Biology
Ms. Ye

Name _____
Date _____ Block _____

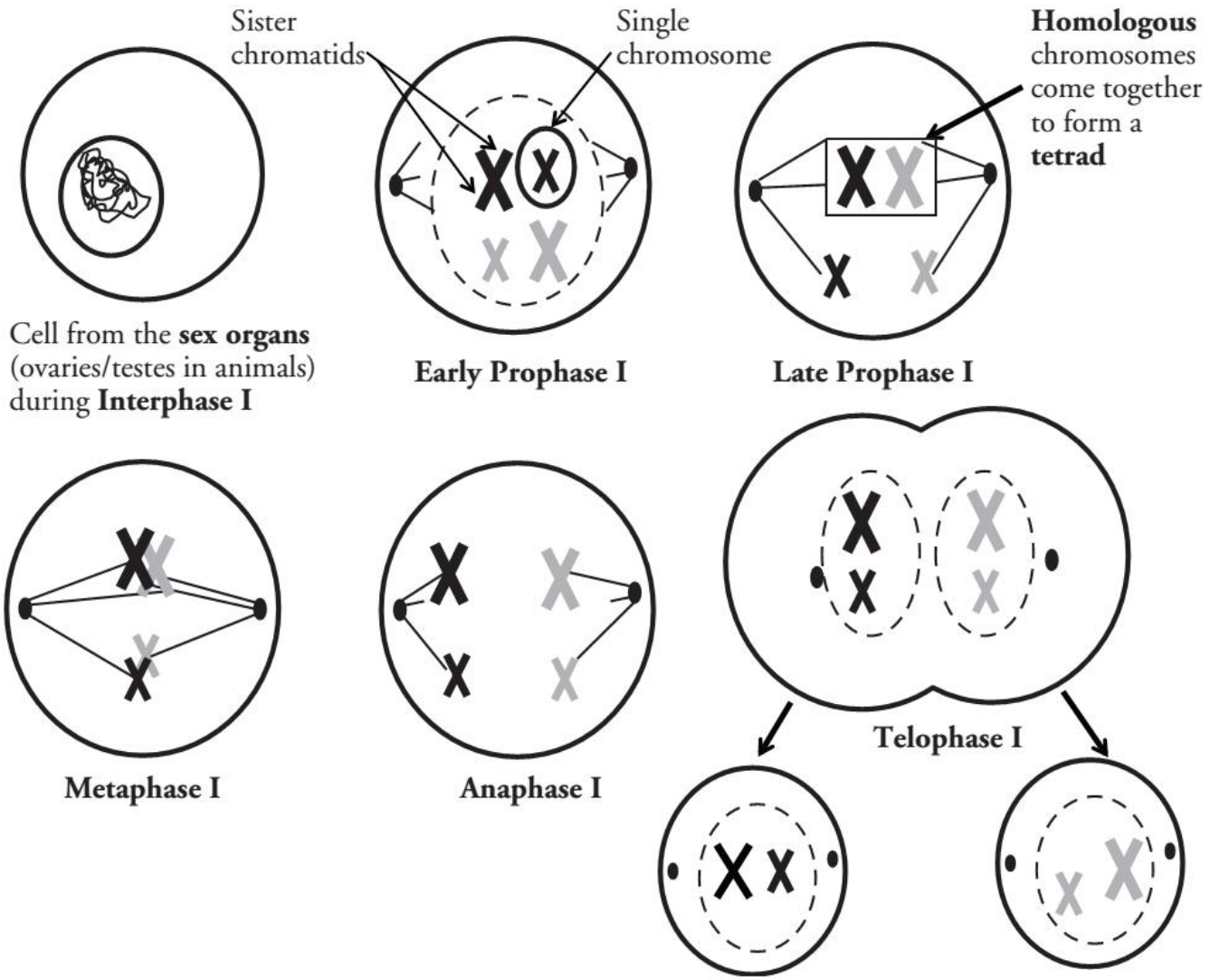
Meiosis

How does sexual reproduction lead to genetic variation?

Why?

Cells reproduce through mitosis to make exact copies of the original cell. This is done for growth and repair. Sexually-reproducing organisms have a second form of cell division that produces reproductive cells with half the number of chromosomes. This process is called **meiosis**, and without it, humans, oak trees, beetles, and all other sexually-reproducing organisms would be vastly different than they are today.

Model 1 – Meiosis I



1. According to Model 1, in what type of organs are the cells that enter meiosis I found?

2. Considering what you already know about mitosis in cells, what event must take place during interphase before a cell proceeds to division?

3. What two structures make up a single replicated chromosome?

4. In Model 1, how many replicated chromosomes does the cell contain during prophase?

Read This!

Alleles are alternative forms of the same gene. For example, gene A may contain the information for fur color. One allele "A" may result in white fur, while the alternative allele "a" may result in black fur. **Homologous chromosomes** are chromosomes that contain the same genes, although each chromosome in the homologous pair may have different alleles.

