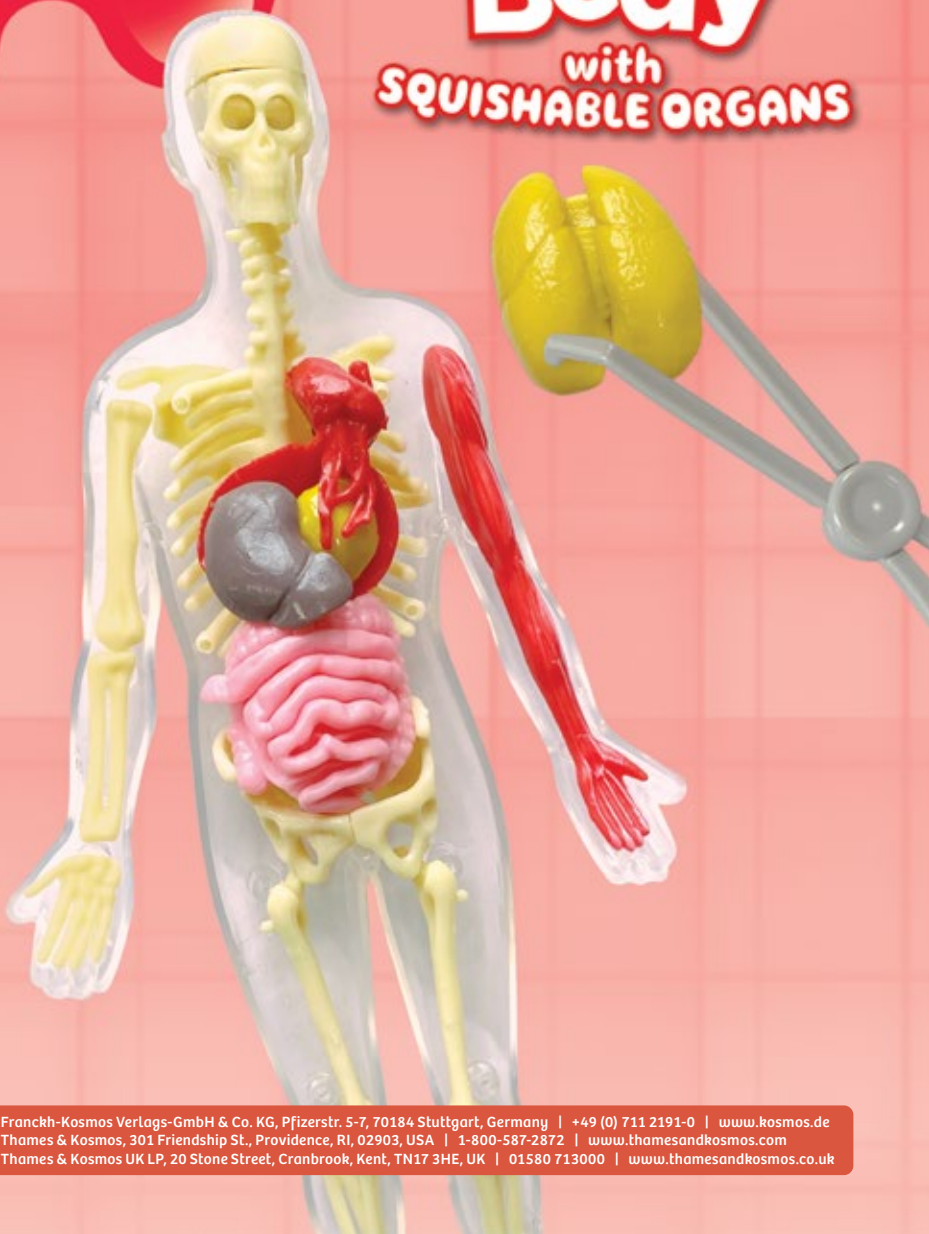
EXPERIMENT MANUAL

Ooze Labs

Visible Human Body

with SQUISHABLE ORGANS



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››› WARNING. Not suitable for children under 3 years. Choking hazard — small parts may be swallowed or inhaled.
››› Keep the packaging and instructions as they contain important information.

