## Study Guide: Chromosomes and Cell Division Name: \_\_\_\_\_

Name: \_\_\_\_\_ Block: \_\_\_\_\_

**Instructions:** Please use this study guide as you prepare for the test; it will be very helpful to you. As always, save the study guides to prepare for the final exam See me during class if you need additional help and would like to schedule time to get help.

The blank line is looking for a number where you see a "#", NOT something trending, though Bio is cool, you must admit.

- 1. On the blank lines, determine whether the condition is **haploid** or **diploid**.
  - a. Germ cells begin as \_\_\_\_\_\_cells, but after division are \_\_\_\_\_. Such as egg cell \_\_\_\_\_, sperm cell \_\_\_\_\_. However, sperm plus egg or zygote is \_\_\_\_\_.

b. Somatic cells (normal body cells) are \_\_\_\_\_.

- c. <u>Mitosis</u> always produces cells that are \_\_\_\_\_\_. For example, if a human skin cell is reproduced, the new skin cell will have \_\_\_\_# chromosomes (or the diploid number of chromosomes).
- d. "2n" \_\_\_\_\_. e. "n" \_\_\_\_\_.
- f. chromosomes NOT in pairs \_\_\_\_\_. g. chromosomes ARE in pairs \_\_\_\_\_\_.
- 2. What's the difference between sister chromatids and homologous chromosomes? Which best shows a "replicated" chromosome? Draw a picture and label the difference if that helps.

3. Regarding **human** chromosomes, there are

a. Fill in the #: \_\_\_\_\_# sex chromosomes and \_\_\_\_# autosomes for a total of \_\_\_\_#
b. An individual gets 23 of these chromosomes from their \_\_\_\_\_ and 23 from their \_\_\_\_\_.
c. Do your 44 autosomes occur as 22 homologous pairs in your cells? Yes / No (look back at the karyotype you made in class)

- 4. a. Cell division in Bacteria is known as
  - Circle the correct answer:
  - b) Bacterial cell division is eukaryotic / prokaryotic.
  - c) Binary Fission is a(n) asexual /sexual form of reproduction.
  - d) The shape of a bacterial chromosome is **linear** /**circular** / **square**.
- 5. For the exam, know the order of the cell cycle, and what is happening in each stage of the cell cycle! Remember, Intelligent People Meet At Three o'Clock: Interphase, Prophase, Metaphase, Anaphase, Telophase, Cytokinesis
  - a. *Circle* the three stages that make up Interphase.

 $G_1$  S  $G_2$  Mitosis Cytokinesis

- b. Draw a line under the two stages above that make up cell division
- 6. Label at G1, S, G2, M (for Mitosis) or C (for cytokinesis):
  - a. Chromosomes replicate so that we now see sister chromatids
  - b. Cell grows and carries out normal functions
  - c. Immediately follows cytokinesis
  - d. Spindle begins to form, organelles are duplicated
  - e. Division of the cytoplasm \_\_\_\_\_
  - f. Division of the nucleus
  - g. First growth phase
  - h. Problems in mitosis (circle one) can / cannot be passed on to offspring
- 7. List, in correct order, the 4 stages of mitosis. Be able to describe what is happening in each stage, particularly what is happening to the chromosomes. Know what the pictures look like in order (study Sneakerdog Mitosis).
  - (1) (2) .

(3) (4) .

Label as P, M, A or T:

- a. Chromosomes line up in the middle \_\_\_\_\_
- b. Nuclear membrane breaks down
- c. Nuclear membrane reforms \_\_\_\_\_
- d. Sister chromatids come apart \_\_\_\_\_
- e. Sisters still attached &
- f. Non-replicated chromosomes \_\_\_\_\_
- g. No nucleolus \_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_,

8.	Sexual	Reproduction	Gamete	Formation:	
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<i>a</i> . b.	<i>Germ cells are located in</i> Meiosis in males is called	<i>or</i>	, it occurs in the	
		and produces four gametes called		cells.
c.	Meiosis in females is called	d	, it occurs in the	
	# polar bodies	and produces ONE gamete called a	an	_ cell plus
d.	<b>Circle</b> the two correct answ Meiosis results in <b>hap</b>	vers: loid/ diploid cells called gametes/	germ cells.	
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- e. Problems in meiosis (circle one) can / cannot be passed on to offspring (future generations)
- 9. What's the difference between germ cells and gametes?

10. What is the difference between germ cells and somatic cells?

11. For a 2n=4 cell, know how to APPLY mitosis vs. meiosis in terms of chromosome number and cell number.

For example, how many **chromosomes** are in a **2n=4** cell at the:

- a. End of mitosis (end of telophase) #
- b. End or Meiosis I (end of telophase I)\_\_\_\_#
- c. End of Meiosis II (end of telophase II) #
- d. End of cell division in a liver cell <u># (a liver cell is a somatic cell that undergoes mitosis)</u>
  e. End of cell division in a sperm cell <u># (remember, the original cell was 2n=4)</u>
- f. Haploid # =
- g. Diploid # =

## How many cells are formed:

- h. at the end of Mitosis (telophase mitosis) \_\_\_\_\_ identical or different?
- i. at the end of Meiosis I (end of telophase I) \_\_\_\_\_ identical or different?
- j. at the end of Meiosis II (end of telophase II) identical or different?

Be able to TRANSFER this knowledge to other problems:

For example, a dog's brain cell divides (2n=78), what is the chromosome # in the new brain cell? #. Or, a dog makes sperm cells, what is the chromosome number in those cells? # Put simply, normal body cells of the dog have 2n=78 chromosomes, so there are 78 chromosomes in normal body cells such as brain cells and half that number in egg or sperm.

12. List at least 3 similarities and 3 differences between mitosis and meiosis. You will get an essay question that asks this!

- 13. What occurs during crossing over, and when does it occur (be specific- Meiosis I, II, or mitosis & what stage), and what is the outcome?
- 14. Draw 3 side by side cells of anaphase: Mitosis, Meiosis 1, Meiosis II assuming the cells begin as 2n=4 (with 4 chromosomes / two pairs of homologs). Label centrioles, spindle in one of those cells. Draw and label sisters coming apart compared with homologous pairs coming apart. Label each cell as haploid or diploid.
- You will see at least 3 examples of cells that appear they will end haploid OR diploid. Know which cell types end diploid and which end haploid.

15. Important: Be able to identify a cell as a plant or animal, and the stage of mitosis or Interphase as it appears under the microscope. A "lab practical" will be included with this exam.

For example, how does telophase in plant cells differ from telophase in animal cells?

Know the terms cell plate and cleavage furrow. Know when a chromatids are still attached to sisters, when they are not, or when a nucleolus is going to be visible.