

LESSON | What is meiosis?

19

In asexual reproduction there is only one parent and one set of chromosomes. The chromosomes are duplicated. The offspring are just like the parent.

Sexual reproduction is different. In sexual reproduction, there are two parents—two sets of chromosomes. A new organism is formed with one set of chromosomes from each parent. The offspring inherits traits from both parents.

Think of yourself, for example. In some ways you are like your mother. In other ways you are like your father. You have inherited traits from both your parents.

How are chromosomes exchanged during sexual reproduction? The chromosomes of body cells are paired. The chromosomes of sex cells are not paired. Chromosomes of sex cells are single chromosomes. Therefore, a sperm or an egg cell has only half as many chromosomes as a body cell.

When fertilization takes place, the sperm chromosomes join the egg chromosomes. Together, they add up to the full number of chromosomes found in body cells.

The fertilized egg, or zygote, now has chromosomes from both parents. It also has traits from both parents.

Reproductive cells also are called **gametes** [GAM-eets]. Gametes develop from special cells in the body. The process by which gametes form is called **meiosis** [my-OH-sis]. You can see the process of meiosis on the next page.

MEIOSIS

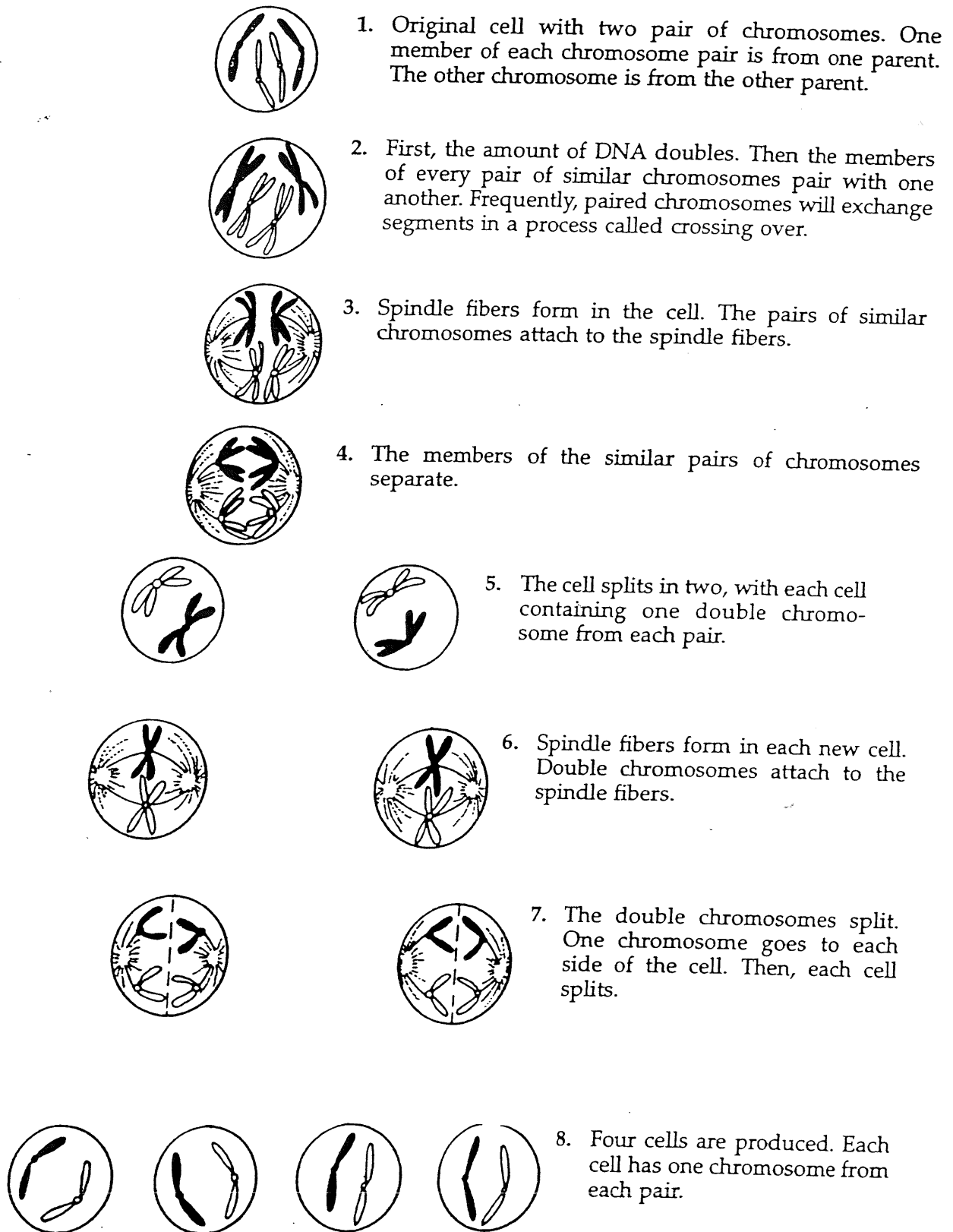


Figure A

ONLY HALF THE STORY!

Body cells are produced by mitosis. But sperm and egg cells do not form this way. Reproductive cells are formed by meiosis. Each gamete has only half the usual number of chromosomes. But when the sperm and egg join, the zygote has the full number of chromosomes.

