

# AIM | What are chromosomes?

17

"Mary has her mother's eyes." "Tom is built just like his father." How often have you heard remarks like these?

All people resemble their parents in some ways. They have similar traits. . . . And it is no accident. Many traits are passed on from parents to offspring. We say they are *inherited*. But how are they inherited? The answer is found in the cell *nucleus*.

Every nucleus has tiny bodies called *chromosomes* [KROME uh soamz]. Most are rod-shaped. Chromosomes, in turn, are made up of even smaller genes [JEENZ]. There are many, many genes—at least one million in every nucleus. **GENES DETERMINE THE TRAITS OF AN INDIVIDUAL.**

There are genes for height and build, genes for nose size and shape, genes for the color of hair, skin, and eyes. In fact, there are genes for most traits any individual has. Some genes even affect traits like voice, intelligence, and behavior.

"Body" cells are cells that are not sperm or egg cells. Chromosomes of body cells are found in *pairs*. One of each pair is inherited from the mother. The other one is inherited from the father. An individual, then, has chromosomes from *both* parents.

Each kind of organism has a certain number of chromosomes. For example, a fruit fly body cell has 8 chromosomes (4 pairs); a frog has 26 (13 pairs); a human has 46 (23 pairs); a garden pea has 14 (7 pairs).

Chromosomes in sex cells are *not* paired. Therefore, a gamete has half the number of chromosomes that a body cell has.

For example, a human body cell has 46 chromosomes. A human sperm or egg has one-half that number—23 chromosomes. How many chromosomes does a pea gamete have?

## CHROMOSOMES AND GENES

Key

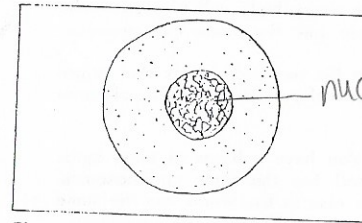


Figure A

Every cell has a *nucleus*.

- Figure A shows an animal cell.
  - Draw a line to the nucleus.
  - Label it "nucleus."

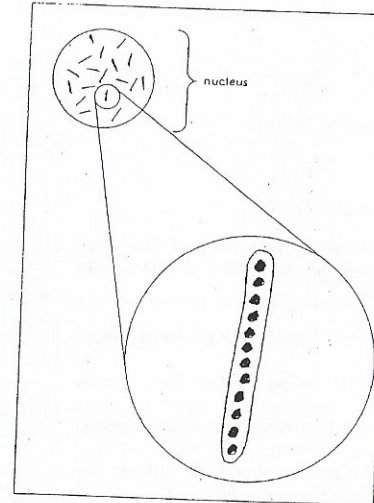


Figure B

- A nucleus contains tiny rod-shaped bodies. What are they called?

chromosomes

- A chromosome is made up of even smaller bodies. What are they called?

genes

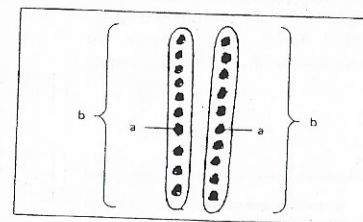


Figure C

- Figure C shows a pair of chromosomes and their genes.
  - The chromosomes are labeled

b

- Two genes are labeled

a

- Why are genes important?

They are characteristics that make up an individual

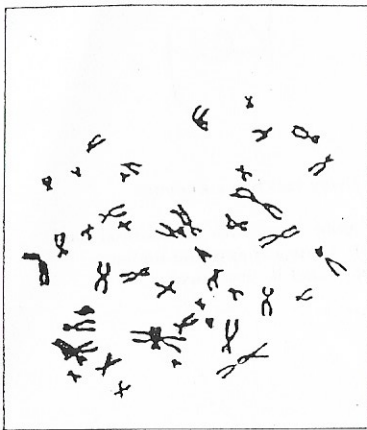


Figure D shows what actual human chromosomes look like.

- Every body cell of a particular organism has the same chromosomes.