5. At which stage in meiosis I do the pairs of homologous chromosomes come together?

6. Once the chromosomes have formed a pair, what are they called?

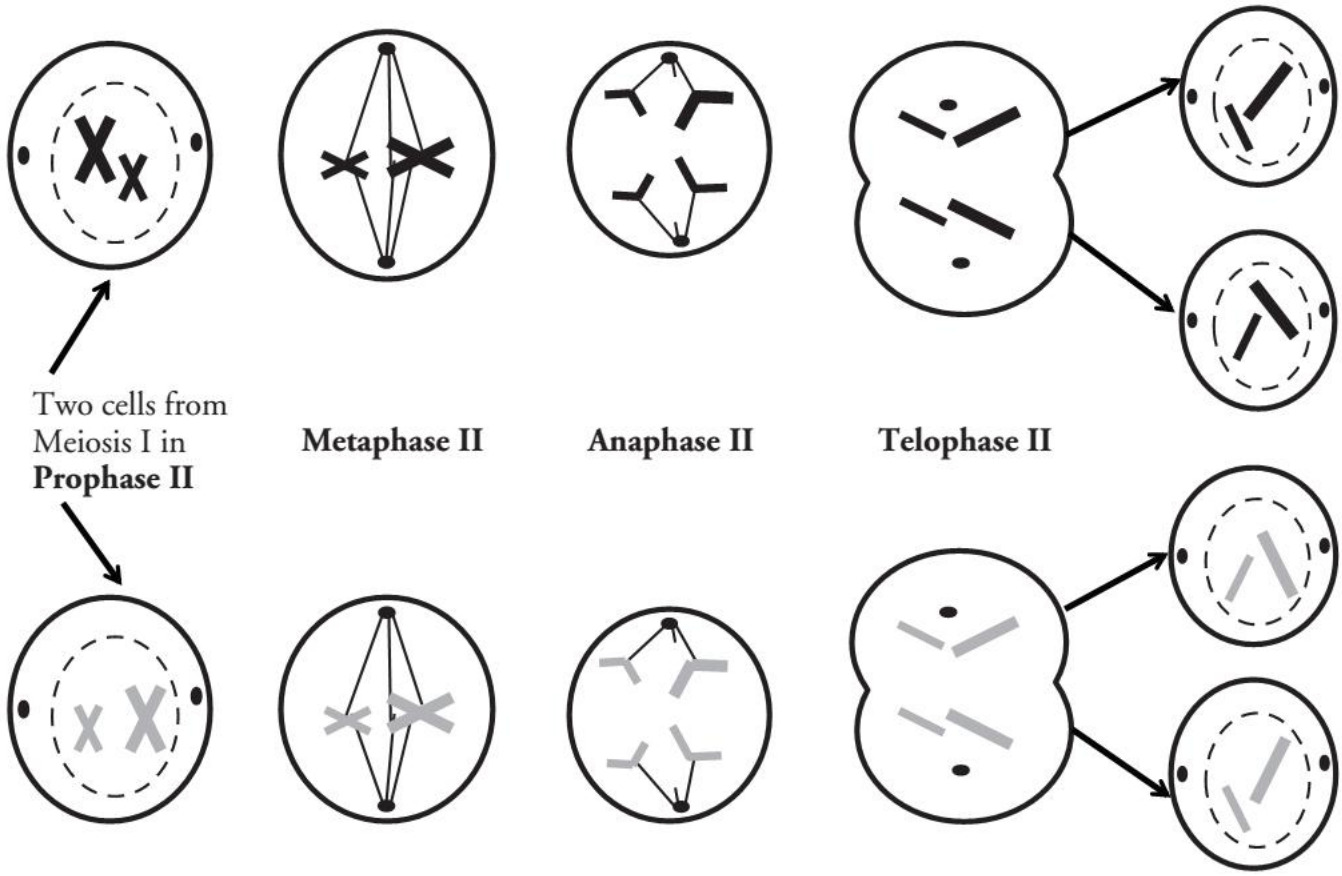
7. At the end of meiosis I, two cells have been produced. How many replicated chromosomes are in each of these cells?

8. Cells with a full set of chromosomes are referred to as **diploid** or **2n**, whereas cells with half the chromosomes are **haploid** or **n**. At which stage(s) of meiosis I are the cells diploid and at which stage(s) are they haploid?

9. Which of the statements below correctly describes the relationship between the cells at the end of telophase I and the original cell?
   a. The new cells have one copy of all of the genetic information in the original cell.
   b. The new cells have two copies of all of the genetic information in the original cell.
   c. The new cells have one copy of half of the genetic information in the original cell.
   d. The new cells have two copies of half of the genetic information in the original cell.

10. Considering the genetic makeup of the homologous pairs, will the cells at the end of telophase I be genetically identical to each other?

