Name _____ Date _____

# Cell Cycle and Mitosis in Order: Interphase, the Phases of Mitosis and Cytokinesis

**Directions:** Put each set of steps in order, then answer the rest of the questions; one group uses a table of cell counts.

**1.** Put these stages of the cell cycle in order, from the moment a new cell forms until its nucleus divides. Match each stage to First, Second, Third or Fourth.

Write the letter of the matching answer on each line.

1. _____ The cell copies all of its DNA.
2. _____ The cell divides its nucleus into two nuclei.
3. _____ Before DNA replication begins, the new cell grows and carries out its usual work.
4. _____ The cell makes its final preparations for division.

A. First
B. Second
C. Fourth
D. Third

**2.** Use the word bank to complete this sentence about a chromosome after S phase.

**Word bank**

nucleus • spindle • centromere • sister chromatids • homologous chromosomes

After S phase, each chromosome is made of two identical _____ held together at a narrow region called the _____.

**3.** Put these events of mitosis in order, from the start of prophase to the end of telophase. Match each event to First, Second, Third or Fourth.

Write the letter of the matching answer on each line.

1. _____ Sister chromatids separate and move toward opposite ends of the cell.
2. _____ New nuclear envelopes form around the two sets of chromosomes.
3. _____ The chromosomes condense into short, thick structures.
4. _____ The chromosomes line up along the middle of the cell.

A. Second
B. First
C. Fourth
D. Third

**4.** A chemical stops spindle fibers from forming in a dividing cell. Which of these events could not happen normally in that cell?

A. The chromosomes condensing at the start of mitosis
B. The cell growing during G1
C. The sister chromatids being pulled to opposite ends of the cell
D. The DNA being copied during S phase

**5.** A plant cell is surrounded by a rigid cell wall, so how does it divide its cytoplasm during cytokinesis?

A. Its nucleus divides, and the two nuclei share one cytoplasm.
B. Its membrane pinches inward until the cell splits in two.
C. Its cell wall dissolves, and then the cell splits like an animal cell.
D. A cell plate forms across the middle and becomes a new cell wall.

**6.** A human skin cell with 46 chromosomes divides by mitosis. How many chromosomes does each of the two new cells have?

A. 92 chromosomes in each new cell

B. 23 chromosomes in each new cell

C. 46 chromosomes shared between the two new cells

D. 46 chromosomes in each new cell

**7.** A dividing cell passes through several checkpoints, including one near the end of G1 and one near the end of G2. What does the cell do at a checkpoint?

A. The cell divides its cytoplasm to form two new cells.

B. The cell checks for problems, such as damaged DNA, before moving on.

C. The cell copies its DNA so that each new cell gets a full set.

D. The cell pairs up its homologous chromosomes.

## Counting Cells in an Onion Root Tip

In an investigation, 200 cells in the growing tip of an onion root were each sorted by stage. Cells in this region divide on their own schedules, not all at once.

200 cells from the growing tip of an onion root, sorted by stage

| Stage | Number of cells |
|---|---|
| Interphase | 172 |
| Prophase | 14 |
| Metaphase | 6 |
| Anaphase | 3 |
| Telophase | 5 |
| Total | 200 |

**8.** What percent of the 200 cells were in one of the four phases of mitosis?

A. 14 percent B. 7 percent C. 86 percent D. 28 percent

**9.** Suppose the share of cells in each stage matches the share of time a cell spends in that stage. Which phase of mitosis would then take the least time?

A. Telophase B. Metaphase C. Prophase D. Anaphase

**10.** What can you conclude about the onion root tip cells from these counts?

A. In this sample, the cells were all dividing at the same moment.

B. In this sample, most of the cells were in interphase.

C. Every onion root cell spends exactly 86 percent of its life in interphase.

D. Cells in this root tip had stopped dividing.