Name _____ _____/53

Unit 5 Exam: Cell Division

Part I: Multiple Choice – Write the correct answer for each of the following questions in the blank provided *1pt each*

1. _____The process that increases genetic diversity within a population is
   a. Asexual reproduction
   b. Cloning
   c. Replication
   d. Sexual reproduction
2. _____Sister chromatids are attached to each other at an area called the
   a. Centriole
   b. Centromere
   c. Chromosome
   d. Spindle fiber
3. _____If a cell has 12 chromosomes, how many chromosomes will each of its daughter cells have after mitosis and cytokinesis?
   a. 4 b. 6 c. 12 d. 24
4. _____A scientist treats a cell with a chemical that prevents DNA synthesis. In which stage of the cell cycle will these cells remain?
   a. Anaphase b. Interphase c. Metaphase d. Prophase
5. _____What is the term for cells that divide and have the potential to become any type of cell?
   a. Ambitious b. Determined c. Reproductive d. Totipotent
6. _____If you glance at an onion root at random times, about 60% of the time you would see its cell in what phase of the cell cycle?
   a. Anaphase b. Interphase c. Prophase d. Telophase
7. _____A cell enters anaphase before all of its chromosomes have attached to the spindle fibers. This may indicate that the cell is not responding to
   a. Apoptosis
   b. Growth factors
   c. Internal regulators
   d. Mitosis
8. _____The illustration to the **right** represents what stage of meiosis?
   a. Anaphase II
   b. Metaphase I
   c. Prophase I
   d. Telophase I

9. _____If an orangutan skin cell has 84 chromosomes, how many chromosomes would you expect an orangutan egg cell to have?
   a. 21 b. 42 c. 84 d. 168
10. _____What is the figure on the right showing?
    a. Cancer
    b. Crossing over
    c. Differentiation
    d. Independent Assortment

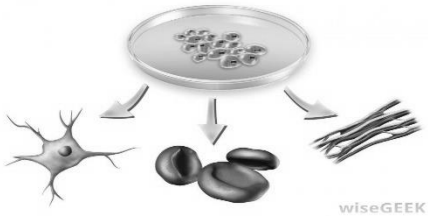

Figure 1

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Part II: Short answer – Answer the following questions in COMPLETE sentences

*Use the following table to help inform you about answers to questions **11 and 12.**

Life Spans of Various Human Cells		
Cell Type	**Life Span**	**Cell Division**
Red Blood Cells	<120 days	Cannot divide
Skin cells	14 days	Can divide
Cardiac muscle	Long-lived	Cannot divide
Smooth Muscle	Long-lived	Can divide
Neuron (nerve cell)	Long-lived	Most do not divide

Data Table 1

11. Based on the data above, in what ways might injuries to the heart and spinal cord be similar? How might they differ from injuries to skin cells? *2pts*

12. If cancers cells were added to the table, predict what would be written in the Life Span and Cell Division columns. *1pt*

Cell type	**Life Span**	**Cell Division**
Cancer Cells		

   a. **Explain why you answered the way you did** *1pt*

13. What is an advantage and disadvantage of both Sexual and Asexual Reproduction? *2pts*

14. Draw a pair of homologous chromosomes. Label the sister chromatids and centromeres. *2pts*

15. What are two (2) differences between spermatogenesis and oogenesis? *2pts*

16. Explain what crossing over is; draw a diagram to help illustrate your ideas. *2pts*

17. Explain how crossing over and independent assortment allow for maximum genetic diversity. *2pts*

18. Ms. Yeager was walking around the room and ended up tripping over the trashcan. In the process of trying to catch herself, she cut her hand. After a few days, where there used to be an open wound, Ms. Yeager shows the class that the cut is healing up nicely. *3.5pts total*
    a. What cell division process allowed for her cut to heal up the way it did?

    b. How many chromosomes could be found in cells of her hand?

    c. What is another term for the body cells that divide by the process mentioned in Part A?

    d. After a week, Ms. Yeager's hand seemed to be completely healed; cell division had stopped.
        i. What caused the once rapidly dividing cells to stop their division?

        ii. What would happen if they kept on dividing, even after the wound had healed?

