

**Topic:** Genetic Variation Worksheet

**Summary:** Students answer questions on meiosis, asexual/sexual reproduction, fertilization, karyotypes, and genetic variation.

**Goals & Objectives:** Students will be able to describe the formation of gametes and the main causes for genetic variation.

**Standards:** CA Biology 2a *Students know* that meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type. CA Biology 2. Mutation and sexual reproduction lead to genetic variation within a population.

**Time Length:** 20 minutes

**Materials:**

- Class textbook and class notes
- Photocopied worksheets
- Pencils or pens

**Procedures:**

1. Tell the students which section they are to use in the textbook. Students are then going to read the section and answer the questions on the worksheet.

**Accommodations:** Students who cannot read at a high school level can be shown pictures in the book that help explain the answer. Students with an IEP can take the handout home if they need extra time.

**Evaluation:**

Each question is worth ½ point. The assignment is worth a total of 16 points.

## Genetic Variation Worksheet

### Asexual Reproduction

1. Prokaryotes reproduce using the following process? \_\_\_\_\_
2. Do some eukaryotes reproduce asexually? \_\_\_\_\_
3. How many parents does an asexual organism have? \_\_\_\_\_
4. An asexual organism's offspring is a \_\_\_\_\_ of the parent which means the offspring is genetically \_\_\_\_\_ to its parent.

### Sexual Reproduction

5. How many parents do sexually reproducing organisms have? \_\_\_\_\_
6. Offspring of a sexually reproducing organism have \_\_\_\_\_ genetic code as their parents.

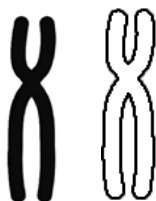
### Meiosis

7. Meiosis results in cells with \_\_\_\_\_ the number of chromosomes as the parent cell.
  8. In *what kind of cells* will a change in the genetic code be passed on? \_\_\_\_\_
  9. What are the two types of animal gamete cells? \_\_\_\_\_
  10. In animals, what two organs have specialized cells that perform meiosis?  
\_\_\_\_\_
  11. Spermatogenesis results in how many functional sperm? \_\_\_\_\_
  12. Oogenesis results in how many functional eggs? \_\_\_\_\_
  13. What is another name for egg? *Singular* \_\_\_\_\_ *Plural* \_\_\_\_\_
  14. In order to give 1 ovum a lot of nutrients, oogenesis results in 3 \_\_\_\_\_.
  15. Meiosis results in four haploid \_\_\_\_\_. *Plural for nucleus*
  16. How many chromosomes are in human haploid nuclei? \_\_\_\_\_
  17. What is crossing over? \_\_\_\_\_
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18. When does crossing over happen? \_\_\_\_\_
  19. Crossing over of homologous chromosomes increases \_\_\_\_\_ within a species.
  20. Draw the stages of crossing over using the two homologous chromosomes.

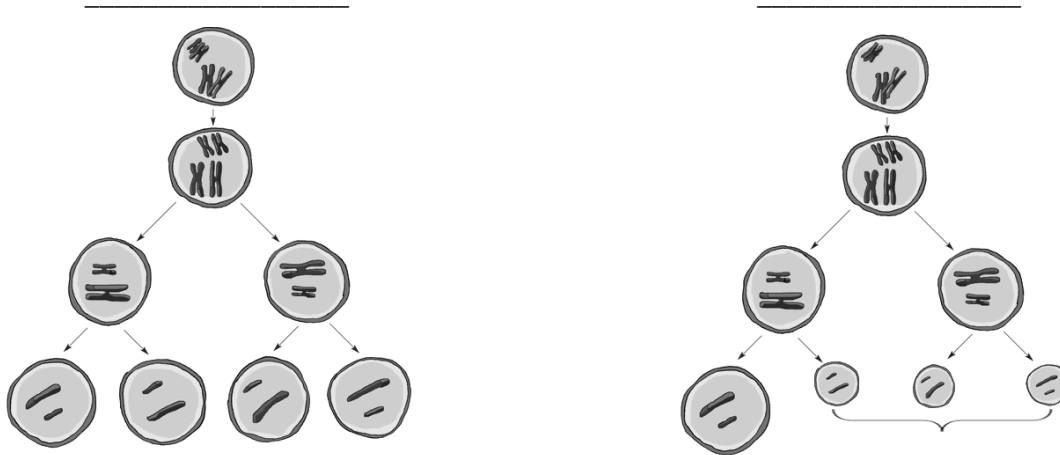
Before

Crossing Over

After



21. Label the two processes below with sperm, ovum, polar bodies, spermatogenesis, oogenesis, and crossing over.



**Fertilization and n Value**

22. n equals how many sets of chromosomes? \_\_\_\_\_
23. 2n equals how many sets of chromosomes? \_\_\_\_\_
24. When a sperm fuses with an egg, what is created? \_\_\_\_\_
25. Write in the n value for the following equation.    n sperm +    n egg =    n zygote
26. Why is the fusion of egg and sperm random? \_\_\_\_\_

**Karyotypes**

27. Using the karyotype, circle the gender of this individual and write the gender next to it.  
 Perform nondisjunction by drawing in a 3rd chromosome to create Down syndrome.



**Increasing Genetic Variation**

28. What is genetic variation? \_\_\_\_\_
29. A change in the genetic code is called a \_\_\_\_\_.
30. \_\_\_\_\_ is the random fusion of egg and sperm to create unique gene combinations.
31. The exchange of segments by homologous chromosomes is called \_\_\_\_\_.
32. The random distribution of chromosomes during meiosis is called \_\_\_\_\_.