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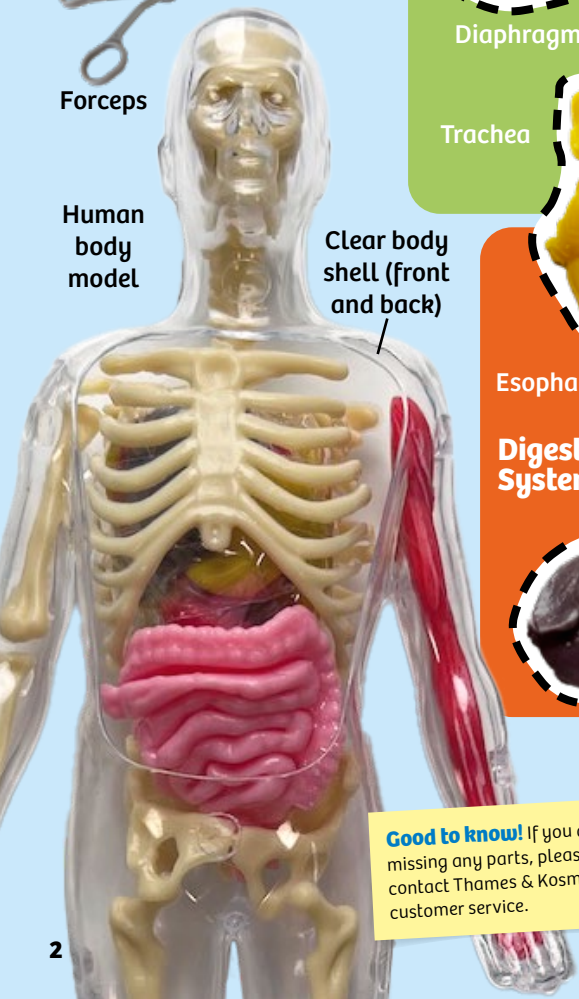
What Is a Scientific Model?

Your visible human body is a **scientific model.** It is a simplified representation of the human body, made for the purpose of teaching about the major body systems and organs. All scientific models have limitations. This model does not include every body part and some of the included body parts have been simplified. It also cannot show the tremendous diversity in the human species.

What's inside your experiment kit:

To get started, remove any clear tape or rubber bands from the model. Pull apart the two clear body pieces. Lay out all of the pieces on the matching pictures on this page. Then read all about each body system on the following pages.

Forceps



Human body model

Clear body shell (front and back)

Nervous System

Brain

Respiratory System

Diaphragm

Lungs

Trachea

Large and small intestines

Esophagus

Digestive System

Stomach

Liver

Kidneys

Urinary System

Bladder

Circulatory System

Heart

Good to know! If you are missing any parts, please contact Thames & Kosmos customer service.

Skull front

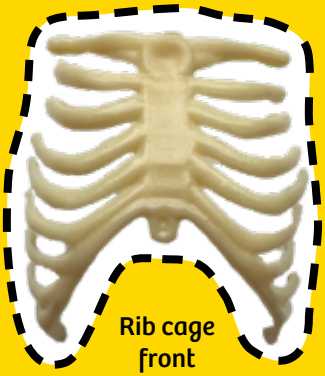
Skull top

Skull bottom

Scapula and clavicle (x2)

Humerus

Radius and ulna



Rib cage front

Hand

Skeletal System

Rib cage back, spine, and sacrum

Hip bones (2 parts)

Femur (x2)

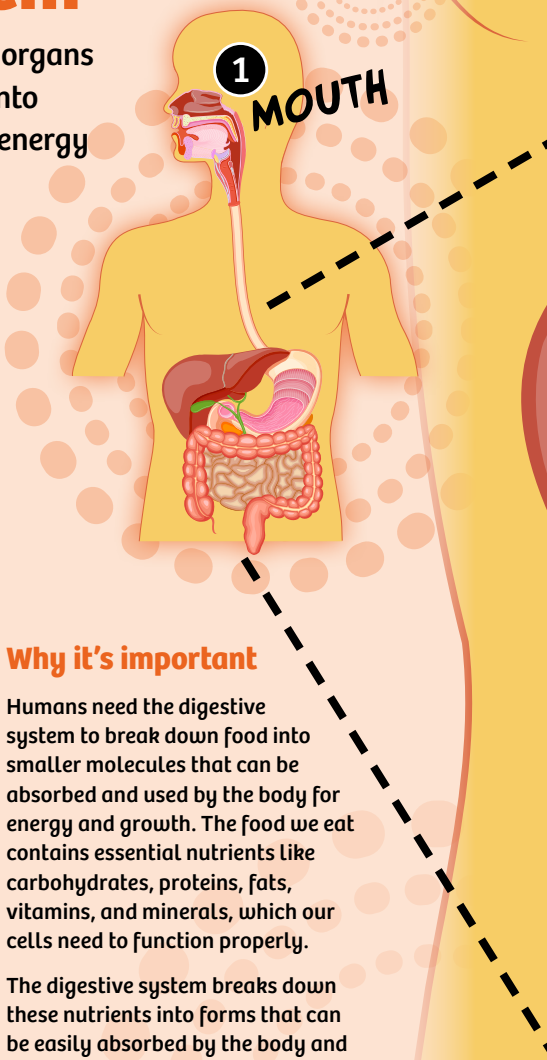
Tibia and Fibia (x2)

Feet (x2)

Muscular System

Digestive System

The **digestive system** is a series of organs that work together to turn food into energy and waste. You need this energy to run, jump, play, think — and everything else you do!



