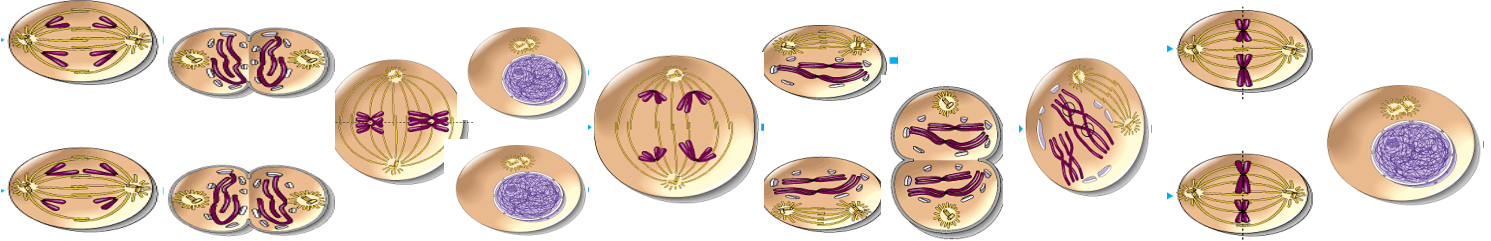
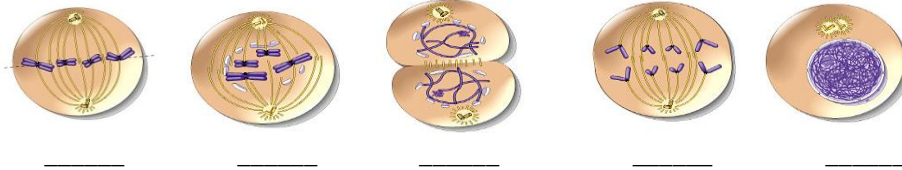


### Cell Division Study Guide

1) Is this cell division process Mitosis or Meiosis (**circle**)? Number the phases 1-10 in the order that they occur.



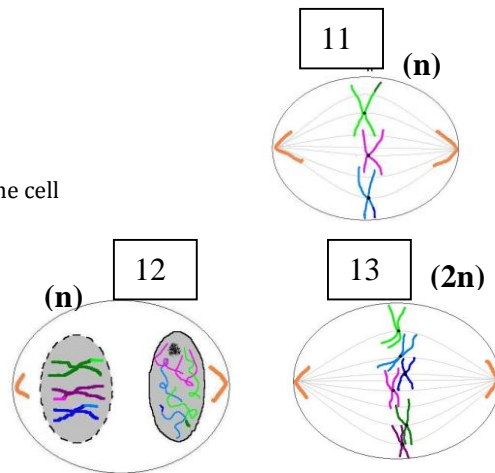
2) Is this cell division process Mitosis or Meiosis (**circle**)? Number the phases 1-5 in the order that they occur.



**MM Review:** Tell whether the description or cell diagram best applies to **Mitosis** or **Meiosis**, **BOTH** or **Neither**

**A=** Meiosis    **B=** Mitosis    **C=** BOTH Mitosis & Meiosis    **D=** Neither Mitosis nor Meiosis

- \_\_\_ 3. involves ripping “double” chromosomes into “single” chromosomes
- \_\_\_ 4. Creates new gene combinations through “crossing over”
- \_\_\_ 5. produces daughter cells with “single” chromosomes at the end
- \_\_\_ 6. produces daughter cells with “double” chromosomes at the end
- \_\_\_ 7. involves “double” chromosomes lining up single file on the equator of the cell
- \_\_\_ 8. functions in growth, replacing lost cells, and repairing injuries
- \_\_\_ 9. begins with a Haploid cell
- \_\_\_ 10. Produces diploid daughter cells
- \_\_\_ 11. see diagram #11
- \_\_\_ 12. see diagram #12
- \_\_\_ 13. see diagram #13



14. Meiosis is often described (by Mr. R) as the “Mix-E, Mix-E, cut your DNA in half” story. Explain two different ways that Meiosis creates genetic variety ensuring that no 2 gametes are ever identical.

