

What Happens When Cells Divide?

Cells form new cells by a process called cell division or mitosis. During mitosis, one cell divides in half to form two new cells. Suppose you could watch a cell divide. You could see that the cell parts called chromosomes move around the cell during mitosis. Because chromosomes move in particular ways, you could arrange the events of mitosis into several steps. Biologists have been able to arrange the events of mitosis into several steps. They examined many dividing cells in order to learn the steps. What are the steps of cell division? In what order do they occur?

OBJECTIVES

In this exercise, you will:

- build models of the steps of mitosis.
- compare your models to the steps of animal-cell mitosis.

DEFINE KEY VOCABULARY ([148-151 in the owl book](#)/[239-244 in the parrot book](#))

- Chromosome:
- Cytoplasm:
- Mitosis:
- Nucleolus:
- Nucleus:
- Spindle fibers:

MATERIALS

4 pieces of different-colored construction paper
 scissors thread glue
 yarn metric ruler

PROCEDURE

1. Using Figure 1 and your textbook, review the steps of mitosis. You may find the animation at www.cellsalive.com/mitosis.htm helpful.
2. Label the steps of mitosis with their proper names

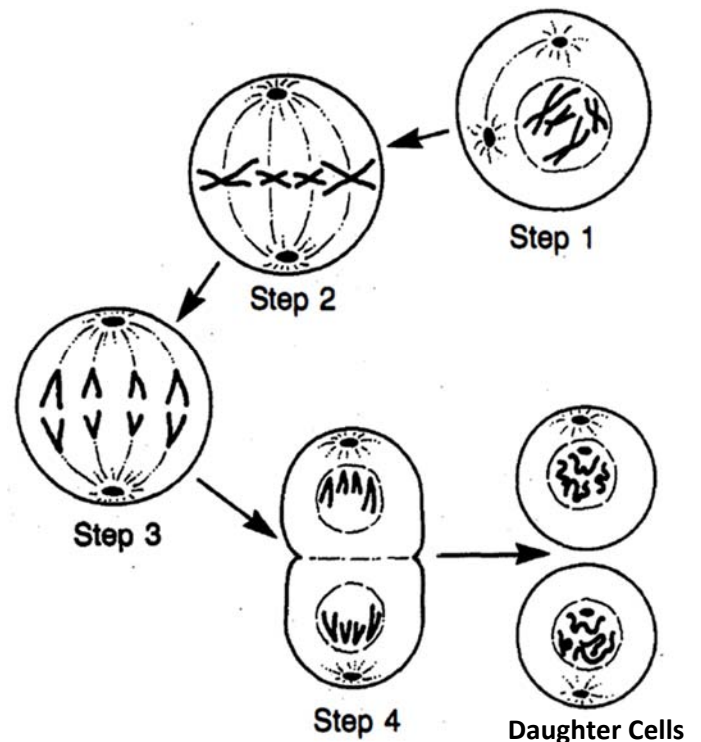
Step 1:

Step 2:

Step 3:

Step 4:

FIGURE 1. Steps of mitosis



3. Use the materials listed in Table 1 to represent the cell parts.

Table 1: Making Cell Parts

Cell Part	Material to Use	Size	Number Needed
Cell wall and membrane	Dark-colored paper	14 x 8 cm	5
Cytoplasm	Light-colored paper	13 x 7 cm	5
Nucleus	Dark-colored paper	Circle with 5 cm diameter	3
Nucleolus	Light-colored paper	Circle with 1 cm diameter	2
Chromosomes	yarn	4 cm long	20
Chromosomes	yarn	10 cm long	2
Spindle Fibers	White paper	.5 cm x 7 cm	24
Cell wall between new cells	Use same color as cell wall	.5 cm x 8 cm	1
Chromatin in new cells	Thread	20 cm	2

