Cells and Body Systems! Year 8 Science at Home

You can help! Your child is learning about the tiny building blocks of all living things — cells — and how they work together in the body. This is the science that underlies all of medicine!

Why are we learning this? Cells, health and communities up here

Understanding cells and body systems has direct relevance to health in remote communities. Conditions like diabetes, heart disease and kidney disease — all more prevalent in some remote communities — are all fundamentally disorders of specific cells and organ systems. When your child learns how the heart, kidneys or pancreas work at the cellular level, they are building the knowledge to understand why these health conditions occur, how they affect the body, and why medical treatments work. This knowledge helps your whole family make sense of the health information that affects your community.

My child will learn to:

✓ Know what a cell is
Understand that all living things are made of cells — the basic unit of life.

✓ Compare plant and animal cells
Describe the key similarities and differences between plant cells (with cell wall and chloroplasts) and animal cells.

✓ Understand cell function
Name the key cell structures (nucleus, mitochondria, cell membrane, cytoplasm) and explain what each does.

✓ Understand organ systems
Describe how cells, tissues, organs and systems are organised and how they work together.

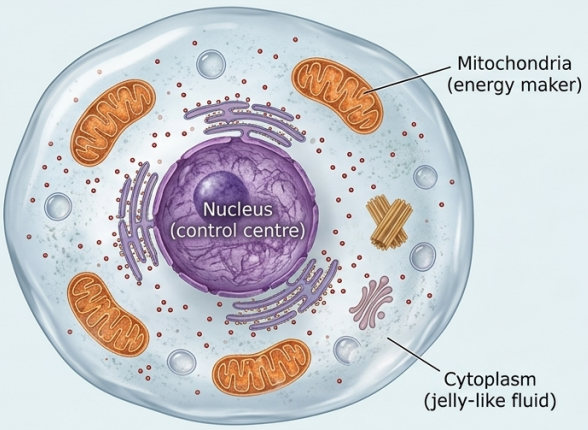
Big ideas to know:

Cells as building blocks
Just as a house is made of bricks, all living things are made of cells. Some organisms (like bacteria) are just one cell. A human body contains around 37 trillion cells! Different cells have different shapes and structures suited to their job — red blood cells carry oxygen, nerve cells send signals, muscle cells contract.

Inside a cell
Every cell has: a nucleus (control centre — contains DNA), cell membrane (outer boundary — controls what comes in and out), cytoplasm (jelly-like fluid where reactions happen), and mitochondria (power stations — produce energy). Plant cells also have a cell wall (rigid outer layer), chloroplasts (photosynthesis) and a large vacuole (water storage).

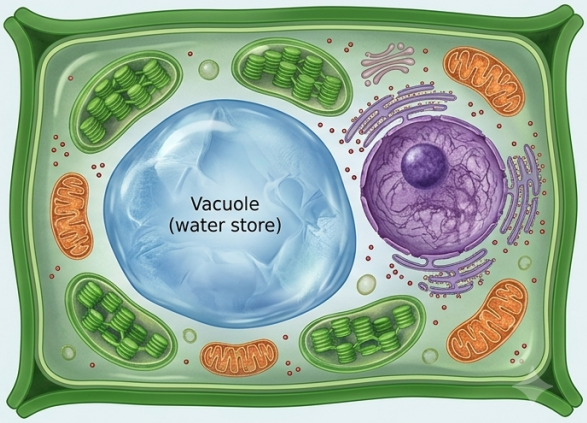
From cells to systems
Cells → Tissues (groups of similar cells) → Organs (groups of tissues with a specific function) → Organ systems (groups of organs working together). For example: heart muscle cells → heart muscle tissue → heart (organ) → circulatory system. A disorder at any level — even cellular — can affect the whole system.

ANIMAL CELL



No cell wall, chloroplasts or large central vacuole

PLANT CELL



Has: rigid cell wall, multiple chloroplasts, very large central vacuole

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Key organ systems — structure and function

System	Key organs	Main function
Digestive system	Mouth, stomach, small intestine, large intestine, liver	Breaks down food into nutrients that cells can absorb and use for energy
Circulatory system	Heart, arteries, veins, capillaries	Pumps blood carrying oxygen and nutrients to all cells; removes waste
Respiratory system	Lungs, trachea, diaphragm, bronchi	Brings oxygen into the blood and removes carbon dioxide (a waste gas)
Nervous system	Brain, spinal cord, nerves	Controls body responses, senses, movement and thought — your body's "internet"
Excretory system	Kidneys, bladder, liver, skin	Removes waste products from the blood — kidneys filter ~180 litres per day!

Think Like a Scientist — System Detective

Choose one of these activities: walking up stairs, eating a meal, or feeling stressed. Write down every organ system that is involved and what each one is doing at that moment. How many systems can you identify?

Ask: "When we run, what happens to our heart rate? Why? What is the circulatory system doing? What is the respiratory system doing? Are they connected?" Most activities involve multiple systems working together!

You will need: *(Materials)*

- Paper and pencil (for body system diagram)
- Stopwatch or phone timer (for heart rate activity)
- Phone (for free 3D anatomy apps or websites — optional)

Body systems in action:

1. Eating — digestive, circulatory, nervous (tasting), muscular
2. Running — circulatory, respiratory, muscular, nervous
3. Feeling sick — immune, nervous, circulatory, possibly digestive
4. Sleeping — nervous, endocrine (hormones), immune (repairs happen at night)
5. Healing a cut — immune, circulatory, skin cells dividing to repair

Questions to ask your child

1. What is the difference between a cell, a tissue and an organ? Can you give an example of each?
2. Why do plant cells have a cell wall but animal cells do not?
3. What job does the mitochondria do? Why does a muscle cell need lots of mitochondria?
4. If someone has kidney disease, which organ system is affected? How does this affect the rest of the body?
5. Why do we need lungs AND a circulatory system — why isn't one enough?
6. How does understanding cells help doctors develop treatments for conditions like diabetes?
7. What is a difference between plant cells and animal cells you can see under a microscope?

There are excellent free apps and websites that let you "explore" the human body in 3D — try searching "human body 3D anatomy" online. Seeing the organs in their real position and relationships makes this topic much easier to understand!

Key words to know:

Cell	The basic unit of life — all living things are made of one or more cells
Nucleus	The control centre of the cell — contains DNA and directs all cell activities
Mitochondria	Organelles that produce energy for the cell by processing glucose and oxygen
Cell membrane	The thin, flexible outer boundary of all cells — controls what enters and exits
Tissue	A group of similar cells that work together for a specific function — e.g. muscle tissue
Organ	A structure made of different tissues working together — e.g. heart, stomach, kidney
Organ system	A group of organs working together for a major body function — e.g. digestive system

Key words to look up

Cell · Nucleus · Mitochondria · Cell membrane · Tissue · Organ · Organ system

What school will check

By the end of Year 8, your child needs to explain the role of specialised cell structures in cellular function and analyse the relationship between structure and function at organ and body system levels.

Try it at home!

Next time someone in your family has a blood test or medical check-up, ask the doctor what the test measures and which cells or organ system it is checking. This is real cells-and-systems science applied to health!