Mix-E #1 =

Mix-E #2 =

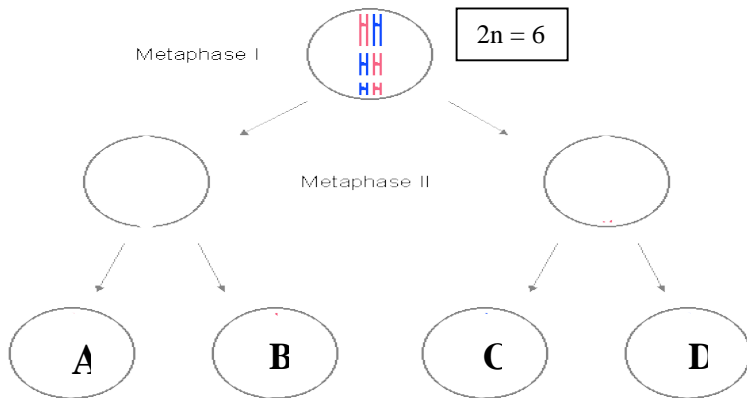
15. At the end of HUMAN Mitosis cell division, four daughter cells are produced: 2 cells each contain **44** “single” chromosomes, one cell has **2** “double” chromosomes, and the last cell has **NO** chromosomes. **CIRCLE** which of the following things most likely went **WRONG** during Mitosis cell division?

- a. 1 spindle fiber was broken
- b. 2 spindle fibers were broken
- c. the centrioles were broke
- d. The chromatin replicated twice
- e. The chromatin failed to replicate
- f. cytokinesis failed to happen
- g. cytokinesis happened twice

16. Number the following steps of **Mitosis** Cell Division in the correct order:

- \_\_\_\_\_ cytokinesis happens
- \_\_\_\_\_ the chromosomes line up single file on the equator line of the cell
- \_\_\_\_\_ the nucleolus and nuclear membrane reappear
- \_\_\_\_\_ the nucleolus and nuclear membrane disappear
- \_\_\_\_\_ the sister chromatids are ripped apart and pulled to opposite poles of the cell

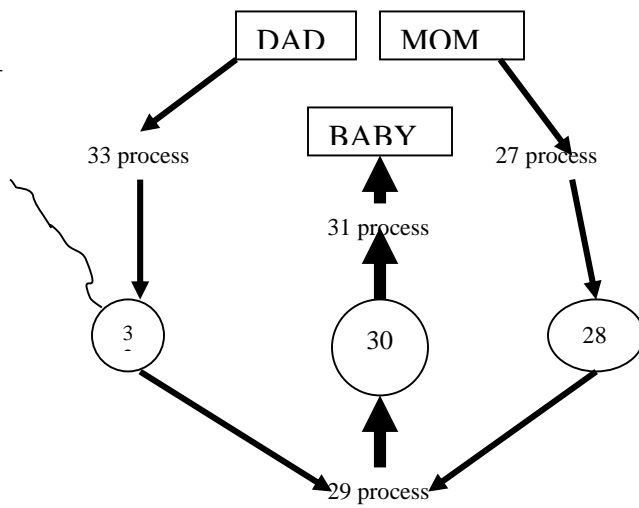
17. How many total eggs are produced by ONE ovary cell during Meiosis (oogenesis)?
18. How many total sperm are produced by ONE testis cell during Meiosis (spermatogenesis)?
19. How many total chromosomes are usually found in a human body cell like skin, heart, liver, etc. ?
20. How many total chromosomes are usually found in a human sperm or egg cell ?
21. Which of the following is a haploid cell?
  - a. liver cell
  - b. testis cell
  - c. skin cell
  - d. egg
  - e. blood cell
  - f. both b and d
22. CIRCLE any of the following cell cycle phases when sister chromatids are visible?
  - a. interphase
  - b. prophase
  - c. metaphase
  - d. anaphase
  - e. telophase
23. Two gametes each containing 4 chromosomes join during fertilization.  
How many chromosomes will the zygote cell contain? \_\_\_\_\_
24. A cell with **14** chromosomes undergoes mitosis twice. How many chromosomes will each daughter cell have? \_\_\_\_\_



25. If the process of **meiosis** shown here proceeds normally, how many chromosomes will cells A, B, C, and D have? \_\_\_\_\_
26. Complete the matrix table below to compare spermatogenesis vs. oogenesis

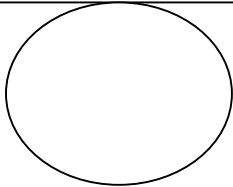
characteristics	Spermatogenesis	Oogenesis	S = same D = different
1. WHO does this type of cell division?			
2. WHAT does this type of cell division produce?			
3. WHERE does this type of cell division happen.....location?			
4. WHEN does this type of cell division happen?			
5. HOW does the cytoplasm divide?			
6. # times the cell divides?			
7. # of gametes produced?			

