

Names _____

Date _____

LO: Model meiosis. SLE: Work collaboratively.

MITOSIS & MEIOSIS: On the Table

Adapted from © 2006 ENSI (Evolution & the Nature of Science Institutes) www.indiana.edu/~ensiweb

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. INVENTORY:

Working with a partner, create the following chromosomes out of construction paper (making sure that they will fit inside of the cells on the sheets provided):

- 12 single (unreplicated) chromosomes, blue
- 12 single (unreplicated) chromosomes, pink
- 4 replicated chromosomes (with sister chromatids), blue
- 4 replicated chromosomes (with sister chromatids), pink

C. ASSUMPTIONS (for the purposes of this exercise):

1. The diploid number ($2n$) of this organism is 2, or one pair;
2. Twisting and crossing over are not covered here.

D. PROCEDURE:

1. Arrange chromosomes on the **MITOSIS** sheet, showing the essential chromosome arrangements during mitosis. (You won't need all the chromosomes for this part.) When you are confident that the arrangements are correct (feel free to check with your instructor!), tape or glue them to the sheet.
2. Arrange the remaining chromosomes 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 remaining chromosomes for meiosis. When you are confident that the arrangements are correct (feel free to check with your instructor!), tape or glue them to the sheet.

E. REVIEW QUESTIONS:

1. Based on your sheets, redraw a cell at each of the following points, showing the chromosomes and spindle. Make sure the blue chromosomes look different in some way from the red ones.

Metaphase of Mitosis	Metaphase I of Meiosis I	Metaphase II of Meiosis II

2. Is Mitosis more like Meiosis I or Meiosis II? Briefly explain. Hint: look at the pictures for #1.

3. Assume that each blue chromosome has an allele B, while each pink chromosome has an allele b. What will be the final genotypes of the sperm or egg cells at the end of Meiosis II?

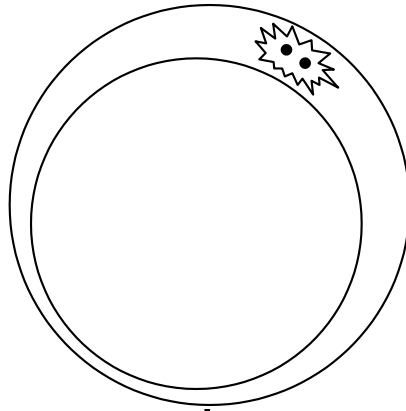
4. Do the spindles appear to serve a similar function in meiosis as they do in mitosis? Briefly explain.

5. List 3 differences between mitosis and meiosis.

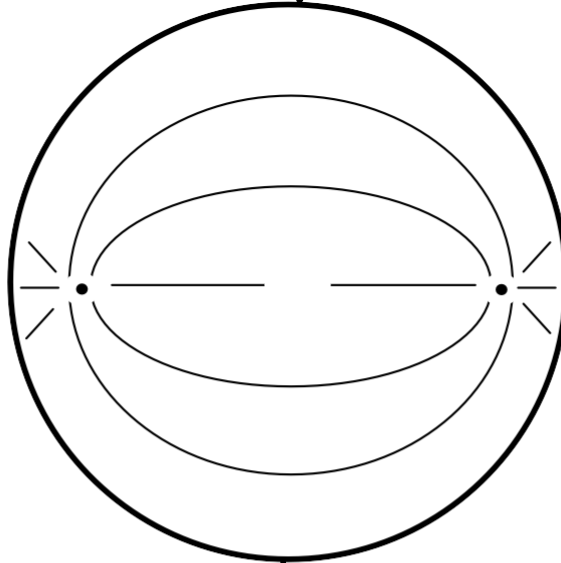
6. Over evolutionary time, organisms can change their total number of chromosomes. There are advantages to increasing one's number of chromosomes; for example, you can have more genes in which to encode more proteins that perform more functions. Based on seeing the complicated, intricate movements of the chromosomes during mitosis and meiosis, describe a possible DISadvantage of having "extra" chromosomes.