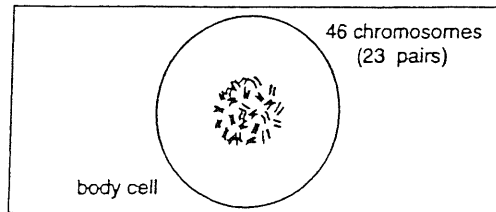


Figure B

A human body cell has 46 chromosomes. The chromosomes are paired. So there are 23 pairs.

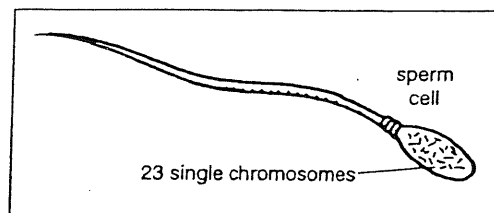


Figure C

Each human sperm cell has 23 single chromosomes.

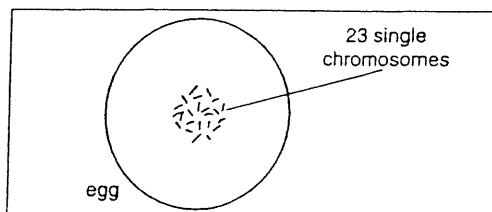


Figure D

Each human egg cell has 23 single chromosomes.

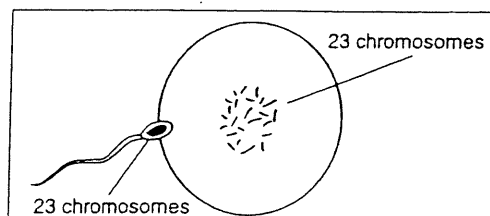


Figure E

Fertilization links the gamete chromosomes.

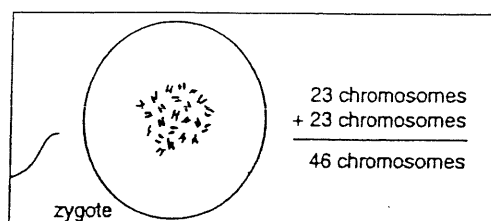


Figure F

The zygote, then, has a total of 46 chromosomes. 23 are from the mother, 23 are from the father.

The zygote starts to divide after fertilization. It divides by mitosis. It divides over and over again as it develops.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. The chromosomes of body cells are paired.
- _____ 2. The process by which gametes form is meiosis.
- _____ 3. A human body cell has 23 chromosomes.
- _____ 4. In sexual reproduction, an offspring inherits traits from only one parent.
- _____ 5. Fertilization links the chromosomes of gametes.
- _____ 6. Every organism has the same number of chromosomes.
- _____ 7. Spindle fibers form twice during meiosis.
- _____ 8. A gamete has the same number of chromosomes as a body cell.
- _____ 9. A gamete has twice the number of chromosomes as a body cell.
- _____ 10. A frog gamete has 13 chromosomes. Every frog body cell, then, has 26 chromosomes.

Fill in the blank

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

one set
half
two

parent
traits
meiosis

just like
paired

- 1. In asexual reproduction there is only one _____.
- 2. In asexual reproduction, _____ of chromosomes is passed on from parent to offspring.
- 3. In asexual reproduction, offspring are _____ the parent.
- 4. In sexual reproduction, there are _____ parents. Offspring inherit _____ from both parents.
- 5. Gamete cells are produced by cell division called _____.
- 6. A sperm or egg cell has only _____ as many chromosomes as a body cell.
- 7. Chromosomes in a body cell are _____.

MORE ABOUT MEIOSIS

Scientists often study fruit flies because they have large chromosomes whose genes are easy to see.

- Every body cell of a fruit fly has 8 chromosomes.
- Every fruit fly gamete (sperm or egg) has 4 chromosomes.

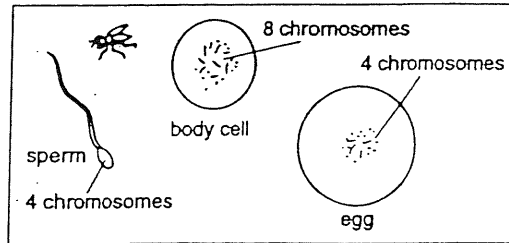


Figure G

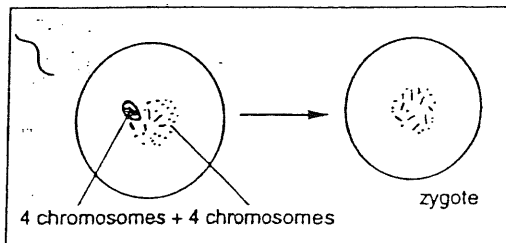


Figure H A sperm fertilizes an egg.

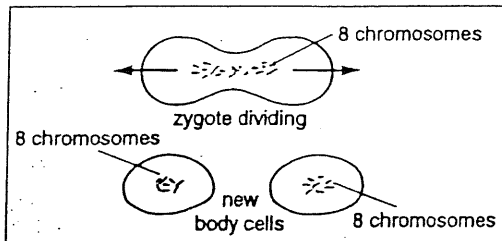


Figure I The zygote divides. Then each new cell divides.

1. Body cells reproduce by a process called _____.
2. Gamete cells are formed by a process called _____.
3. a) How many chromosomes does the egg cell of a fruit fly have? _____
b) Sperm cells? _____
4. What do chromosomes control?

5. How many chromosomes does a fruit fly zygote have? _____
6. How many chromosomes will each body cell have? _____
7. The offspring will have traits of the mother and the father. Why? _____

REACHING OUT

Why must a gamete have only one half the number of chromosomes found in body cells?