27. Name the process happening at #27 ? \_\_\_\_\_
28. How many chromosomes are in the **egg** ? \_\_\_\_\_
29. Name the process happening at #29 ? \_\_\_\_\_
30. How many chromosomes are in the **zygote** ? \_\_\_\_\_
31. Name the process happening at #9? \_\_\_\_\_
32. How many chromosomes in the **sperm** ? \_\_\_\_\_
33. Name the process happening at #33 ? \_\_\_\_\_
34. Is the sperm cell Haploid or Diploid ? \_\_\_\_\_
35. Is the zygote Haploid or Diploid ? \_\_\_\_\_

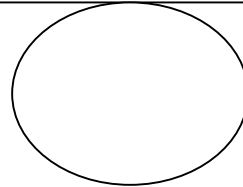


36. Draw a diagram of a cell with a diploid number of 6 ( $2n = 6$ ) during the following stages of cell division:

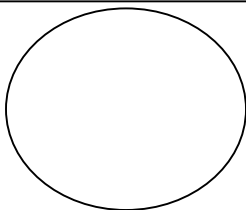
During **Mitosis** as the chromosomes line up in the middle of the cell (equator)



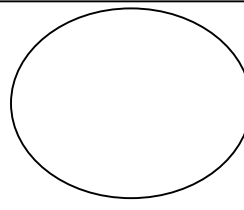
A daughter cell formed immediately at the end of **Mitosis**



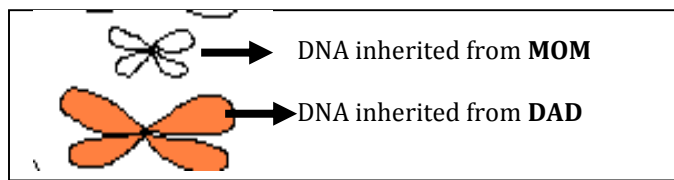
During **Meiosis I** as the chromosomes line up in the middle of the cell (equator)



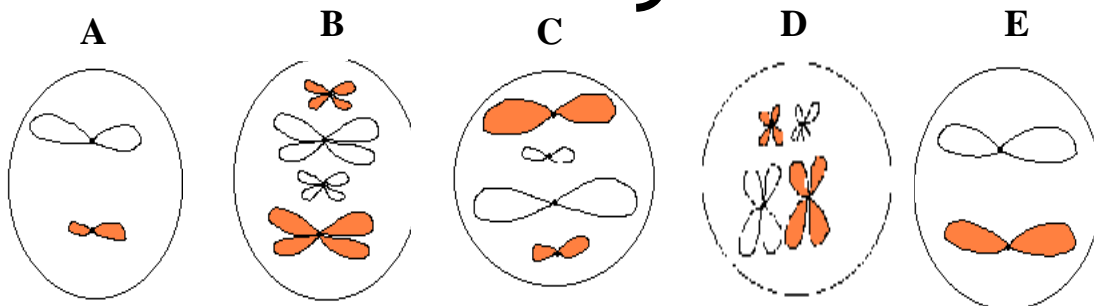
A gamete (sperm or egg) formed at the end of **Meiosis II**



Carefully study the 5 diagrams of **Mosquito** cells below and then answer questions 37-42; each diagram shows a specific stage from either Mitosis or Meiosis cellular division.



