

MITOSIS & MEIOSIS: On the Table**KEY**

A. OBJECTIVE: Discover critical differences between mitosis and meiosis, and possible misunderstandings about the two processes, by showing key “movie frames” of the key stages in each process on your desk.

B. IDENTIFICATION:

- Each single fuzzy piece (pipe cleaner) equals one **chromosome**
a pink piece equals one chromosome inherited from the mother;
a blue piece equals one chromosome inherited from the father.
- Two fuzzy pieces, held together by a bead—the **centromere**—equals one chromosome duplicated into two new strands (**chromatids**), each of which becomes a duplicate chromosome when the centromere splits at the beginning of anaphase.

C. INVENTORY: Check your chromosome. Before doing this lab, AND when finished, count all pieces in the container. Notify your teacher if there are any extras or shortages. **DO NOT REMOVE BEADS FROM DOUBLE FUZZY PIECES:**

5 single pieces, blue	3 double pieces, blue	1 Mitosis sheet
5 single pieces, pink	3 double pieces, pink	2 Meiosis sheets
		1 Summary sheet

D. ASSUMPTIONS (for purposes of this exercise):

- The diploid number ($2n$) of this organism is “2”, or 1 pair;
- Chromosomes are NOT visibly divided into chromatids (think “chromosome kids”) until **metaphase**;
- Twisting and crossing over are NOT to be shown here.

E. PROCEDURE: Do all the following from memory and understanding so far; think of each stage as a frame in a movie film of the process:

- Arrange the pieces on the **MITOSIS** sheet, showing the essential chromosome arrangements during mitosis. You won’t need all the pieces for this part. When done, raise your hand to be checked.
- When your MITOSIS layout is approved, copy those arrangements onto your Mitosis-Meiosis Summary sheet, using red and blue pencils (or using clear and shaded shapes).
- Remove all pieces and proceed to arrange them on the two **MEIOSIS** sheets, with MEIOSIS I sheet placed above the MEIOSIS II sheet. so the arrows flow from sheet to sheet. Remember to show the essential differences between mitosis and meiosis. Be sure to end up with sperm if you are a boy, or an egg with polar bodies if you are a girl. You should use ALL of the pieces for meiosis. When finished, raise your hand to be checked by your teacher.
- When your meiosis layout is approved, copy the arrangements onto your Mitosis - Meiosis Summary sheet, using red and blue pencils (or using clear and shaded shapes)
- Count all pieces back into their container, and return the container and “layout” sheets to the tray.
- Now help others by giving clues; do NOT show the correct arrangements; let others discover this as you did. When student gets it right, shout “GOT IT!”, and have student show arrangement on the Summary sheet.

F. DISTINGUISHING FEATURES: What are the three main differences between mitosis and meiosis?

in MITOSIS:	in MEIOSIS:
NO synapsis (pairing of matching–homologous–chrom.)	Homologous chromosomes pair off (synapsis)
Centromere splits, 2 chromatids become 2 chromosome	Homologous pairs separate (in first division)
1 division --> 2 cells: $2n \rightarrow 2n$, or $n \rightarrow n$	2 divisions --> 4 cells; $2n \rightarrow n$

G. APPLICATION: On the back of this sheet, copy the stages of mitosis and meiosis from your separate Summary sheet, BUT show how TWO PAIRS of chromosomes would appear: a **short** pair, and a **long** pair; remember that each pair consists of a pink chromosome and a blue chromosome. Be sure to use your red and blue pencils.

H. QUESTION: What are the 2 main functions of meiosis? (answer below):

- Keeps chrom. number from doubling and redoubling;
- Increases variation by random assortment and crossing over.