

*Janice VanCleave's*

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# **The Human Body for Every Kid**

**Easy Activities that Make  
Learning Science Fun**

Sample

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Sample

# 1

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## Building Blocks

### Parts and Functions of Living Cells

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#### What You Need to Know

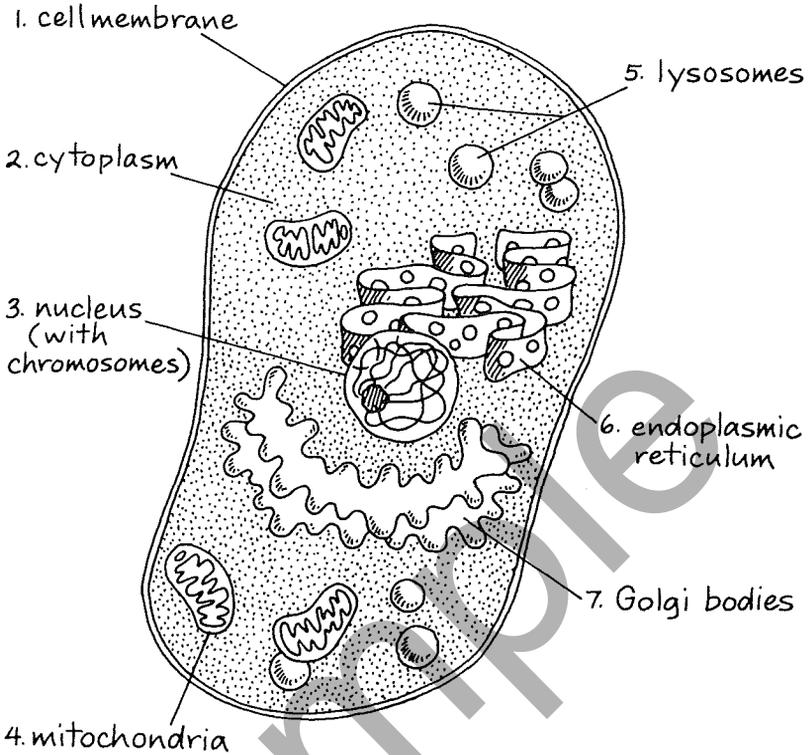
In 1665, the English scientist Robert Hooke (1635–1703) made a startling discovery. While studying a slice of cork under a microscope, he saw that the cork was made up of tiny, empty cavities (holes) enclosed by what looked like walls. The holes looked to Hooke like the small rooms, or “cells,” in a monastery. Thus, he named the structures he had found **cells** (the smallest units, or the building blocks, of all living things).

In 1839, two German biologists working separately, Matthias Schleiden and Theodor Schwann, discovered that all living things are made up of cells. At this time it was known that cells are not actually empty. Instead they are filled with a jellylike material. The work of Schleiden and Schwann and others established what is known as the **cell theory**, which states that (1) all living things are made up of cells and (2) all cells come from previously existing cells.

As the microscope has improved through the years, many cell structures and their functions have been identified. The diagram shown here illustrates basic cell structure. Each part of the cell has a specific function, as described below.

1. **Cell membrane:** The thin filmlike outer layer that holds the cell together and separates it from its environment. It allows materials to pass into and out of the cell.

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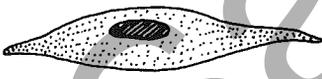


- 2. Cytoplasm:** A jellylike material made mostly of water. It fills the cell, and the other parts of the cell float in it.
- 3. Nucleus:** The control center that directs all the activities of the cell. It is shaped like a sphere and contains **chromosomes**, which are special threadlike structures that carry instructions, much like a computer program, to make the cell work.
- 4. Mitochondria:** The cell's power stations, where food and oxygen react to produce the energy needed for the cell to work and live.
- 5. Lysosomes:** The parts of the cell that contain chemicals used to destroy harmful substances or worn-out cell parts.

6. **Endoplasmic reticulum:** The structure within the cell where protein is made. Protein is used for growth and repair.
7. **Golgi bodies:** The structure within the cell where proteins are stored until needed.

Your body contains trillions of cells. Each cell has a job to perform, and all cells must work together to keep you alive and well. A group of similar cells that perform a special job form **tissue**, such as skin, nerve, muscle, and bone tissue. Different tissues working together form **organs**, such as your heart and lungs. A group of different organs working together to perform a particular job forms a **system**, such as the circulatory or respiratory system. All the systems working together in a living being form an **organism**, such as you.