How it works

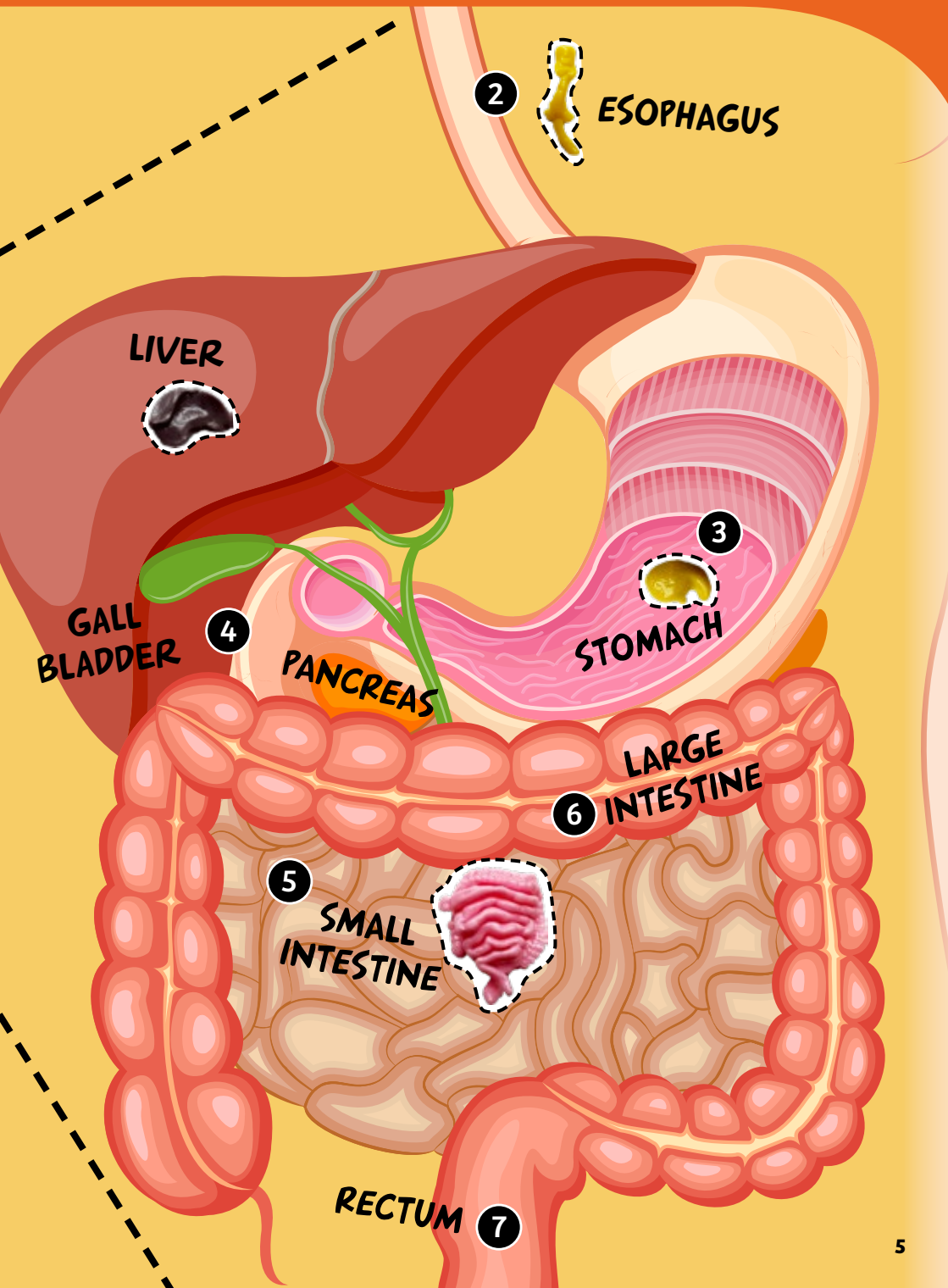
1. Food is first chewed and mixed with saliva in the **mouth.**
2. Then the food goes down the **esophagus** and into the stomach.
3. In the **stomach,** the food is mixed with stomach acid and enzymes to break it down further.
4. Then it moves into the small intestine, where it is mixed with bile from the **liver** and enzymes from the **pancreas** to break down the food even more. The **gall bladder** stores bile until it is needed.
5. Nutrients are absorbed into the bloodstream through the walls of the **small intestine** and sent to the **cells** of the body.
6. The waste products move into the **large intestine,** where most of the remaining water and electrolytes are absorbed.
7. The waste material that is left is then eliminated from the body through the **rectum** and anus.

Your entire body is made of small building blocks called cells. They are too small to be seen without a microscope.

