

# Procedure & Analysis

ANSWER ALL QUESTIONS ON SEPARATE A WORD DOCUMENT IN COMPLETE SENTENCES

## Interphase

Begin with **interphase**. Make sure you represent the cell membrane and nucleus. Before a cell begins mitosis, genetic material is in the form of threadlike chromatin. DNA replicates and prepares for division.

Label the *chromatin*, *nuclear membrane*, *cell membrane*, and *centrioles*. Anything that appears new or needs to be stressed in your animation should be labeled.

Answer the following questions:

- What are visual clues that tell you that this cell is in interphase?

## Prophase

Next model **prophase**. The nuclear membrane is starting to break down and the centrioles have moved to opposite poles.

Label the *chromosomes*, *centromeres*, and *sister chromatids*. The spindle fibers are forming from the centrioles. Anything that appears new or needs to be stressed in your animation should be labeled.

Answer the following questions:

- What is the purpose of spindle fibers?
- What change has occurred in the structure of the chromatin (genetic material)?

## Metaphase

For metaphase, line up your chromosomes up on the equatorial (middle) plane. The spindle fibers should attach to the chromosomes in the correct place.

Label the *chromosomes*, *chromatids*, and *spindle fibers*.

Answer the following questions:

- What are the functions of the centrioles during metaphase?
- Where do the spindle fibers attach to the chromosomes?
- What checkpoint occurs at this phase? What is its purpose?

## Anaphase

For the next stage, anaphase, separate the chromosomes; move them toward opposite poles.

Label the *chromatids* and *spindle fibers*.

Answer the following question:

- How many chromosomes do you have now?
- What problem might occur at this stage, during the separation of the chromatids?

## Telophase

In telophase, the nuclear membrane reforms around the new sets of chromosomes. The chromosomes begin to unwind and become thin strands again.

Label the *chromatids*, *nuclear membrane*, and *cleavage furrow*.

Answer the following questions:

- What cellular parts disappear at this stage of mitosis?
- What cellular parts appear at this stage of mitosis?

## Cytokinesis

Cytokinesis begins during telophase and continues after telophase. Make sure you show the formation of a cleavage furrow and the split into two new cells.

Label the *chromatin* and *daughter cells*.

Answer the following questions:

- What is the result of cytokinesis?
- How would this process differ for a plant cell?

After you are finished taking your pictures, you are ready to make your movie. Use any stop motion software available to you. If you want, you may include a movie title and credits.

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**Rewrite each question and answer in complete sentences.**

1. Why is mitosis important?
2. Why was it necessary to replicate the chromosomes during the S (synthesis) phase before mitosis began?
3. How many chromosomes are present in the parent cell? How does this compare to each daughter cell?
4. A common biological study specimen, the fruit fly, has four pairs of chromosomes in each cell. As it grows, it reproduces more cells via mitosis. How many chromosomes would you expect to find in each new cell?
5. Number the following steps in the correct order and tell which stage it occurs in:
  - a. A cleavage furrow or cell plate forms, separating the nuclei.
  - b. Chromosomes line up at the equator and chromatids are attached to spindle fibers.
  - c. Nuclear membrane and nucleolus reappear.
  - d. Genetic material replicates and is joined at the centromere.
  - e. Centromeres divide and single-stranded chromosomes move to poles.
6. What are some problems (errors) that can occur during mitosis? How might this affect an organism?