- As a team work to cut the pieces of paper, yarn, and thread to the sizes given in Table 1. It is important that your measurements are accurate. Use your ruler and abide by Norm's Law: Measure twice, cut once.
NOTE: Conserve paper by working from the edge in. Ex. Don't cut a circle out from the middle of a paper
- Once you have prepared your materials begin building the models of the cell division steps by gluing each "cytoplasm" paper to the top of a "cell wall and membrane" paper so the cell wall and membrane shows on all sides. Use the drawing at the bottom of this page as a guide.
- Following the diagrams in Figure 4, make each of the "cell wall-membrane-cytoplasm" pieces into a mitosis step.
- Use glue to attach the proper parts to the pieces. Be sure to study the diagrams so that you get the correct parts in each step
- Arrange your models in the order in which mitosis occurs.
- Note how your models differ from those shown in Figure 1.
- Compare your models, that show dividing plant cells, with the drawings of the dividing animal cells in Figure 5.
- In Figure 5 write the name and step number of mitosis below each drawing of the animal cells.

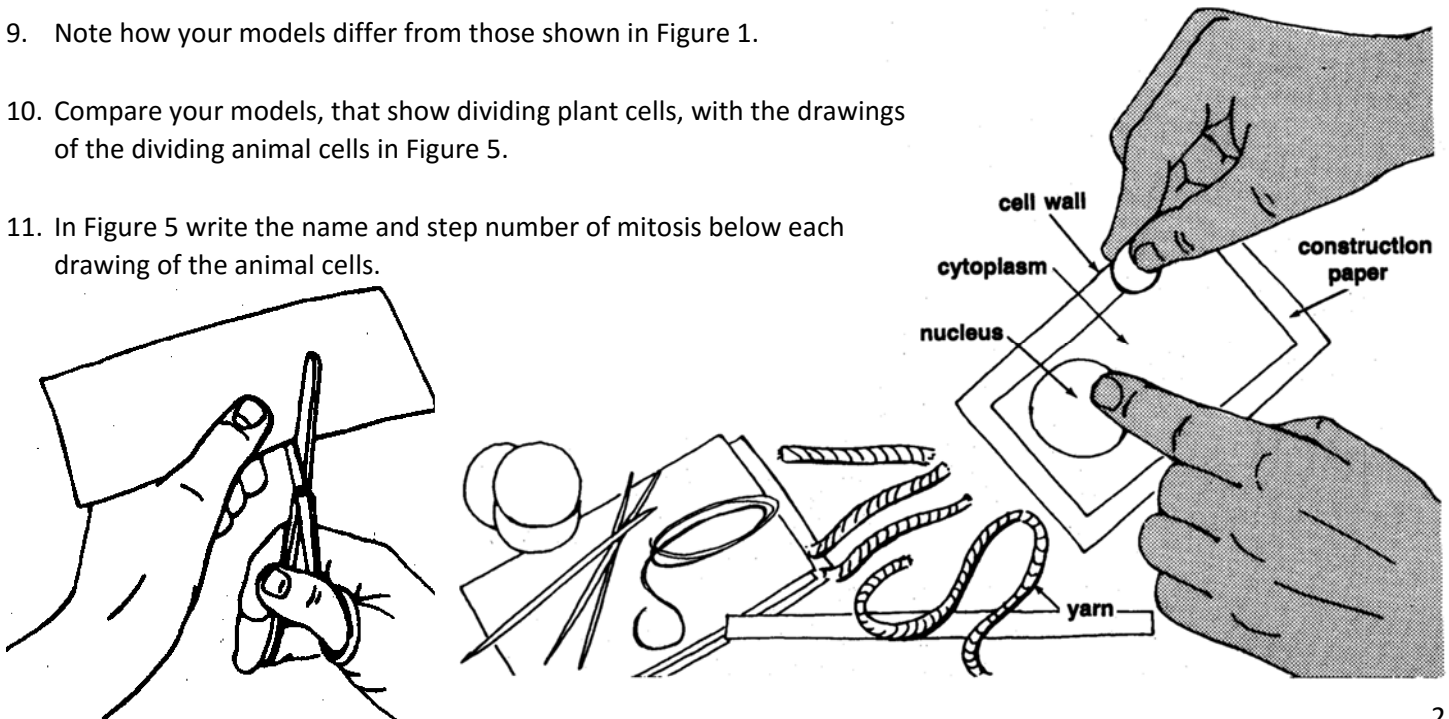


FIGURE 4. Steps of plant cell mitosis

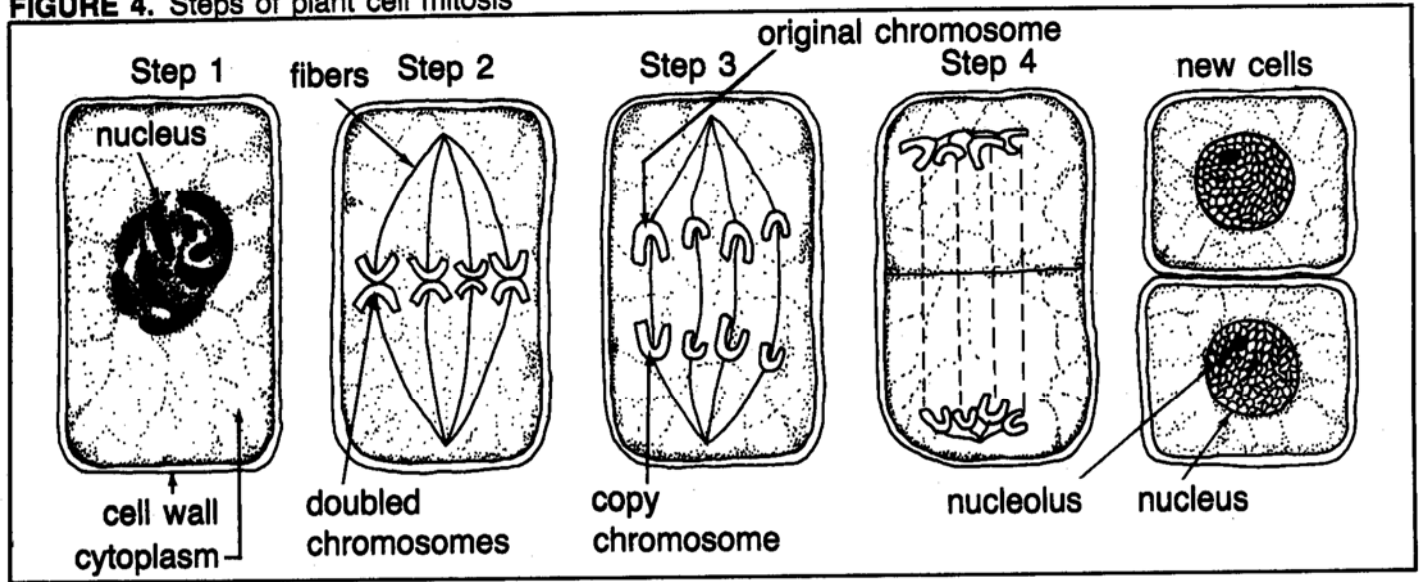
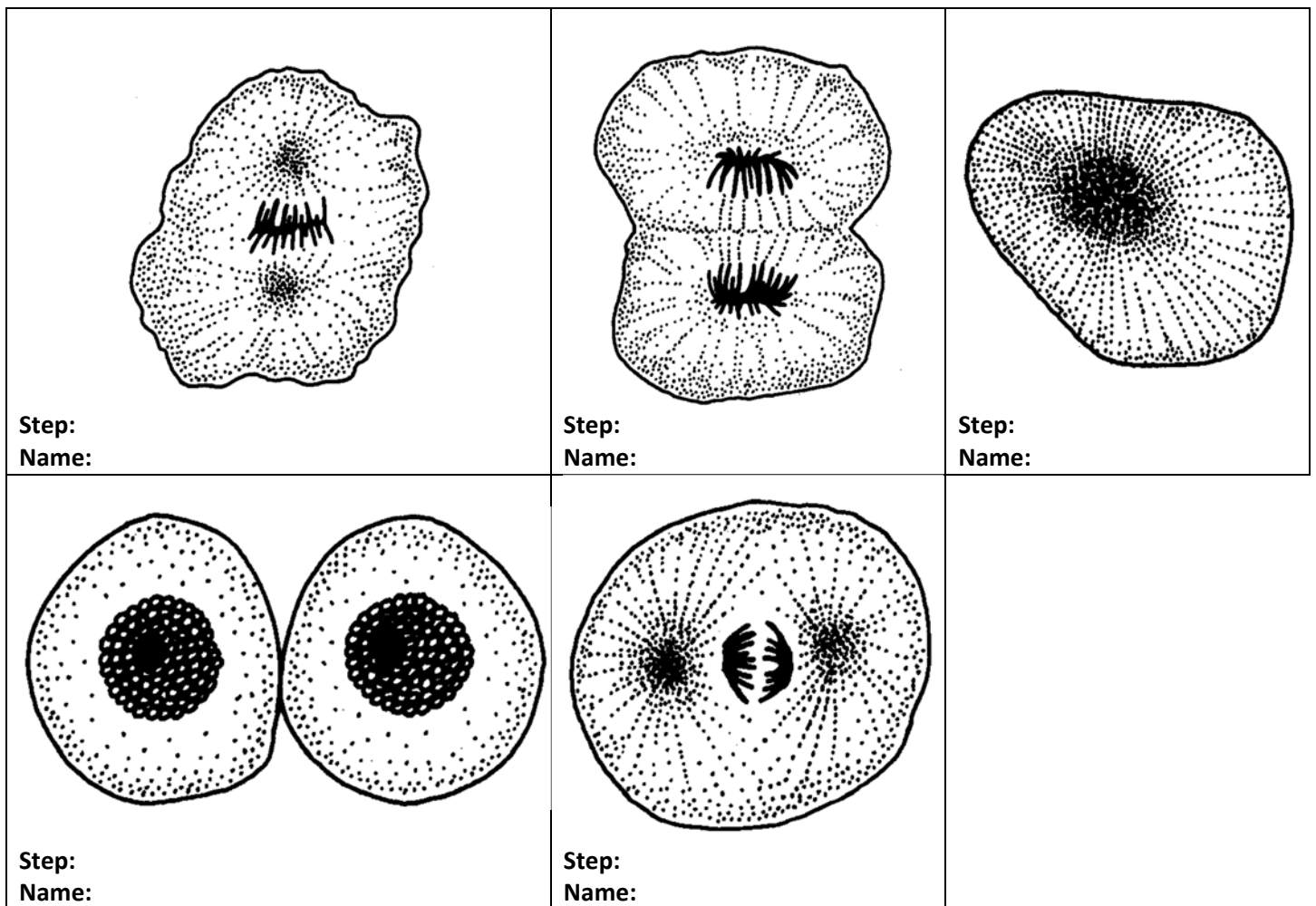


Figure 5: Steps of Animal Cell Mitosis



Name: _____

Period: _____

QUESTIONS

1. What part is present in plant cells but absent in animal cells?
2. How are the new cells of your models and the animal cells alike?
3. In which steps of mitosis is a nucleus visible?
4. In which step of mitosis do you first see spindle fibers?
5. In which step of mitosis do the spindle fibers begin to disappear?
6. What is the job of the spindle fibers?
7. Doubled chromosomes first become visible in which step of mitosis?
8. How many doubled chromosomes are visible in this step?
9. What is happening to the doubled chromosomes in steps 3 and 4?
10. How many cells (in total) does each dividing cell form?
11. What forms between the cells after the doubled chromosomes have pulled apart in plant cells?
12. Match the following by writing the correct letter in the proper blank.

Step 1: _____	a. chromosomes move apart to the ends of each cell
Step 2: _____	b. nucleus reformed
Step 3: _____	c. doubled chromosomes separate
Step 4: _____	d. chromosomes become thick, dark, and doubled
Step 5: _____	e. membrane around nucleus disappearing