Why it's important

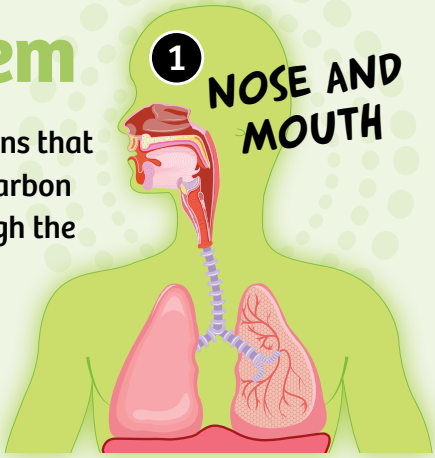
Humans need the digestive system to break down food into smaller molecules that can be absorbed and used by the body for energy and growth. The food we eat contains essential nutrients like carbohydrates, proteins, fats, vitamins, and minerals, which our cells need to function properly.

The digestive system breaks down these nutrients into forms that can be easily absorbed by the body and transported to cells where they are used to create energy, build and repair tissue, and perform other essential functions. The digestive system also removes waste products from the body that can be harmful if they build up.


2
ESOPHAGUS
LIVER
3
STOMACH
GALL BLADDER
4
PANCREAS
LARGE INTESTINE
6
5
SMALL INTESTINE
RECTUM
7

Respiratory System

The **respiratory system** is a series of organs that allow for the exchange of oxygen and carbon dioxide between the body and the air, through the process of breathing. You need oxygen to convert nutrients into energy for your cells!

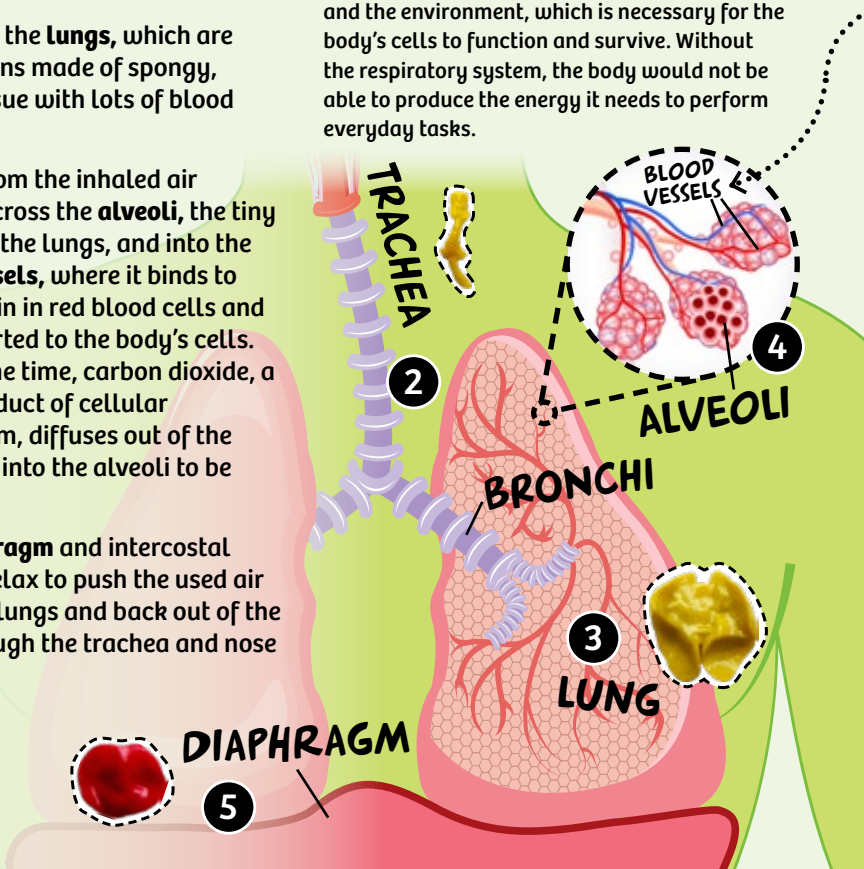


How it works

1. Air is taken in, or inhaled, through the **nose or mouth** by a contraction in the diaphragm muscles.
2. The air passes through the **trachea** and **bronchi** ...
3. ... and into the **lungs,** which are large organs made of spongy, elastic tissue with lots of blood vessels.
4. Oxygen from the inhaled air diffuses across the **alveoli,** the tiny air sacs in the lungs, and into the **blood vessels,** where it binds to hemoglobin in red blood cells and is transported to the body's cells. At the same time, carbon dioxide, a waste product of cellular metabolism, diffuses out of the blood and into the alveoli to be exhaled.
5. The **diaphragm** and intercostal muscles relax to push the used air out of the lungs and back out of the body through the trachea and nose or mouth.

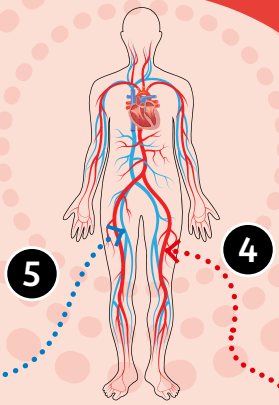
Why it's important

The respiratory system enables the exchange of oxygen and carbon dioxide between the body and the environment, which is necessary for the body's cells to function and survive. Without the respiratory system, the body would not be able to produce the energy it needs to perform everyday tasks.



