

Principles of organisation

Revision notes • How cells, tissues, organs and organ systems build up an organism, and how their sizes compare.

For AQA GCSE Biology 8461 and Combined Science: Trilogy 8464. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Principles of organisation Spec 4.2.1

Cells, tissues, organs and organ systems Spec 4.2.1

Living things are built up in levels. Each level is made from the one below it.

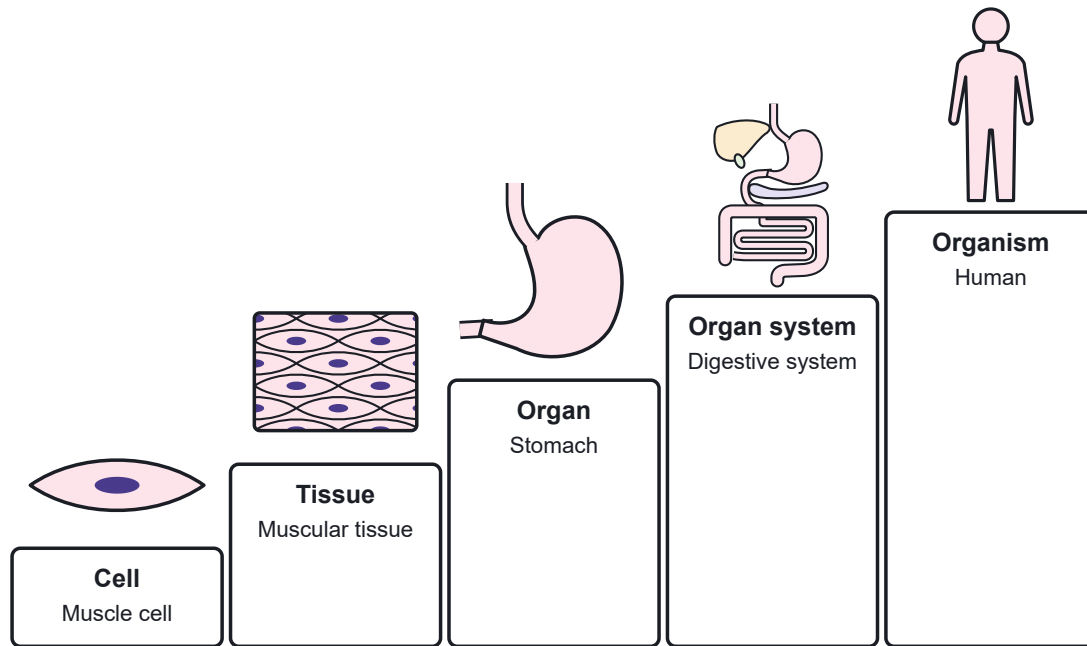
Cell	The basic building block of all living organisms.
Tissue	A group of cells with a similar structure and function.
Organ	An aggregation of tissues performing specific functions.
Organ system	Organs are organised into organ systems, which work together to form organisms.

The stomach is a good example of an **organ**. It is made of several tissues that work together. Muscular tissue churns the food, glandular tissue makes digestive juices (enzymes and acid), and epithelial tissue covers the inside and outside surfaces.

The stomach is one of the organs in the **digestive system**. This is an **organ system**: several organs working together to digest and absorb food.

Levels of organisation		
Level	Animal example	Plant example
Cell	A muscle cell	A palisade mesophyll cell
Tissue	Muscular tissue	Palisade mesophyll
Organ	The stomach or the heart	A leaf
Organ system	The digestive system or the circulatory system	Roots, stem and leaves (transport system)
Organism	A human	A tree

Exam tip: An organ contains more than one tissue. To explain why something is an organ, say it is made of several tissues that work together to do a specific job.



Each level is made from the one below: **cell → tissue → organ → organ system → organism**.

Size and scale Spec 4.2.1

Each level of organisation is bigger than the one before. A tissue is many cells, an organ is many tissues, and an organ system is several organs.

Most cells are only tens of micrometres (μm) across, so you need a microscope to see them. Tissues and organs are large enough to see with the naked eye, and are measured in millimetres (mm) or centimetres (cm).

To compare sizes you must use the same unit for both. To change mm to μm , multiply by 1000.

How many cells fit across a tissue?

A strip of tissue is 2 mm wide. Each cell is 40 μm wide. How many cells fit across the strip?

1. Convert 2 mm to μm : $2 \times 1000 = 2000 \mu\text{m}$.
2. Divide the width of the tissue by the width of one cell: $2000 \div 40$.

Answer: 50 cells

Maths skill: Always check the units match before you divide. Mixing mm and μm is the most common mistake in size and scale questions.

Quick check

1. What is a tissue?
2. Why is the stomach an organ?
3. Put these in order from smallest to largest: organ, cell, organ system, tissue.
4. How many micrometres are in 1 mm?

Quick check answers

Principles of organisation

1. A group of cells with a similar structure and function.
2. It is made of several tissues that work together to perform a specific function.
3. Cell, tissue, organ, organ system.
4. 1000 μm .