual Reproduction**

1. Is mitosis an asexual or sexual method of reproduction?

Select the organisms that perform this type of asexual reproduction.

\_\_\_\_\_2. Binary Fission A. Star fish

\_\_\_\_\_3. Budding B. Amoeba

\_\_\_\_\_4. Sporulation C. yeast

\_\_\_\_\_5. Regeneration D. Mushrooms and some bacteria

\_\_\_\_\_6. Vegetative reproduction E. White potato plant

 Select the appropriate definition for each type of asexual reproduction.

\_\_\_\_\_7. Mitosis A. growing back a missing part

\_\_\_\_\_8. Regeneration B. section of a cell grows and seperates from the original cell

\_\_\_\_\_9. Spore Formation C. cellular division

\_\_\_\_\_10. Binary Fission D. smaller Indentical cells produced from frequent cell division

\_\_\_\_\_11. Budding E. organism divided into two with a copy of parents DNA

12. What is cytokinesis? When does it occur?

13. Compare cytokinesis in plant and animals:

**Cancer and Mitosis**

1. What is cancer?

2. Cancer is caused by what?

3. Any factor that causes cancer is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. Define benign

5. Define malignant

6. Define metastasis

7. What are cyclins and what do they do?

8. Name 3 cancer treatments and give a brief description.

 1.

 2.

 3.

9. What happens when cells lose control of the cell cycle?

**Meiosis**

1. What do the terms haploid and diploid mean? Provide examples of each type of cell.

2. What is the difference between a haploid, diploid, and zygote?

|  |  |
| --- | --- |
| ***Organism*** | ***Chromosome #*** |
| *Mosquito* | *6* |
| *Frog* | *26* |
| *Pea plant* |  *14* |
| *Human* | *46* |

What is the chromosome number for diploid human cells? \_\_\_\_\_\_\_\_\_\_\_\_

What is the chromosome number for haploid pea plant cells?

What is the chromosome number for human gamete cells?

If a frog cell had 26 chromosomes, would that be diploid or haploid?

If a mosquito cell had 3 chromosomes, is it diploid or haploid?

If a human cell had 23 chromosomes would it be a gamete or somatic cells?

1. What is meiosis?

2. What type of cell undergoes meiosis?

3. Meiosis produces reproductive/sex cells called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ like \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.

4. What is the chromosome number for humans?

5. The fusion (fertilization) of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and an \_\_\_\_\_\_\_\_\_\_\_\_\_ produces a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ with a 46 (2n) chromosome number.

6. Every sperm and egg cell is genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with a \_\_\_\_\_\_\_\_\_\_\_\_\_ chromosome number.

7. One way in which genetic variation can occur is through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-over. During this process the doubled chromosomes pair up and some parts of the chromosome (or genes) can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ places.

8. What happens in meiosis I that makes each reproductive cell unique? Describe this process or draw a picture to show it.

9. Which of the following best describe the term “crossing over”?

a. An exchange of information between two homologous chromosomes

b. A separation of two sister chromatids

c. A molecular interaction between two sister chromatids

d. A molecular interaction between two non-sister chromatids

10. Describe what the term independent assortment means:

**Meiosis and Sexual Reproduction Review**

**Phases Meiosis half doubled haploid Four**

**sex two fertilization Diploid crossing-over homologous variation**

1. Mitosis is for asexual reproduction whereas \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is for sexual reproduction.
2. Gametes are also called \_\_\_\_\_\_ cells.
3. Meiosis goes through the same \_\_\_\_\_\_\_\_\_ as mitosis but MEIOSIS goes through \_\_\_\_ divisions.
4. During Meiosis I, the chromosome number is cut in \_\_\_\_\_\_\_. The cells have 23(half) the chromosome number but they are still \_\_\_\_\_\_\_\_\_\_. So, Meiosis II separates the doubled chromosomes and the result is \_\_\_ cells with a \_\_\_\_\_\_\_\_\_\_ chromosome number.
5. The gametes (sex) cells made as a result of Meiosis can then combine in a process called \_\_\_\_\_\_\_\_\_\_\_, where 23 chromosomes from the mothers egg and 23 chromosomes from the fathers sperm form a \_\_\_\_\_\_\_\_\_\_\_ cell called a zygote with 46 chromosomes.
6. Meiosis is a form of sexual reproduction which means the offspring are genetically different. The sources of the genetic variation are: random assortment of chromosomes, random fertilization and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. In the process of crossing-over, a gene on one of the \_\_\_\_\_\_\_\_\_\_\_\_ chromosomes is exchanged with the gene on the other chromosome allowing for more genetic possibilities for the offspring.
8. Homologous chromosomes are similar in that they code for the same traits but can have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the trait.