- No two individuals that reproduce sexually have the same chromosomes.

You have trillions of body cells. Each cell has the same chromosomes. No one else in the world has the same chromosomes. There is no "duplicate" of you—anywhere!

Figure D  
Human chromosomes

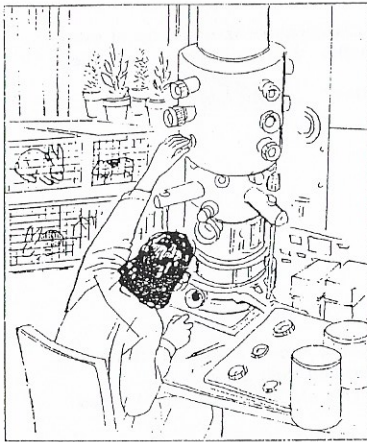


Figure E

The study of traits and how they are passed on is called *genetics* [juh NET icks].

- All living things have traits.
- All living things have genes.
- Only living things have genes.

The genes contain the "plans" for the traits an organism has.

What are genes made of?

Scientists have discovered that genes are made of a complicated compound called DNA. DNA stands for *deoxyribonucleic acid*. Try to pronounce it!

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SENTENCES may be used twice.

genes	46	specific
pairs	genetics	23
inherited	traits	chromosomes

1. The characteristics an individual has are called traits.
2. Traits are passed down from parents to offspring. Another way of saying this is "traits are inherited."
3. The study of heredity is called genetics.
4. Every plant and animal cell has tiny rod-shaped bodies called chromosomes.
5. A chromosome is made up of a chain of genes.
6. Genes determine the traits of an individual.
7. Every organism has a specific number of chromosomes.
8. In body cells, chromosomes are found in pairs.
9. Each of your body cells has 23 pairs of chromosomes. This is a total of 46 single chromosomes.
10. A human sperm or egg has 23 single chromosomes.

**MATCHING** Match the two lists. Write the correct letter on the line next to each number.

- |                         |  |
|-------------------------|--|
| 1. <u>d</u> genes       | <del>a)</del> compound that makes up genes |
| 2. <u>b</u> chromosomes | b) made up of many genes                   |
| 3. <u>a</u> DNA         | <del>c)</del> have unpaired chromosomes    |
| 4. <u>e</u> body cells  | <del>d)</del> pass on traits               |
| 5. <u>c</u> gametes     | <del>e)</del> have paired chromosomes      |



NUMBER, PLEASE!

the missing number of chromosomes.

	Organism	Chromosomes in each body cell	Chromosomes in each sperm or egg
1.	Human	46	23
2.	Horse	60	30
3.	Housefly	12	6
4.	Dog	78	39
5.	Grasshopper	14	7
6.	Mosquito	6	3
7.	Chicken	18	9
8.	Apple	34	17
9.	Spinach	12	6
10.	Lily	24	12

11. A gamete has half the number of chromosomes that a body cell has.  
half, twice

12. How many pairs of chromosomes are there in each body cell of the following:

- a) horse 30
- b) mosquito 3
- c) spinach 6
- d) lily 12
- e) human 23
- f) housefly 6

TRUE OR FALSE Write T on the line next to the number if the sentence is true.  
 Write F if the sentence is false.

- 1. T Traits are the characteristics of living things.
- 2. F Only animals have traits.
- 3. F Traits are passed on from offspring to parents.
- 4. T Traits are passed on by genes.

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- 5. F A cell has only a few genes.
- 6. F Only animals have genes.
- 7. F Different genes control different traits.
- 8. T Genes form chromosomes.
- 9. F Every organism has the same number of chromosomes.
- 10. F Body cells have paired chromosomes.
- 11. F Gametes have paired chromosomes.
- 12. F A body cell and a sex cell have the same number of chromosomes.
- 13. F Gametes have half the number of chromosomes of body cells.
- 14. F A human body cell has a total of 23 chromosomes.
- 15. F A human gamete has 23 single chromosomes.