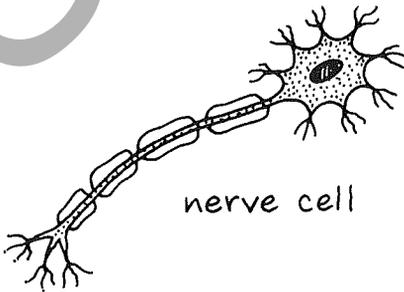
Cells come in different shapes and sizes, depending on the special job that they perform. Muscle cells are long and can shorten or lengthen to allow you to move. Nerve cells have long fibers that send messages around your body. Red blood cells are disk shaped and able to transport oxygen.



muscle cell



red blood cells



nerve cell

### TYPES OF CELLS

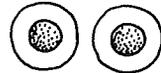
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Most cells are too small to see with the unaided eye. The **ovum** (female sex cell, or egg) is the largest human body cell, with a diameter of about 0.008 inches (0.02 cm). The smallest cells in the body, with diameters of about 0.0002 inches (0.0005 cm), are found in your brain.

### Exercise

Cells in your body live for different amounts of time. Bone cells can last for many years, while cells lining your small intestine live for only a few days. Cells die in your body every second, but new cells are constantly being made to replace them. New cells are made when a cell divides into two identical new cells. The steps showing how cells reproduce to make new cells are listed below. Match each step with the diagram that represents it.

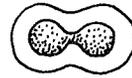
1. One cell.
2. The cell grows larger.
3. The nucleus starts to divide.
4. The cell membrane starts to break apart.
5. Two new identical cells.



A



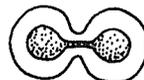
B



C



D



E

## Activity: WORLD-CLASS CELL MODEL

**Purpose** To construct a model that shows three parts of a cell.

**Materials** lemon gelatin dessert mix  
1-pint (125-ml) resealable plastic bag  
quart (liter) bowl  
large grape  
adult helper

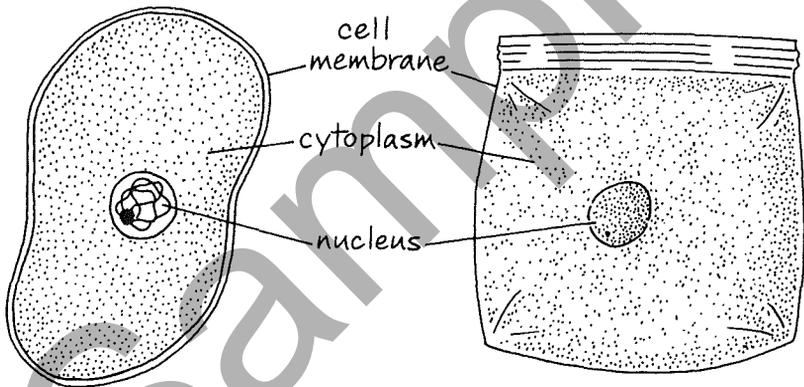
### Procedure

1. Have your adult helper mix the ingredients for the gelatin dessert according to the instructions on the box.
2. Allow the gelatin to cool to room temperature.
3. Pour the gelatin into the resealable bag, seal the bag, and place it in the bowl.
4. Set the bowl and bag in the refrigerator and chill until the gelatin is firm (about 3 to 4 hours).
5. Remove the gelatin from the refrigerator and open the bag.
6. Using your finger, insert the grape into the center of the gelatin.
7. Reseal the bag.
8. Place the bag of gelatin on a flat surface such as the kitchen counter. Observe its shape.
9. Hold the bag over the bowl as you gently squeeze it. (The bowl is used in the event that you squeeze too hard and the bag opens.) Observe the shape of the bag as you squeeze.

**Results** A model of a cell with three parts is made. Squeezing the model or placing it on a hard surface causes its shape to change.

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**Why?** All the cells in your body, like the model, have these three parts: a cell membrane, cytoplasm, and a nucleus. The plastic bag, like a cell membrane, keeps the parts of the cell together and acts as a barrier to protect the inner parts. The pale color of the gelatin dessert simulates the grayish jellylike material, called cytoplasm, that fills the cell. It is in the cytoplasm that most of the chemical work of the cell takes place. Floating in the gelatin is a grape that represents the nucleus, the cell's governing body. The cell membrane, cytoplasm, and nucleus all work together and are necessary for the life of the cell. Most of the cells in your body, like the model, change shape when pressure is applied. Bone cells are more rigid and keep their shape.



### Solutions to Exercises

#### 1. *Think!*

- Both diagrams B and D show a single cell.
- Which diagram, B or D, represents the cell before it starts to enlarge?

*Step 1 matches diagram D.*