Names:

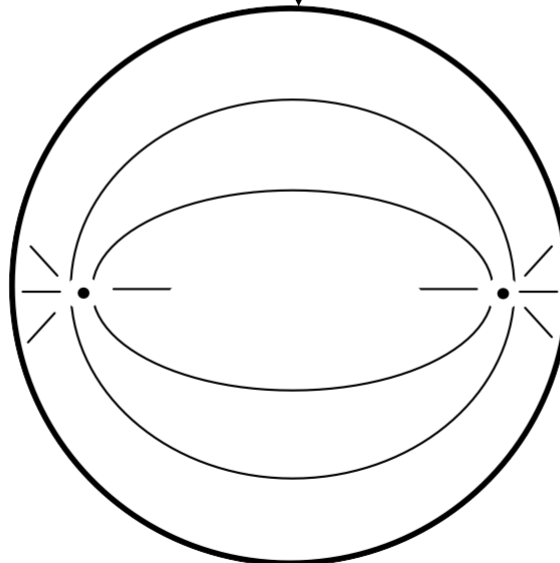
MEIOSIS I



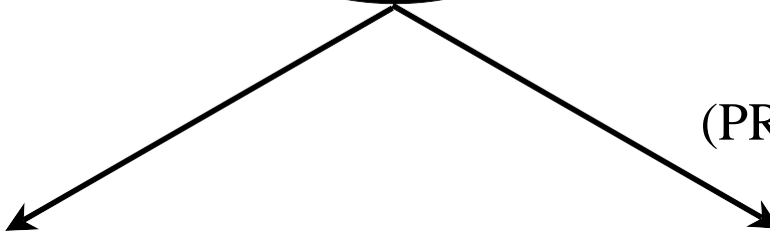
PROPHASE I



METAPHASE I



ANAPHASE I
(TELOPHASE I)