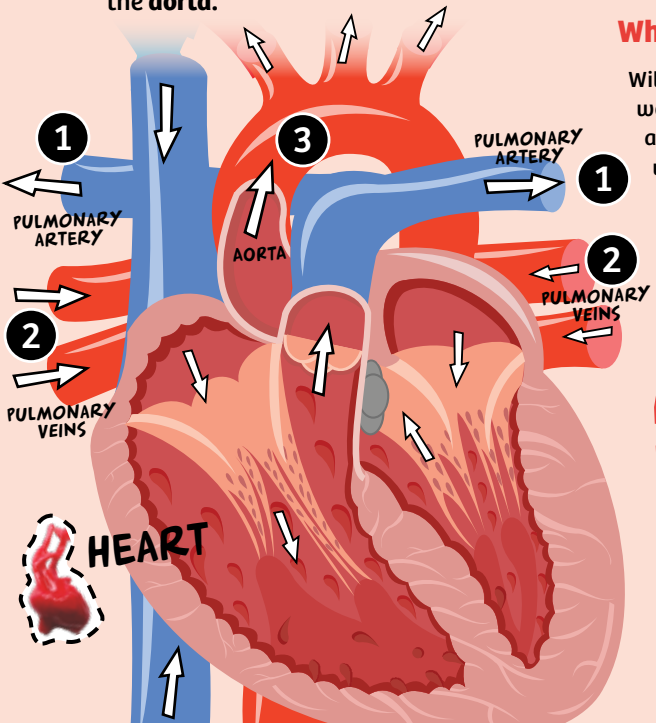
Circulatory System

The **circulatory system** is a network consisting of the heart and blood vessels, like arteries and veins. It pumps oxygen and nutrients to the body's cells and removes waste products.



How it works

1. The **heart** pumps oxygen-poor blood to the **blood vessels** in the lungs through the **pulmonary artery.** In the lungs, the blood releases carbon dioxide and takes on oxygen, becoming oxygen-rich.
2. The oxygen-rich blood returns to the heart via the **pulmonary vein.**
3. The oxygen-rich blood is pumped out to the rest of the body through the **aorta.**
4. The oxygen-rich blood travels through the body's **arterial system,** providing oxygen and nutrients to all the body's cells.
5. The oxygen-poor blood, now low in oxygen and high in carbon dioxide, returns to the heart through the **venous system.** It passes through the liver to pick up some nutrients before getting back to the heart. The cycle repeats.

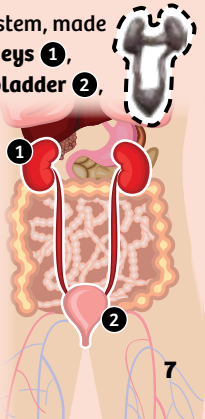


Why it's important

Without the circulatory system, the body would not be able to transport oxygen and nutrients to the cells, and remove waste products, leading to the death of the cells and the organism.

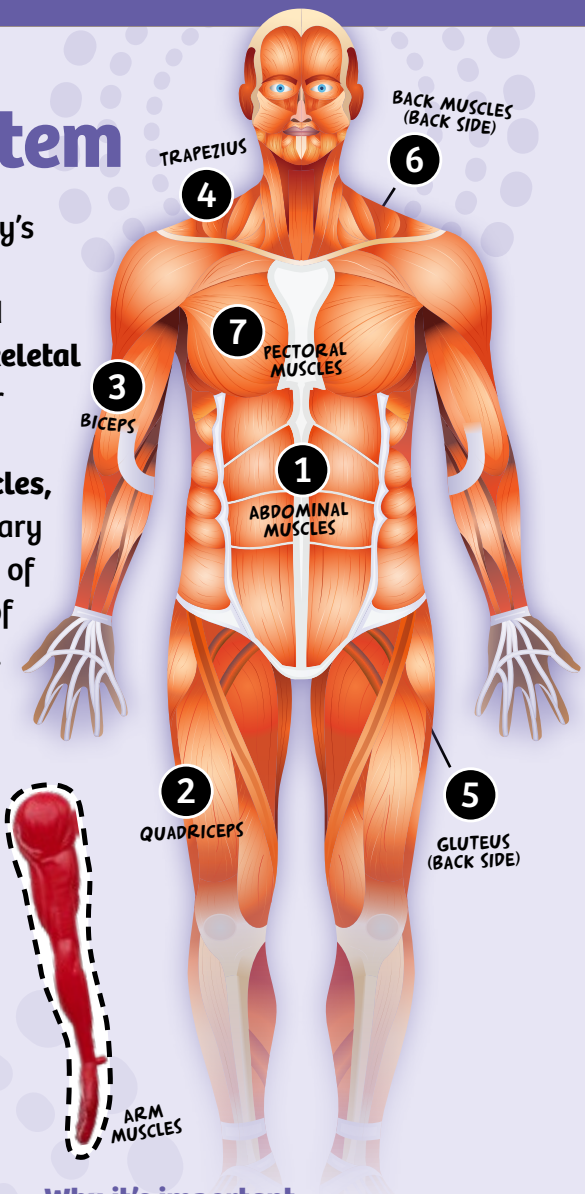
Urinary System

The urinary system, made up of the **kidneys** 1, ureters, **urinary bladder** 2, and urethra, is responsible for filtering waste products from the blood and eliminating them from the body in the form of urine.



