Name _____ Date _____ Period _____

Lab: Mitosis "Flip Books"

H O N O R S   B I O L O G Y :   C E L L   E N E R G Y

Background: Mitosis is nuclear division plus cytokinesis, and produces two identical daughter cells during prophase, prometaphase, metaphase, anaphase, and telophase. Interphase is often included in discussions of mitosis, but interphase is technically not part of mitosis, but rather encompasses stages G1, S, and G2 of the cell cycle.

Purpose: For students to create a visual aid to help them understand the process of mitosis

Materials:
1. Free cell phone app: "**Stop Motion Studio**"
2. Any app or software to create stop motion animation
3. Any materials you would like to use to create animation (i.e. Play-Doh, string, etc.)
4. Small Whiteboards and markers
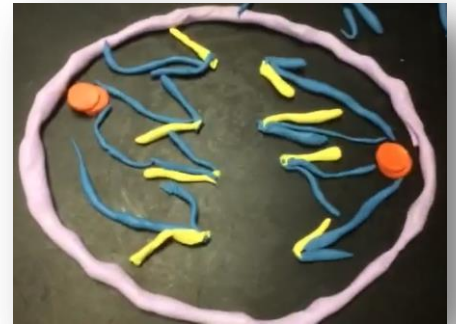
Method:
1. You can make your animation as detailed as you want, as long as you realize you'll be creating/drawing a lot of very similar images.
2. To make a good stop motion vdeo, each successive picture should vary a tiny bit from the preceding picture. When you view it, the animation should be fairly smooth.
3. Imagine mitosis as a smooth process. Mitosis doesn't happen in 4 or 5 static frames, the way it's depicted in textbooks. Emphasize the movement of chromosomes.
4. Use the textbook diagrams to help draw/create the cell in mitosis. Remember the changes to chromosomes, the nuclear membrane, spindle fibers, cell membrane, etc.
5. Make sure that you label all of the appropriate structures somewhere in your video.
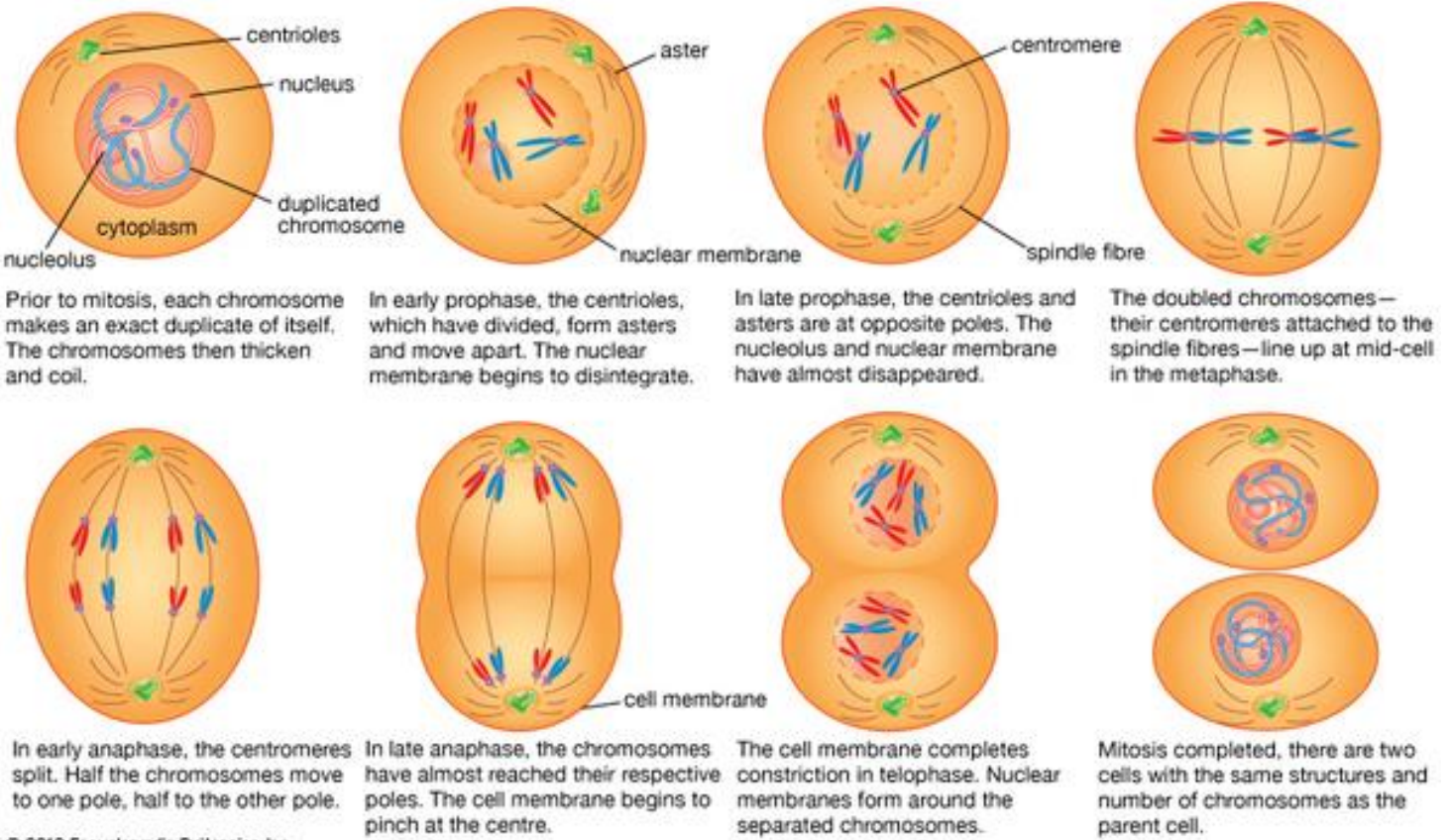
Assessment:
- Animations analyzed for the correct depiction of the five phases (i.e., chromosome placement, presence of nuclear membrane)
- All the phases must be underlined labeled along with the correct structures in the phases. Label the following structures: cell membrane, nuclear envelope, chromosomes (when visible), spindle fibers (when visible), centrosomes/centrioles (when visible).
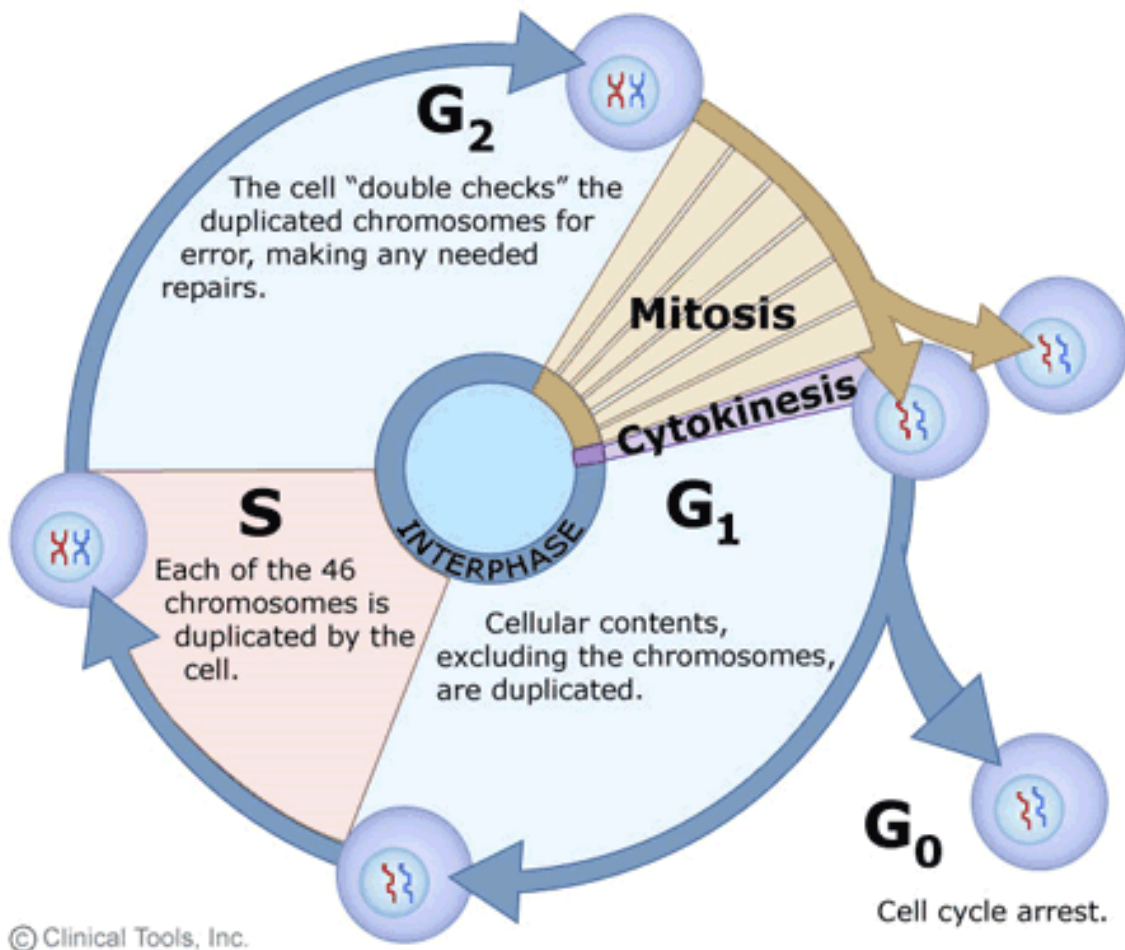