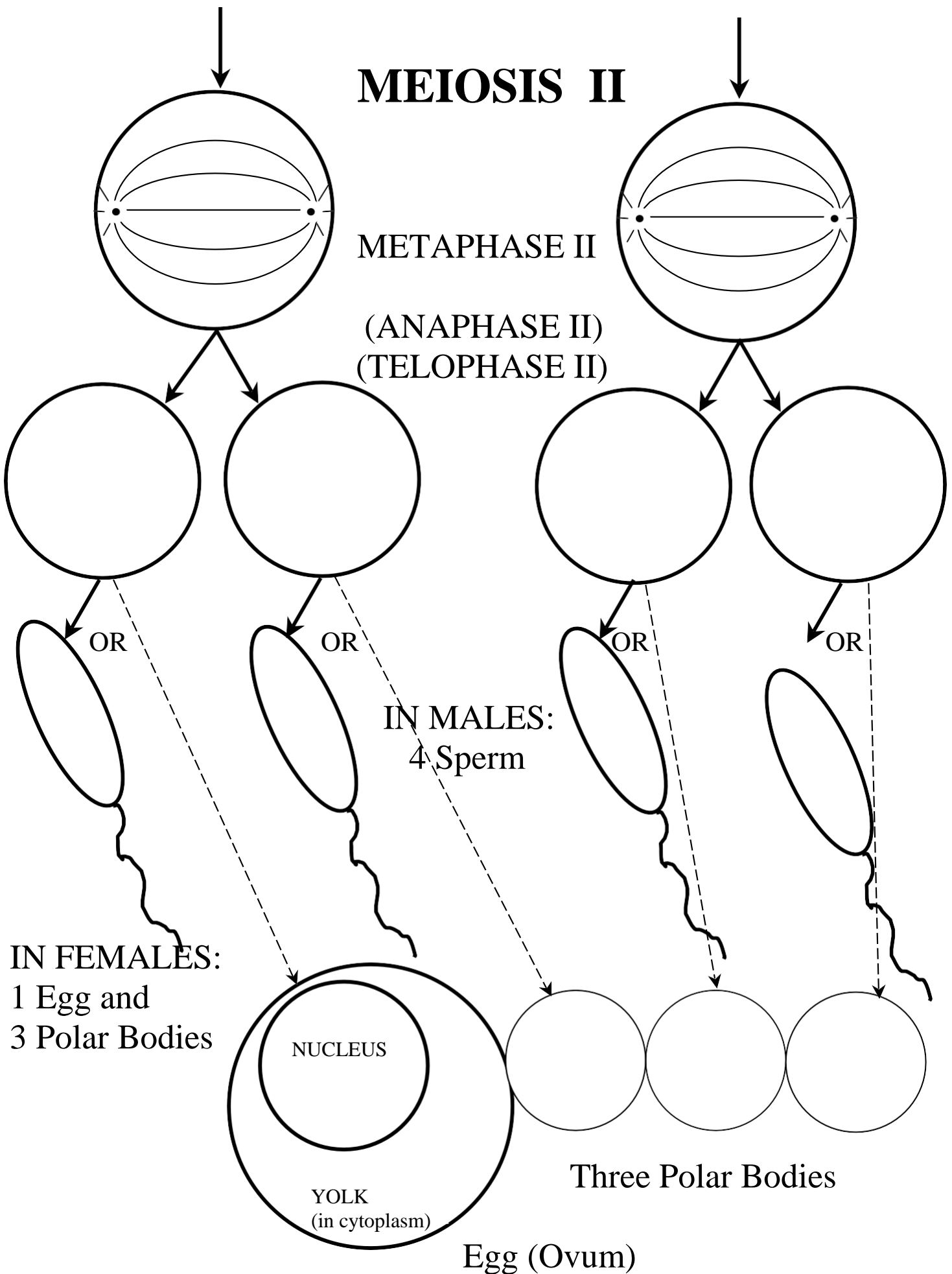


(PROPHASE II)

MEIOSIS II

METAPHASE II

(ANAPHASE II)
(TELOPHASE II)



IN FEMALES:
1 Egg and
3 Polar Bodies

IN MALES:
4 Sperm

NUCLEUS

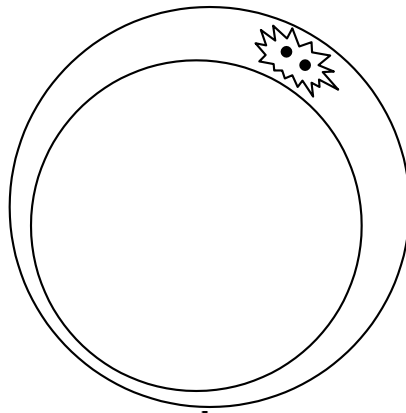
YOLK
(in cytoplasm)

Egg (Ovum)

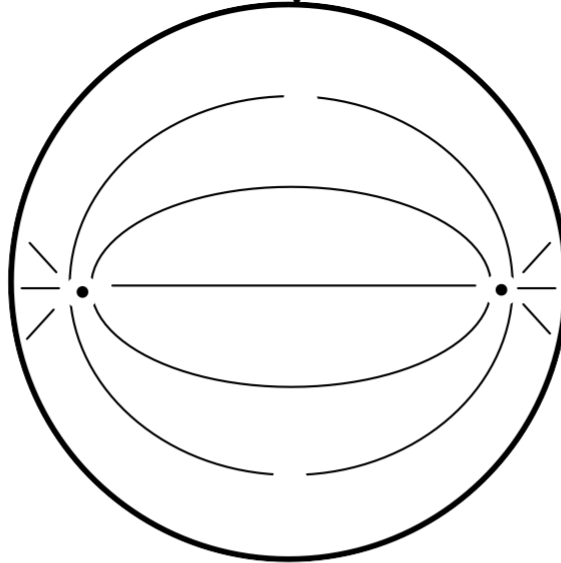
Three Polar Bodies

Names:

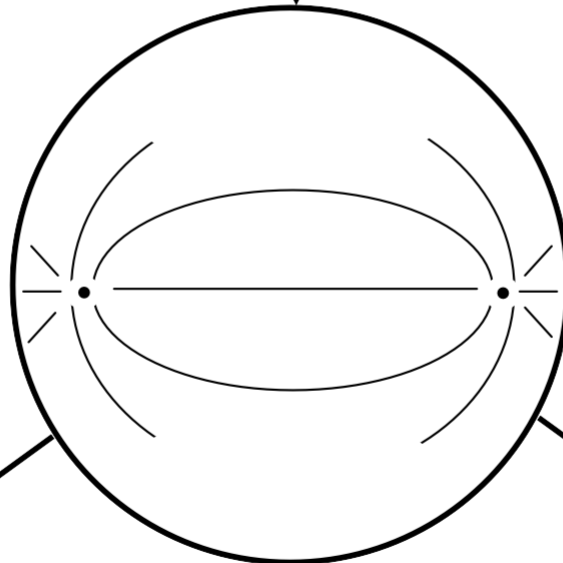
MITOSIS



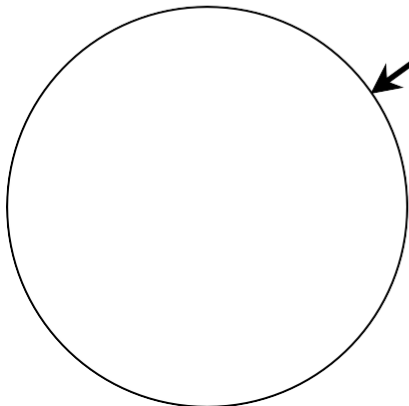
PROPHASE



METAPHASE



ANAPHASE



(TELOPHASE)
DAUGHTER CELLS