Muscular System

The **muscular system** is the body's network of muscles that work together to provide movement and stability to the body. It includes **skeletal muscles,** which are responsible for voluntary movement, as well as **smooth muscles** and **cardiac muscles,** which are responsible for involuntary movement such as the contraction of blood vessels and the movement of food through the digestive system.



Some of the Skeletal Muscles:

1. **Abdominal muscles:** provide support to the spine and help to protect internal organs
2. **Quadriceps:** responsible for extending the knee and straightening the leg
3. **Biceps:** responsible for flexing the elbow and supinating the forearm
4. **Trapezius:** responsible for extending, adducting and rotating the shoulders, and flexing the neck
5. **Gluteus:** responsible for hip extension, abduction, and external rotation
6. **Back muscles:** responsible for postural support and movement of the spine
7. **Pectoral muscles:** responsible for moving the shoulders and arms

Why it's important

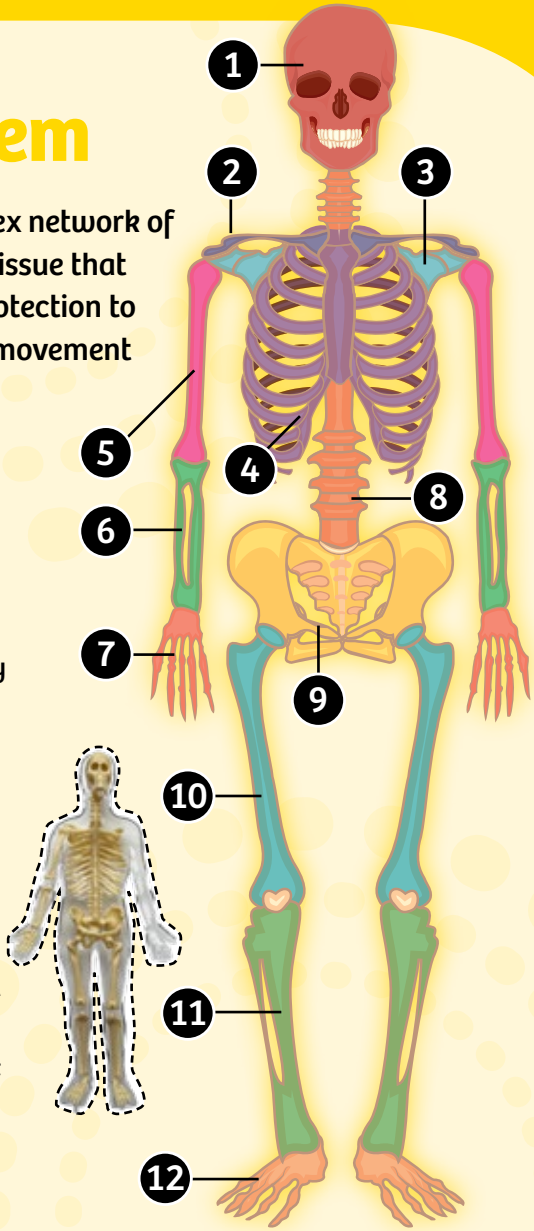
Without muscles, you wouldn't be able to move at all! The muscular system is important for providing movement (voluntary and involuntary), stability, and support for the body and its organs. It also plays a key role in maintaining posture and balance, protecting internal organs, and generating heat, which helps to regulate body temperature.

Skeletal System

The **skeletal system** is a complex network of bones, joints, and connective tissue that provide structure, support, and protection to the body, as well as allowing for movement and the production of blood cells.

Some of the Bones:

1. **Skull:** protects the brain and holds the eyes and facial muscles
2. **Clavicle:** connects the shoulder to the rest of the skeleton
3. **Scapula:** enables shoulder mobility in many directions
4. **Rib cage:** protects the heart and lungs
5. **Humerus:** upper arm bone; rotates via ball joint at the shoulder
6. **Radius and Ulna:** lower arm bones that allow the wrist to turn
7. **Hand bones:** 27 bones allow for all hand and finger moment
8. **Spine:** supports the head and body; protects the spinal cord
9. **Pelvis:** a bowl made of the hip bones and sacrum
10. **Femur:** upper leg bone; rotates via ball joint at the hip
11. **Tibia and Fibula:** lower leg bones; connect the femur to the foot
12. **Foot bones:** 26 bones allow for all foot and toe movement, and balance

