

Biology

Cells · the body · reproduction

Life, from the smallest cell up to the whole body.

This belongs to **Henry**.

Skills

Biology

Chemistry

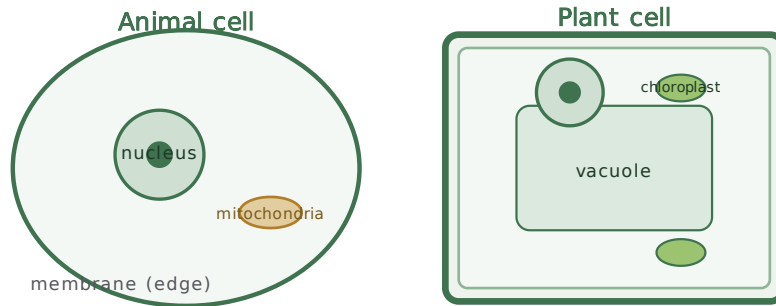
Physics

The thread through Biology

Everything starts with the cell. Cells build tissues, tissues build organs, organs build the body. Keep that ladder in mind and the topics join up.

Animal and plant cells

Big idea: Every living thing is made of cells. The cell is the smallest unit of life.



Plant cells have everything an animal cell has, plus three extra parts: a cell wall, chloroplasts and a large vacuole.

What you must know

Nucleus controls the cell. Holds the instructions.

Cytoplasm jelly where reactions happen.

Cell membrane controls what goes in and out.

Mitochondria release energy.

Cell wall (plant only) strong support.

Chloroplast (plant only) makes food using light.

Vacuole (plant only) holds sap, keeps the cell firm.

MUST KNOW

The 4 animal parts and the 3 extra plant parts, with jobs.

SHOULD KNOW

Animal vs plant differences.

NICE TO KNOW

Magnification = eyepiece \times objective.

Common mistakes

- Plant cells **do** have a membrane. It sits just inside the wall.
- Not every cell has a nucleus. Red blood cells do not.

Specialised cells and diffusion

Specialised cells

Some cells have a special shape for a special job.

Red blood cell no nucleus, dish shaped. Carries oxygen.

Nerve cell long and thin. Carries signals fast.

Sperm cell has a tail to swim to the egg.

Root hair cell long point, big surface to absorb water.

Diffusion

Diffusion is when particles spread from where there are lots of them to where there are few, until they are evenly spread.

- Oxygen diffuses from the lungs into the blood.
- The smell of food diffuses across a room.

Key vocabulary

Cell the smallest unit of life

Specialised shaped for one special job

Diffusion particles spreading from high to low

MUST KNOW

What diffusion is, with one example.

SHOULD KNOW

How a cell's shape suits its job.

NICE TO KNOW

Names of more specialised cells.

Cells: questions

QUICK CHECK

1. Which part controls the cell?

2. Name the three parts found only in plant cells.

3. Which cell has no nucleus?

EXPLAIN WHY

4. Why is a red blood cell well suited to carrying oxygen?

WORKED EXAMPLE ANSWER

A red blood cell has no nucleus, so there is more room inside to carry oxygen. Its dish shape gives it a large surface, so oxygen can pass in and out quickly. This makes it well suited to its job of carrying oxygen around the body.

5. Explain what diffusion is, and give one example from the body.

EXAM STYLE

6. Give two ways a plant cell is different from an animal cell. [2 marks]

How the body is organised

Big idea: Small parts build bigger parts. Cells make tissues, tissues make organs, organs make systems.



A **tissue** is a group of similar cells. An **organ** is made of tissues doing a job (like the heart). An **organ system** is organs working together.

Main organ systems

Digestive breaks food down so the body can use it.

Circulatory heart and blood carry oxygen and food around.

Respiratory lungs take in oxygen, remove carbon dioxide.

Skeleton and muscles support the body and let it move.

Key vocabulary

Tissue a group of similar cells

Organ tissues working together (e.g. heart)

Organ system organs working together

MUST KNOW

The order: cell, tissue, organ, system, organism.

SHOULD KNOW

What each main system does.

NICE TO KNOW

Organ names within each system.

Common mistakes

An organ and an organ system are not the same. The **heart** is an organ. The **circulatory system** is the whole system it belongs to.