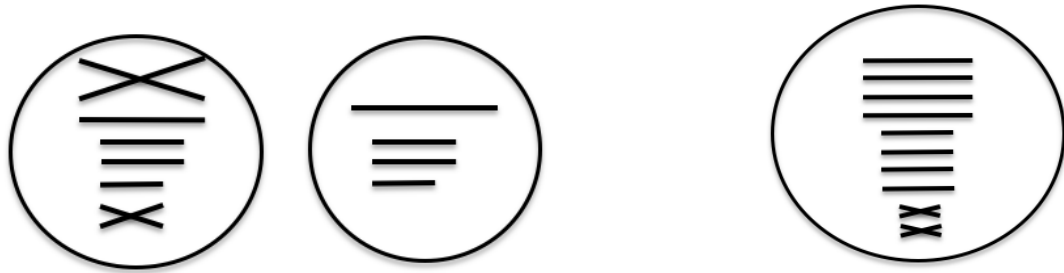
KEY for chromosome color



37. Which cell above has chromosomes LINED UP on the equator during a middle stage (**metaphase**) of **Mitosis**? \_\_\_\_\_
38. Which cell above was formed at the end of **Mitosis**? \_\_\_\_\_
39. Which cell above has chromosomes LINED UP on the equator during the middle of **Meiosis I** (**Metaphase I**)? \_\_\_\_\_
40. Which cell above was formed at the end of **Meiosis II**? \_\_\_\_\_
41. How many total chromosomes are in the nucleus of a mosquito body cell like a blood cell or wing cell? \_\_\_\_\_
42. Explain which cell above is visually NOT accurate? \_\_\_\_\_

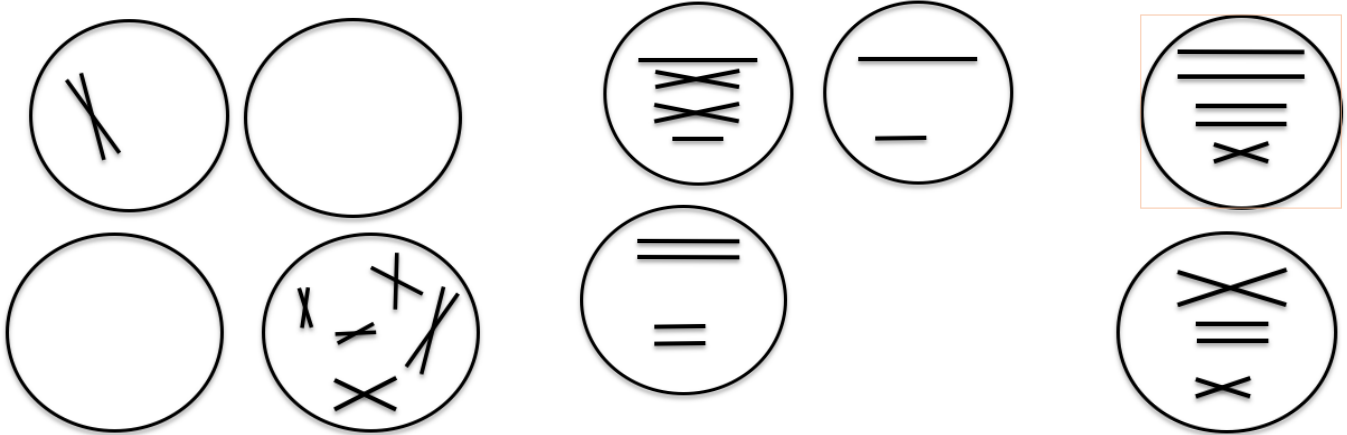
**What Went Wrong During Meiosis?** First study your Meiosis FLIP BOOK diagrams ( $2n=6$ ) and then identify what went wrong during meiosis (to create each gamete diagram below at the end of meiosis) by matching the appropriate choices from the list below:

- |   |  |
|---|--|
| A) 1 spindle fiber pair was broken during Anaphase 1              | H) Cytokinesis failed to happen after Telophase 1              |
| B) 1 spindle fiber pair was broken during Anaphase 2 in 1 cell    | I) Cytokinesis failed to happen after Telophase 2 in 1 cell    |
| C) 1 spindle fiber pair was broken during Anaphase 2 in each cell | J) Cytokinesis failed to happen after Telophase 2 in each cell |
| D) 2 spindle fiber pairs were broken during Anaphase 1            | K) The centrioles never formed during Prophase 1               |
| E) 2 spindle fiber pairs were broken during Anaphase 2 in 1 cell  | L) Centrioles never formed during Prophase 2 in 1 cell         |
| F) 2 spindle fiber pairs were broken in Anaphase 2 in each cell   | M) Centrioles never formed during Prophase 2 in each cell      |
| G) The chromatin NEVER replicated                                 | N) The chromatin replicated twice                              |



43. \_\_\_\_\_

44. \_\_\_\_\_



45. \_\_\_\_\_

46. \_\_\_\_\_

47. \_\_\_\_\_