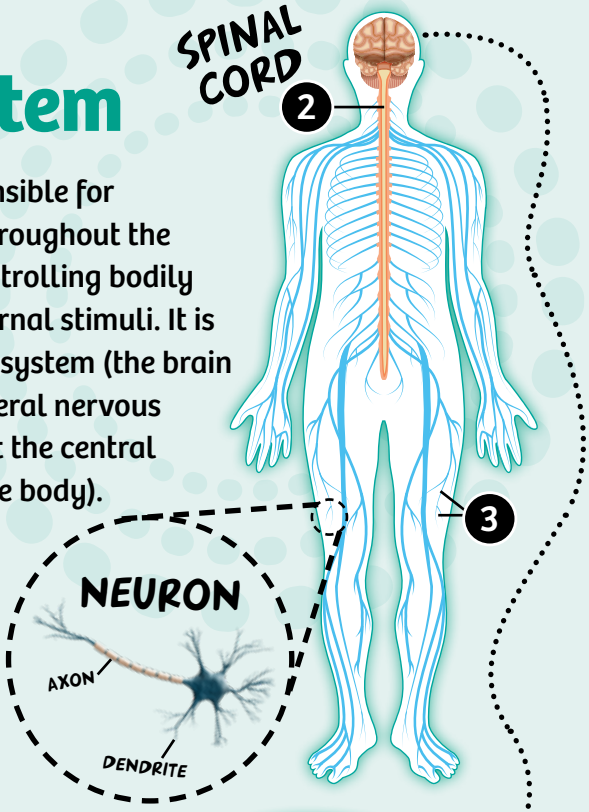


Why it's important

Without a skeleton, a body would be like a cooked noodle! Bones provide support for the muscles, allowing for voluntary movement. They also act as a framework for the body, protecting vital organs such as the heart and lungs. Additionally, **bone marrow,** which is the soft, spongy tissue inside the bones, is responsible for producing red blood cells, white blood cells, and platelets.

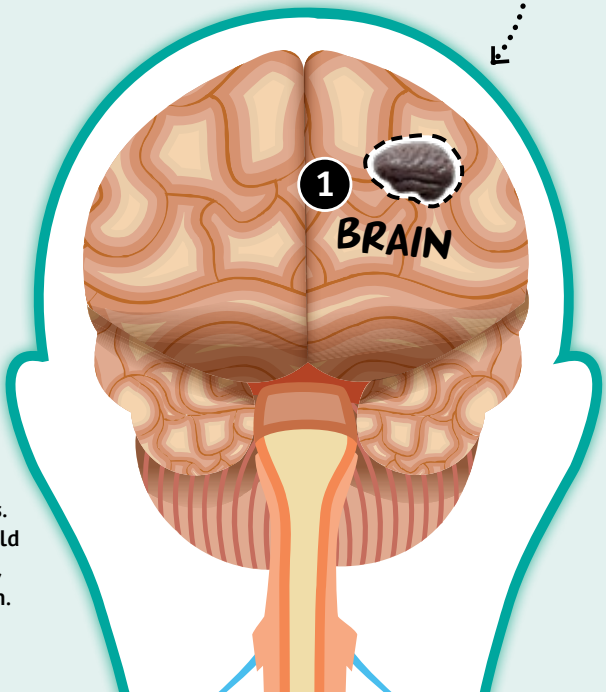
Nervous System

The **nervous system** is responsible for transmitting information throughout the body, and coordinating and controlling bodily functions and responses to external stimuli. It is made up of the central nervous system (the brain and spinal cord) and the peripheral nervous system (the nerves that connect the central nervous system to the rest of the body).



How it works:

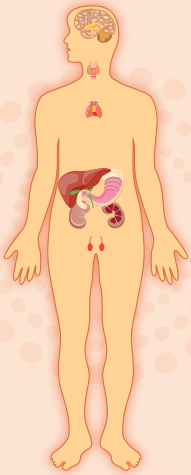
1. The **brain** receives information in the form of electrical impulses from the senses, such as sight, sound, and touch, and processes that information to create a response.
2. The **spinal cord** acts as a relay between the brain and the rest of the body, sending signals to and from the brain.
3. **Nerves,** made up of bundles of fibers called axons and dendrites, transmit electrical impulses throughout the body, allowing for movement and sensation.



Why it's important

The nervous system allows us to move, feel, think, and interact with the world around us. Without the nervous system, our brains would not be able to communicate with our bodies, and vice-versa! The body would not function.

Endocrine System

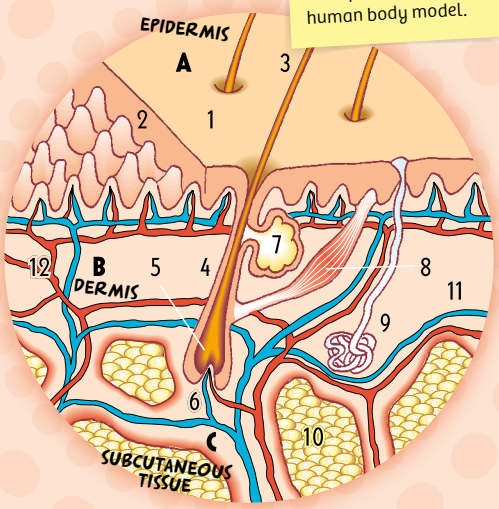


The **endocrine system** is a collection of glands that secrete hormones into the bloodstream to regulate various bodily functions such as metabolism, growth and development, and response to stress. These hormones travel through the bloodstream to target cells and organs, where they bind to specific receptors and trigger a response.

