

Meiosis

Name _____

Date _____

Period _____

Part 1 · Vocabulary

1. Write the letter of the matching description next to each term.
- _____ Haploid

_____ Diploid

_____ Homologous chromosomes

_____ Sister chromatids

_____ Synapsis

_____ Tetrad

_____ Crossing over

_____ Chiasma

_____ Independent assortment

_____ Nondisjunction

A The pairing of homologous chromosomes in prophase I

B Exchange of matching segments between nonsister chromatids

C A point where crossing over can be seen

D Chromosomes or chromatids failing to separate in meiosis

E A homologous pair held together, made of four chromatids

F A pair with the same genes at the same locations, one from each parent

G Having one set of chromosomes

H Each homologous pair lines up either way, independently of the other pairs

I Having two sets of chromosomes

J Two identical copies of a chromosome, made in S phase and joined at the centromere

Part 2 · Why meiosis

2. Why must gametes be haploid?
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3. Complete the table for a human cell going through meiosis.

	Cells	Chromosomes per cell	Chromatids per chromosome
Start (after S phase)			
After meiosis I			
After meiosis II			

4. What makes two chromosomes a homologous pair?

- A They are identical copies made in S phase
- B They carry the same genes at the same locations, one from each parent
- C They are the two sex chromosomes
- D They are joined at a centromere

Part 3 • Meiosis I

5. Put the stages of meiosis in order. Number them 1–8.

- _____ Telophase I
- _____ Anaphase I
- _____ Prophase II
- _____ Anaphase II
- _____ Metaphase I
- _____ Telophase II
- _____ Metaphase II
- _____ Prophase I

6. Crossing over exchanges segments between which chromatids?

- A Sister chromatids of one chromosome
- B Nonsister chromatids of a homologous pair
- C Chromatids of different, non-homologous chromosomes
- D Any two chromatids in the nucleus

7. What holds the homologs of a pair together at the end of prophase I, and why must every pair have at least one?

8. Ignoring crossing over, how many different arrangements of the 23 pairs at the metaphase I plate are possible?

- A 23
- B 46
- C 2^{23} — over eight million
- D 23^2

9. What separates in anaphase I?

- A Sister chromatids
- B Homologous chromosomes
- C The two centrioles of each centrosome
- D Nothing — the chromosomes only line up

10. A human cell starts meiosis with 46 chromosomes. How many chromosomes does each cell have after meiosis I?

Part 4 • Meiosis II and the gametes

11. How is meiosis II like mitosis, and how is it different?

12. Give two reasons the four cells made by meiosis are genetically different.

13. How many gametes does one meiosis make in a male? In a female?

Part 5 · Comparing, errors and variation

14. Compare mitosis and meiosis.

	Mitosis	Meiosis
Number of divisions		
Cells made		
Chromosome number		
Genetically		
Homologs pair, crossing over		
Used for		

15. The homologs of chromosome 21 fail to separate in meiosis I. What do the four gametes get?

- A** All four are normal
- B** Two have two copies of chromosome 21, two have none
- C** One has two copies, one has none, two are normal
- D** All four have two copies

16. A sperm with 24 chromosomes — two copies of chromosome 21 — fertilizes a normal egg. How many chromosomes does the zygote have, and what condition results?

17. List three sources of genetic variation in sexual reproduction.