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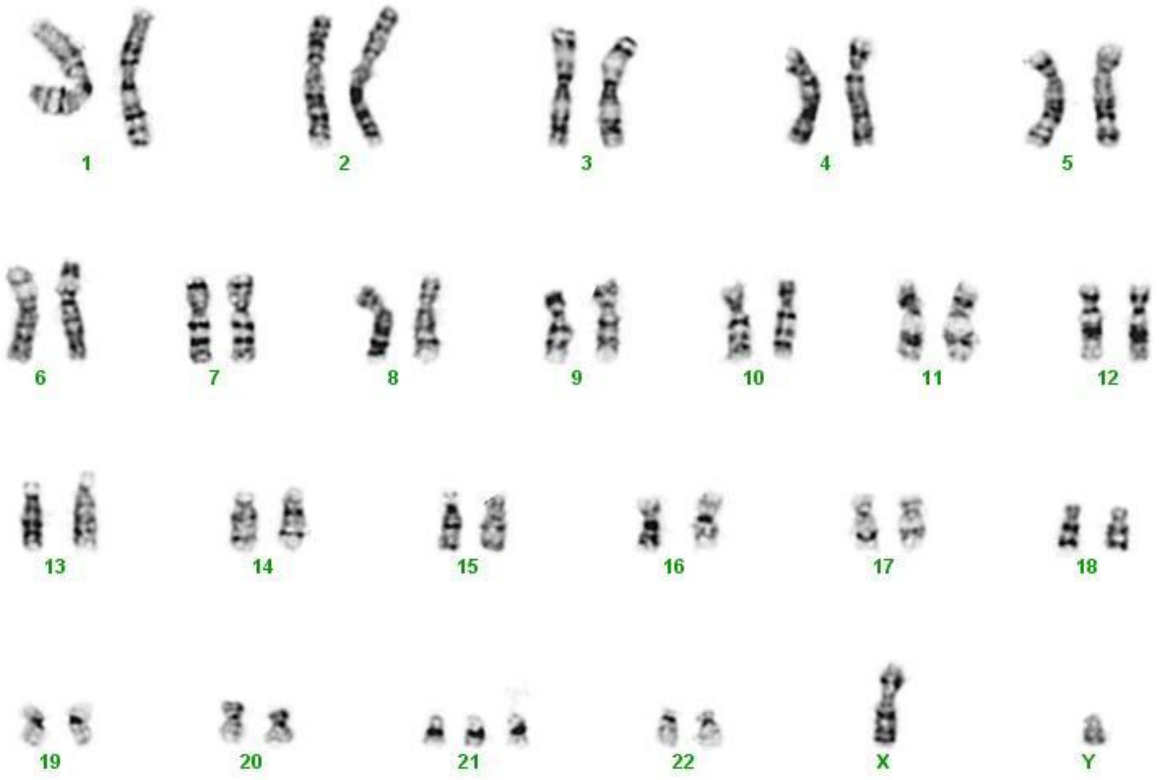
19. Looking at the karyotype shown below, **CIRCLE the chromosome # (.5 pt)** where geneticists might find a chromosomal abnormality.

    This is a result of a genetic chromosomal error during the cell Cycle:

    a. Identify if this error occurred during Mitosis OR Meiosis. *0.5pt*

    b. Identify and Explain in which specific Phase of the Cycle you selected above did this error occur resulting in the specific abnormality seen below. *2 pts*

    c. ***BONUS (+1):*** This karyotype comes from a male that has Down Syndrome. What is the scientific name for this chromosomal abnormality?



Name _____ _____/53

Part III: Cell Cycle Identification

Identify each specific phase of Mitosis or the entire cell cycle from the descriptions below. Place your answers on the blank line preceding the statement. *1pt. each*

20. _____ - The period of the cell cycle that immediately follows cell division when the cell grows. New organelles are made but the chromosomes have not yet replicated.

21. _____ - The stage of mitosis where the duplicated chromosomes line up in the center of the cell.

22. _____ - The stage of mitosis where the nuclear membrane and nuclei reform, cytokinesis is nearly complete, and the chromosomes eventually uncoil to chromatin.

23. _____ - The stage of the cell cycle where the chromosomes replicate in preparation for cell division.

24. _____ - The stage of mitosis where the chromatin condenses and the chromosomes become visible. Also the nucleolus disappears, the nuclear membrane fragments, and the spindle forms and attaches to the centromeres of the chromosomes.

25. _____ - Cytoplasmic division where the dividing cell separates into two diploid daughter cells.

26. _____ - The stage of mitosis where diploid sets of daughter chromosomes separate and are pushed and pulled toward opposite poles of the cell.

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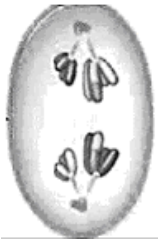
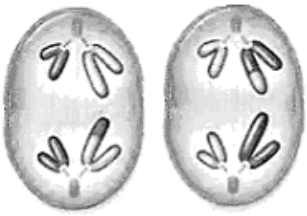
Identify the phases of meiosis that correspond with the following images. *1pt each*

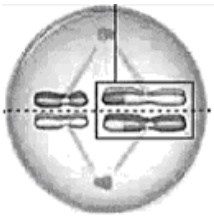


27. _____

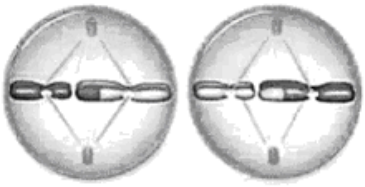


28. _____

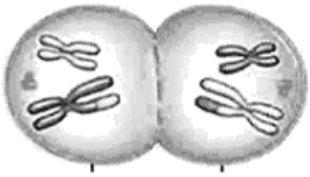
29. _____



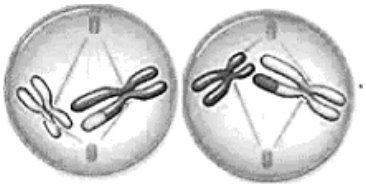
30._____



31. _____



32. _____



33. _____

34. _____

35. *Label* the following terms on the diagrams above: **cleavage furrow, spindle fiber, homologous chromosomes, segregation, synapsis, tetrad** *(0.5 pts each)*

- Answer the questions about these phases.

36. What specific event, that is unique to this stage of meiosis, is occurring in #29? *1pt*

37. How many chromosomes are found in #30? *1pt*

38. What meiotic process is seen in #34 (Hint: How many cells are produced?) *1pt*

39. The resulting cells of this process would have _____chromosomes and therefore are considered _____ *2pts*

40. At the end of this stage, what is the name of the genetic material as it unravels? *1pt*