

Cells and Systems

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

Why Study Cells and Systems?

- Living things take many forms, but scientists use ideas like systems, cells, structures and functions to make sense of that diversity.
- Finding pattern within diversity is a major challenge in biology, from individual cells to complex organisms.
- Healthy organisms, including healthy humans, function as balanced systems within a life-supporting environment.
- Focusing question: what do living things have in common, from the smallest to the largest?

Cells: The Basic Unit of Life

What is a cell?

Cells are the basic unit of life. Scientists compare single-celled and multicelled organisms, such as an amoeba versus a grizzly bear, or a single-celled alga versus a poplar tree. Plant and animal cells differ: plant cells have cell walls while animal cells have only cell membranes.

Moving matter in and out

Gases and liquids move into and out of cells through diffusion and osmosis, driven by concentration differences. Students examine plant and animal structures to see how cells, tissues and organs each contribute a role.

How Human Body Systems Work Together

1

Digestive system

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

2

Respiratory system

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

3

Circulatory system

Moves blood carrying oxygen and nutrients through the heart and blood vessels.

4

Body tissues and organs

Cells contribute to healthy functioning in nerves, muscle, blood, skin and bone.

Body Systems and Their Reactions to Stimuli

Circulation

Blood circulates throughout the body to carry oxygen and nutrients to tissues and organs.

Respiration

Lungs exchange oxygen and carbon dioxide; bronchia provide a passageway for air.

Digestion and excretion

These systems work in general terms alongside sensory awareness to support the body.

Response to stimuli

Body functions change with conditions, such as heart rate rising during exercise or reflexes reacting to stimuli.

Systems Within Systems

Cells are the basic unit of life, and they organize into tissues, organs and systems that keep organisms functioning and balanced. In humans, the digestive, respiratory, circulatory and musculoskeletal systems rely on each other to support movement, nutrition, respiration, growth and reproduction. Healthy organisms respond to internal and external stimuli to maintain that balance.

If one body system stops working properly, how might that affect the other systems it normally works with?