The body: questions

QUICK CHECK

1. Put these in order, smallest to largest: organ, cell, organism, tissue, organ system.

2. Which system breaks down food?

EXPLAIN WHY

3. Explain the difference between an organ and an organ system.

WORKED EXAMPLE ANSWER

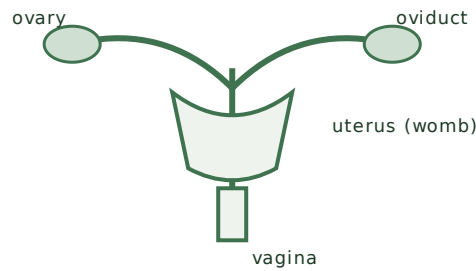
An organ is one body part made of tissues that do a job, such as the heart. An organ system is a group of organs working together to do a bigger job, such as the circulatory system, which includes the heart and blood vessels. So an organ is part of an organ system.

EXAM STYLE

4. Name one organ system and describe what it does. [2 marks]

How a new human begins

Big idea: A new human starts when a sperm cell joins an egg cell. This is fertilisation.



The female system. Eggs are stored in the ovaries. Fertilisation happens in the oviduct. The baby grows in the uterus.

The key parts

Ovary stores and releases eggs (female).

Oviduct the tube where fertilisation happens (female).

Uterus (womb) where the baby grows (female).

Testes make sperm (male).

MUST KNOW

Sperm + egg = fertilisation, in the oviduct.
Baby grows in the uterus.

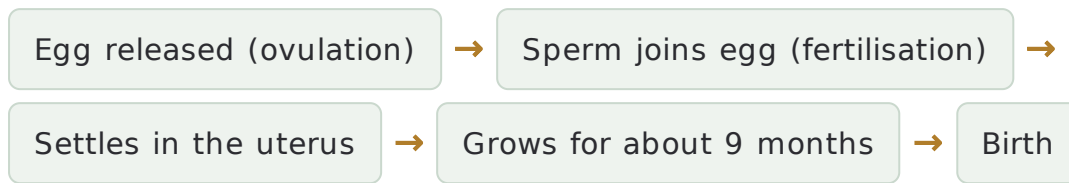
SHOULD KNOW

The main parts and their jobs.

NICE TO KNOW

Exact lengths of each stage.

From fertilisation to birth



The menstrual cycle

- About every 28 days, the lining of the uterus builds up, ready for a fertilised egg.
- Around the middle of the cycle, an egg is released from an ovary.
- If the egg is not fertilised, the lining breaks down and leaves the body. This is a period.

Puberty

Puberty is the time when the body changes and becomes able to reproduce. Changes include a growth spurt and body hair, sperm being made in boys, and periods starting in girls.

Key vocabulary

Fertilisation a sperm joining an egg

Gestation the time a baby grows in the uterus

Ovulation the release of an egg

Puberty changes that make the body able to reproduce

Common mistakes

- Fertilisation happens in the **oviduct**, not the uterus.
- The egg is much larger than the tiny sperm.

Reproduction: questions

QUICK CHECK

1. What is fertilisation?

2. Where in the body does fertilisation happen?

3. Where does the baby grow?

EXPLAIN WHY

4. Why does a sperm cell have a tail?

EXAM STYLE

5. Describe what happens from when an egg is released to when a baby is born. [3 marks]

Biology: answers

Topic 1: Cells

1. The nucleus.
2. Cell wall, chloroplast, vacuole.
3. The red blood cell.
4. It has no nucleus, so more room for oxygen, and a dish shape for a large surface. (See model answer.)
5. Diffusion is particles spreading from where there are many to where there are few, until evenly spread. Example: oxygen from the lungs into the blood.
6. Any two: plant cells have a cell wall, chloroplasts, a large vacuole; plant cells are often a fixed box shape.

Topic 2: The body

1. Cell, tissue, organ, organ system, organism.
2. The digestive system.
3. An organ is one part (the heart); a system is organs working together (the circulatory system).
4. Any one, with a job. E.g. the respiratory system takes in oxygen and removes carbon dioxide.

Topic 3: Reproduction

1. When a sperm cell joins an egg cell.
2. In the oviduct.
3. In the uterus (womb).
4. To swim to the egg.
5. An egg is released from an ovary, a sperm fertilises it in the oviduct, the fertilised egg settles in the uterus, grows for about nine months, then the baby is born.