Name _____ Class _____ Date _____

Section Quiz 5.2: Mitosis & Cytokinesis

Write the letter of the best answer on the blank space provided.

_____ 1. The processes of mitosis and cytokinesis produce two identical
   a. daughter cells.
   b. strands.
   c. chromosomes.
   d. chromatids.

_____ 2. The process of organizing and condensing DNA into its compact form takes place at the start of
   a. interphase.
   b. metaphase.
   c. mitosis.
   d. cytokinesis.

_____ 3. Which is the term for the group of proteins that organizes and condenses long strands of DNA into tight coils?
   a. telomeres
   b. centromeres
   c. chromatids
   d. histones

_____ 4. During which phase of mitosis do sister chromatids separate from each other?
   a. prophase
   b. metaphase
   c. anaphase
   d. telophase

_____ 5. Which of the following statements is true of cytokinesis?
   a. takes place in plant cells only
   b. completes the cell cycle
   c. organizes DNA
   d. occurs during prophase

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Reinforcement 5.2: Mitosis & Cytokinesis

KEY CONCEPT Cells divide during mitosis and cytokinesis.

During interphase, a cell needs access to its DNA to make use of specific genes and to copy the DNA. During mitosis, however, the DNA must be condensed and organized so that it can be accurately divided between the two nuclei. DNA is a long polymer made of repeating subunits called nucleotides. Each long continuous thread of DNA is called a **chromosome,** and each chromosome has many genes.

During interphase, DNA wraps around organizing proteins called **histones** and is loosely organized as **chromatin,** which looks sort of like spaghetti. As a cell prepares for mitosis, however, the DNA and histones start to coil more and more tightly until they form condensed chromosomes. Each half of the duplicated chromosome is called a **chromatid.** Both chromatids together are called sister chromatids, which are attached at a region called the **centromere.** The ends of DNA molecules form **telomeres,** structural units that do not code for proteins. Telomeres help prevent chromosomes from sticking to each other.

Mitosis is a continuous process, but scientists have divided it into phases for easier discussion.

- During **prophase** the chromatin condenses into chromosomes, the nuclear envelope breaks down, and spindle fibers start to assemble.
- During **metaphase** spindle fibers align the chromosomes along the middle of the cell.
- During **anaphase** spindle fibers pull the sister chromatids away from each other and toward opposite sides of the cell.
- During **telophase,** the nuclear membranes start to form around each set of chromosomes, the chromosomes start to uncoil, and the spindle fibers fall apart.
- Cytokinesis divides the cytoplasm into two separate cells. In animal cells, the cell membrane pinches together. In plant cells, a cell plate forms between the two nuclei. It will eventually form new cell membranes for the cells and a new cell wall.

1. What role do histones play in a cell?

   _____

2. What is a chromatid?

   _____

3. During which phase of mitosis are sister chromatids separated from each other?