**Fill in the chart below to compare mitosis and meiosis:**

|  |  |  |
| --- | --- | --- |
|  | Mitosis | Meiosis |
| Type of cells that reproduce this way |  |  |
| Sexual or asexual process? |  |  |
| How many cell divisions? |  |  |
| Haploid or diploid at beginning? |  |  |
| Haploid or diploid at end? |  |  |
| Total number of cells at end of cytokinesis? |  |  |
| Are cells same or different at the end?  |  |  |

20. Give 2 examples how meiosis differs from mitosis.

 1.

 2.

**Reproduction:**

Which type of reproduction produces identical offspring? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which type of reproduction produces very different offspring? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Human body cells have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ total chromosomes, \_\_\_\_\_\_\_\_\_ of them are the sex chromosomes

* Having 2 X chromosomes (XX) makes you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Having an X and a Y chromosome makes you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Don’t Forget!** *Goal 1.2.2 and 3.2.1 – Cell Reproduction*

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reproduction requires \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ parent(s) and produces offspring that are genetically identical.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ creates two equally-sized cells and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ creates a larger and a smaller cell.
3. Growth 1, Synthesis and Growth 2 are all part of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. When a cell gets a signal to divide, the first thing that must happen is that the DNA is \_\_\_\_\_\_\_\_\_\_\_\_.
5. The phase of mitosis when the copies of chromosomes are pulled apart is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. The correct order of the cell cycle is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. Mitosis produces \_\_\_\_\_\_ cells that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and genetically identical.
8. Mitosis and Meiosis both replicate the DNA \_\_\_\_\_\_\_\_\_\_\_\_\_, but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ divides twice.
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a type of asexual reproduction and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and fertilization are sexual reproduction.
10. Meiosis produces four \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells called gametes that are genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
11. Crossing over occurs during \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and increases genetic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
12. The benefit of meiosis is that it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genetic variation.

**Multiple Choice Review**

1. When sexual reproduction is used, there are extra steps before the full organism is produced. Which of the following is the correct order of these steps?

 A) Mitosis → Fertilization → Meiosis C) Meiosis → Mitosis → Fertilization

 B) Mitosis → Meiosis → Fertilization D) Meiosis → Fertilization → Mitosis

2. Organisms that use sexual reproduction would be more successful in times of danger because there is

 A) a slower reproduction time frame C) closer relationships between organisms

 B) more genetic variety D) none of the above

3. Meiosis produces which of the following to prepare for sexual reproduction?

 A) Genetic variation B) a reduced chromosome number C) both A&B D) none of these

4. During which process is DNA copied to prepare for division?

A) Mitosis B) Meiosis C) both A&B D) neither

5. What type of cells result after meiosis?A) Diploid somatic cells B) diploid gamete cell C) haploid somatic cells D) haploid gamete cells

6. A cell with a diploid chromosome number of 12 divided two times, producing four cells with six chromosomes each. The process that produced these four cells was most likely

A) Internal fertilization B) mitotic cell division C) external fertilization D) meiotic cell division

7. Meiosis produces \_\_\_\_\_\_\_ cells that are genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* 1. 2;identical B) 2;different C) 4;identical D) 4; different

8. A sperm cell of an alligator has 16 chromosomes. What is the total number of chromosomes normally present in a stomach cell of this alligator? A) 8 B) 32 C) 48 D) 16

9. If the following somatic cell undergoes meiosis, each of the daughter cells will have how many chromosomes?

 A) 2 homologous pairs C) 2 doubled chromosomes

 B) 4 chromosomes D) 2 chromosomes