Model 2 – Meiosis II



11. According to Model 2, where did each of the cells come from that started meiosis II?

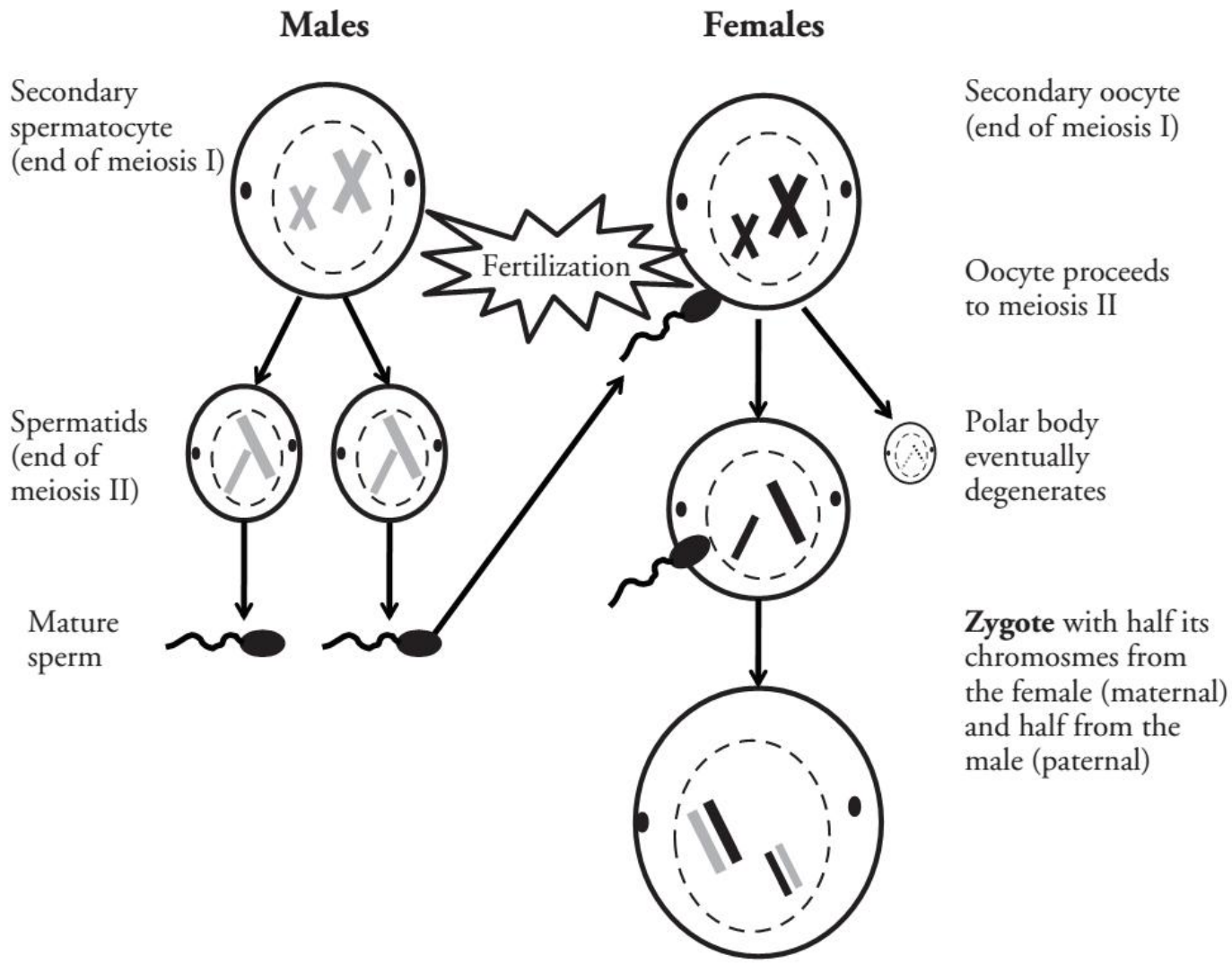
12. In meiosis I, during anaphase I, which structures separated—homologous chromosomes or sister chromatids? (For this one refer back to model 1 on the previous page)

13. In meiosis II, during anaphase II, which structures separated—homologous chromosomes or sister chromatids?

14. At the end of the meiosis II are four daughter cells. Are they haploid or diploid? Explain your answer in a complete sentence.

15. Which of the statements below correctly describes the relationship between the cells at the end of meiosis II and the original cell?
    a. The new cells have one copy of all of the genetic information in the original cell.
    b. The new cells have two copies of all of the genetic information in the original cell.
    c. The new cells have one copy of half of the genetic information in the original cell.
    d. The new cells have two copies of half of the genetic information in the original cell.

Model 3 – Gametogenesis and Fertilization (Human)



16. The model above shows meiosis in males and females. During fertilization which two cells come together? Be specific in your answer.

17. What is the ploidy of the zygote produced by fertilization—haploid or diploid? Explain.

18. What would the ploidy of the zygote be if egg and sperm were produced by mitosis rather than meiosis? How would this affect the ploidy of each successive generation?