What Is a Cell?

All living things are made of tiny structures called cells. A cell is the smallest unit that can perform all the functions needed for life. Most cells are so small you need a microscope to see them. More than 50 human cells can fit on the dot in this letter i.

Some living things are made of only one cell. Others are made of millions of cells. Cells from two organisms can be very different from one another. Even cells from different parts of the same organism can be very different from one another. However, all cells have some basic things in common.

What Is the Cell Theory?

Scientists first saw cells through a microscope in 1665. Since then, we have learned a lot more about cells. Scientists have learned that all cells have some important things in common. These things make up the cell theory. The cell theory has three parts:

1. All organisms are made of one or more cells.
2. The cell is the basic unit of all living things.
3. All cells come from existing cells.

What Structures Are Found in All Cells?

Cells come in many shapes and sizes and can have different jobs. All cells have three parts in common, however: a cell membrane, genetic material, and organelles.
SECTION 1 The Characteristics of Cells continued

CELL MEMBRANE
Every cell has a cell membrane. The cell membrane is a layer that covers and protects the cell. Much like the skin covering your body, the cell membrane separates the cell from its surroundings. The cell membrane also controls what goes in and out of the cell. Inside the cell is a fluid called cytoplasm.

GENETIC MATERIAL
Almost all cells contain DNA (deoxyribonucleic acid). DNA is the genetic material that holds information needed to make new cells and new organisms. DNA passes from parent cells to new cells. It tells the cell what job to do. In some cells, the DNA is found inside a structure called the nucleus. Almost every cell in your body has a nucleus.

ORGANELLES
Cells have parts called organelles that do different jobs in the cell. Many organelles are covered with membranes. Different types of cells have different organelles.

Parts of a Cell

What Are the Two Kinds of Cells?
There are two basic kinds of cells—one kind has a nucleus and the other kind doesn’t. A cell without a nucleus is called a prokaryotic cell. A cell with a nucleus is called a eukaryotic cell.
What Are Prokaryotes?

A **prokaryote** is a single-celled organism that does not have a nucleus. Even though they have no nuclei, prokaryotes do have DNA. Bacteria and archaea are prokaryotes. Many prokaryotes have **flagella** (singular, **flagellum**) that help them move.

These are some characteristics of prokaryotes:

- no nucleus
- DNA shaped like a twisted rubber band
- no membrane-covered (or membrane-bound) organelles
- a cell wall outside the cell membrane

**Prokaryotic Cell**

What Are Eukaryotes?

Eukaryotic cells are about 10 times larger than bacteria cells. Eukaryotic cells are still very small, and you need a microscope to see most of them.

**Eukaryotes** are organisms made of eukaryotic cells. They can have one cell or many cells. Yeast, which makes bread rise, is an example of a eukaryote with one cell. Plants are eukaryotes with many cells.

**Eukaryotic Cell**

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**TAKE A LOOK**

4. **Identify** Label the parts of the prokaryote with the following terms: DNA, flagellum, cell membrane, cell wall.

**Math Focus**

5. **Calculate** Most of the smallest prokaryotic cells have diameters of about 1 micron. What do you expect is the diameter of the smallest eukaryotic cell?

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10 microns

**TAKE A LOOK**

6. **Identify** What does this cell have that a prokaryotic cell does not?
1. **Identify** What are the three parts of the cell theory?

1. all living things are made of cells
2. the cell is the smallest basic unit of life
3. cells come from pre-existing cells

2. **Compare** Complete the chart below to compare prokaryotes and eukaryotes.

<table>
<thead>
<tr>
<th>Prokaryotes</th>
<th>Eukaryotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>have a cell wall.</td>
<td>no cell wall</td>
</tr>
<tr>
<td>no nucleus</td>
<td>have a true nucleus</td>
</tr>
<tr>
<td>non - membrane bound organelles</td>
<td>membrane-bound organelles</td>
</tr>
<tr>
<td>one cell</td>
<td>one or many cells</td>
</tr>
<tr>
<td>also DNA</td>
<td>genetic material is DNA</td>
</tr>
</tbody>
</table>

3. **Apply Concepts** You have just discovered a new organism. It is a single cell and has a cell wall but no nucleus. What kind of organism is it? Explain your answer.

A prokaryote because it does have a cell wall and does **NOT** have a nucleus. It is not a virus if it has organelles like ribosomes.