Heredity
Unit 2 Test Review

Name: Answer Key Date: _____ Hour: _____ Test #: _____

1. Define each of the following words:
   a. Chromatids: One of two identical parts of a chromosome, found after DNA replication but prior to cell division
   b. Centromere: point at which sister chromatids are attached
   c. Spindle Fiber: microtubules of protein - 2 types: polar and kinetochore
   d. Mitosis: division of cell nucleus that results in 2 diploid identical cells
   e. Synapsis: pairing of homologous chromosomes (occurs in Prophase I)
   f. Tetrad: Group of 4 chromatids that form 2 chromosomes
   g. Spermatogenesis: production of sperm through meiotic cell division
   h. Oogenesis: production of 1 egg and 3 polar bodies through meiosis
   i. Zygote: diploid fertilized egg resulting from fusion of gametes
   j. Crossing Over: portions of chromatids exchange genetic material
   k. Meiosis: process of nuclear division that reduces the # of chromosomes by half for sexual reproduction
   l. Polar fibers: microtubules extending across cell from centriole to centriole
   m. Kinetochore fibers: microtubules extending from centromeres of chromosomes to centrioles, moves chromosomes to center of the cell
   n. Chromatin: nuclear material in non-dividing cell, composed of DNA/protein in thin uncoiled strands
   o. _____
   p. Sexual Reproduction: production of offspring through meiosis and the fusion of gametes
   q. Polar Bodies: 3 cells that receive little cytoplasm during meiosis and eventually disintegrate
   r. Homologous Chromosome: two members of a pair of chromosomes with the same size and shape

provides a source of genetic variation within a species

2. What are the steps of DNA condensing from chromatin to chromosomes? Replicates, DNA begins to coil around histones, seen as chromosome (only the physical arrangement changes, chemically they are the same)
3. Human Chromosome Numbers?
   a. Diploid Number: 46
   b. Haploid Number: 23
   c. Somatic cell number: 46
   d. How many sex chromosomes? 2 (XX or XY) > 2 + 44 = 46
   e. How many non-sex (autosomes) chromosomes? 44

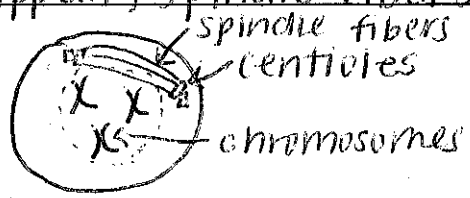
4. What is the main purpose of mitosis? In multicellular organisms, mitosis is the means of tissue repair and growth

5. What is diploid? What symbol is used to represent it? Which cells in an organism are diploid?
(2n) total chromosome number in a body or somatic cell, has both chromosomes of a homologous pair

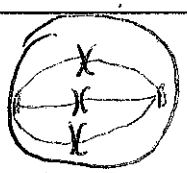
6. What is haploid? What symbol is used to represent it? Which cells in an organism are haploid?
(1n) chromosome number of egg or sperm cell with only one chromosome from each homologous pair

7. What are the four steps of mitosis? And what happens in each? List them in the correct order. Draw a picture of each stage below your description. You will have to recognize pictures of each phase on your test.

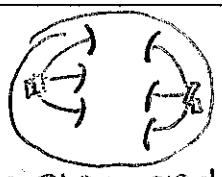
a. PROPHASE - centrioles begin to move to opposite sides, chromatin coils into chromosomes, nuclear membrane and nucleolus disappear, spindle fibers form



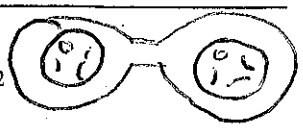
b. METAPHASE - spindle fibers attach to paired sister chromatids, chromosomes move to the middle of the cell



c. ANAPHASE - spindle fibers shorten and pull the chromosomes away to opposite poles of the cell



d. TELOPHASE - centrioles and spindle fibers disappear, two distinct nuclei, nuclear membrane, and nucleolus reappear



8. Write out the correct order of events in the cell cycle. Briefly summarize G_1, S, and G_2

a. Interphase
   i. G1 - cell grows, DNA is in chromatin form
   ii. S - synthesis, DNA is copied
   iii. G2 - cell grows, prepares for cell division

b. Mitosis
   i. Prophase
   ii. Metaphase
   iii. Anaphase
   iv. Telophase

c. Cytokinesis

9. Which stage of the cell cycle does the cell spend most of its life in? Interphase

10. What is the difference between animal and plant cells in mitosis/cytokinesis? Animal → forms a cleavage furrow Plant → cell plate becomes cell wall Plant cells do not have centrioles.

11. What are the steps of Meiosis I? Briefly explain main events that happen within each phase. You will have to recognize pictures of each phase on your test. (Study pictures from "Meiosis Worksheet")

a. PROPHASE I - pairing of maternal/paternal homologous chromosomes (synapsis), forms a tetrad, crossing over occurs

b. METAPHASE I - Tetrads are moved to the equator of the cell, homologous pairs stay together

c. ANAPHASE I - Homologous chromosomes separate and are pulled by spindle fibers to opposite poles

d. TELOPHASE I - cytoplasm divides, forming two haploid daughter cells

12. What are the steps of Meiosis II? Briefly explain main events that happen within each phase. You will have to recognize pictures of each phase on your test. (Study pictures from "Meiosis Worksheet")

a. PROPHASE II - spindle fibers form

b. METAPHASE II - chromosomes move to the middle of the cell

c. ANAPHASE II - chromatids separate and move away to opposite poles

d. TELOPHASE II - nuclear membrane reforms, results in 4 haploid daughter cells that are different

13. How do Meiosis I and Meiosis II differ? Meiosis I → separates homologous chromosomes, Meiosis II → separates sister chromatids

14. How many cell divisions are in mitosis? Meiosis? Mitosis - 1 , Meiosis - 2

15. Fill in the charts below.

	Meiosis	Mitosis
Type of Reproduction (Sexual or Asexual)	Sexual	Asexual
Does crossing over occur?	yes (Prophase I)	NO
Pairing of Homologous Chromosomes	yes	NO
# of Divisions	2	1
# of Daughter Cells	4 Haploid	2 Diploid
Are daughter cells genetically identical or different?	Different	Identical

	Meiosis I	Meiosis II
Prophase	Spindle fibers appear Tetrads form	New spindle fibers form
Metaphase	Tetrads move to cell equator	chromosomes (2 sister chromatids) move to equator
Anaphase	Homologous Pairs separate	chromatids separate
Telophase	· cytoplasm divides 2 haploid cells	Nuclear membrane surrounds 4 daughter nuclei