Integumentary System

The skin is represented by the clear body shell pieces in this human body model.

The **integumentary system** is the body's outermost organ system that includes the skin, hair, nails, and exocrine glands. It serves as the first line of defense against physical, chemical, and biological insults, and also plays a role in regulating body temperature, synthesizing vitamin D, and sensing the environment through touch and temperature receptors.



Parts of the skin:
1. Stratum corneum
2. Stratum basale or germinativum
3. Hair
4. Hair follicle
5. Hair root
6. Blood vessels (capillaries)
7. Fat gland (sebaceous gland)
8. Hair follicle
9. Sweat gland
10. Fat cells

11/12. Blood vessels

How it works:

Human skin is made of two main layers: the epidermis (A) and the dermis (B). Below the dermis is the subcutaneous tissue (C), which is not officially part of the skin. It attaches the skin to the bones and muscles and contains a lot of fat cells, which pad and insulate the body.

There are other body systems and organs not represented in this model. The various body systems do not function independently — they all work together as parts of a whole.

Assemble the skull with the brain inside.

1

Insert the pegs on the scapula and clavicle pieces into the holes on the back body shell.

Peg the spine and rib cage piece to the scapula pieces.

Peg the skull to the head cavity.

2

Attach the two hip bones together and then to the sacrum at the bottom of the spine.

3

Peg the rest of the bones in place.

4

Peg the arm muscles piece in place.

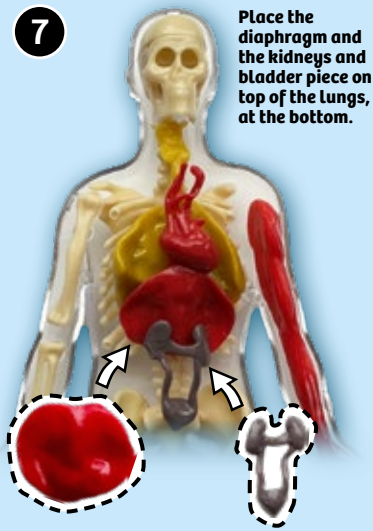
5

Place the lungs onto the back rib cage. Place the trachea on top.

6

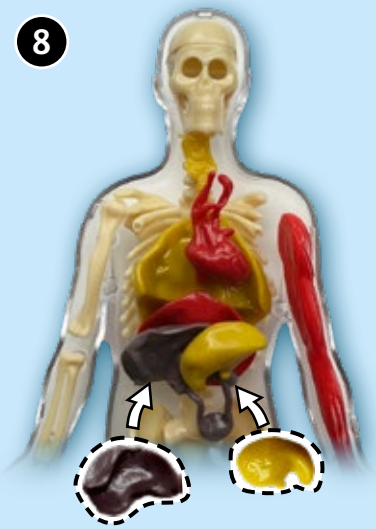
Place the heart on top of the lungs, in the center.

7



Place the diaphragm and the kidneys and bladder piece on top of the lungs, at the bottom.

8



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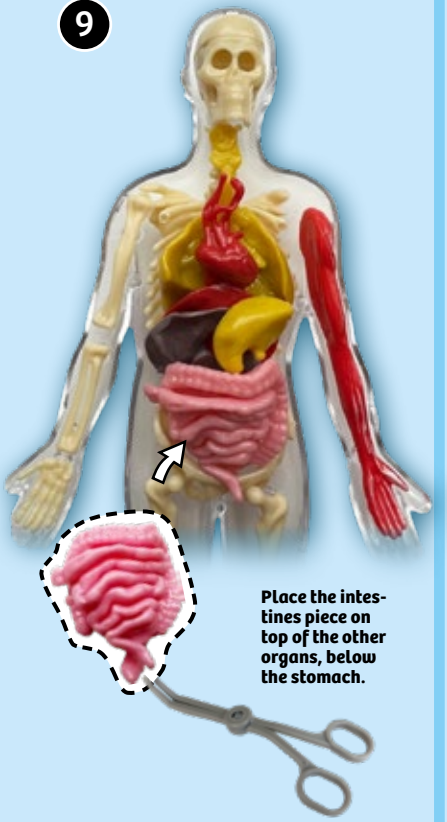

Place the intestines piece on top of the other organs, below the stomach.

10

Rest the front rib cage on top of the upper organs. Note: It does not attach with pegs.

Secure with a piece of clear adhesive tape if necessary.

Attach the front body shell to the back body shell, clipping them together securely.

DONE!

Finally, place it on the display stand!

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