

Cells and Systems

Grade 8 Science: from single cells to whole-body systems



Learning Intentions and Success Criteria

- We are investigating living things and applying scientific ideas to interpret structure, function and organization.
- We are investigating and describing the role of cells within living things.
- We are interpreting the healthy function of human body systems and how the body reacts to stimuli.
- Success: I can describe cells as the basic unit of life and compare single-celled and multicelled organisms.
- Success: I can distinguish plant cells from animal cells and explain diffusion and osmosis in general terms.
- Success: I can describe how individual organs and cells support healthy body function.

Plant Cells vs Animal Cells

Animal Cells

Animal cells have a cell membrane but no cell wall. They rely on internal systems such as digestion, respiration, circulation and the musculoskeletal system to carry out life processes. Movement, nutrition, respiration, growth and reproduction are vital processes carried out by these systems working together.

Plant Cells

Plant cells have a rigid cell wall in addition to a cell membrane, distinguishing them from animal cells. Plants use xylem to transport water and nutrients from roots upward, and phloem to move sugars from leaves to the rest of the plant, performing a function similar to animal circulation.

How Body Systems Work Together

1

Digestive System

Breaks down food and absorbs nutrients using the mouth, stomach, intestines, liver and pancreas.

2

Respiratory System

Exchanges oxygen and carbon dioxide through the trachea, lungs and diaphragm.

3

Circulatory System

Moves blood, oxygen and nutrients around the body using the heart and blood vessels.

4

Cells and Tissues

Individual cells in nerves, muscle, blood, skin and bone each contribute to healthy body function.

5

Whole-Body Response

The body changes its functions in response to conditions, such as heart rate rising during exercise.

Diffusion and Osmosis in Cells

Why cells move gases and liquids without pumps

Gases and liquids move into and out of cells during diffusion and osmosis, driven by differences in concentration rather than a pump. This is a general concept, not a detailed mechanism, so students should focus on the idea that particles move from areas of higher concentration to lower concentration until balance is reached. Understanding this helps explain how oxygen enters blood cells and how plant root hairs absorb water.

Wrapping Up: Cells and Systems

Cells are the basic unit of life, and every living thing, from a single amoeba to a human body, relies on cells working together in tissues, organs and systems. Human body systems such as digestion, respiration and circulation interpret how healthy organisms function as balanced systems, responding to changes such as exercise or temperature.

If one cell type in your body, like a red blood cell, stopped doing its job properly, which body system would be affected first, and why?