HELPFUL HINTS

- Make sure that each picture is only slightly different from the previous one. Cell division is a fluid process, not a quick jump from stage to stage. You should have multiple frames for each stage of the cycle.
- Your animation should begin and end with **Interphase**.

Mitosis, or somatic cell division

Prior to mitosis, each chromosome makes an exact duplicate of itself. The chromosomes then thicken and coil.

centrioles
nucleus
duplicated chromosome
cytoplasm
nucleolus

In early prophase, the centrioles, which have divided, form asters and move apart. The nuclear membrane begins to disintegrate.

aster
nuclear membrane

In late prophase, the centrioles and asters are at opposite poles. The nucleolus and nuclear membrane have almost disappeared.

centromere
spindle fibre

The doubled chromosomes—their centromeres attached to the spindle fibres—line up at mid-cell in the metaphase.

In early anaphase, the centromeres split. Half the chromosomes move to one pole, half to the other pole.

In late anaphase, the chromosomes have almost reached their respective poles. The cell membrane begins to pinch at the centre.

cell membrane

The cell membrane completes constriction in telophase. Nuclear membranes form around the separated chromosomes.

Mitosis completed, there are two cells with the same structures and number of chromosomes as the parent cell.

© 2013 Encyclopædia Britannica, Inc.

G_2
The cell "double checks" the duplicated chromosomes for error, making any needed repairs.

Mitosis

Cytokinesis

G_1
Cellular contents, excluding the chromosomes, are duplicated.

G_0
Cell cycle arrest.

S
Each of the 46 chromosomes is duplicated by the cell.

INTERPHASE

© Clinical Tools, Inc.