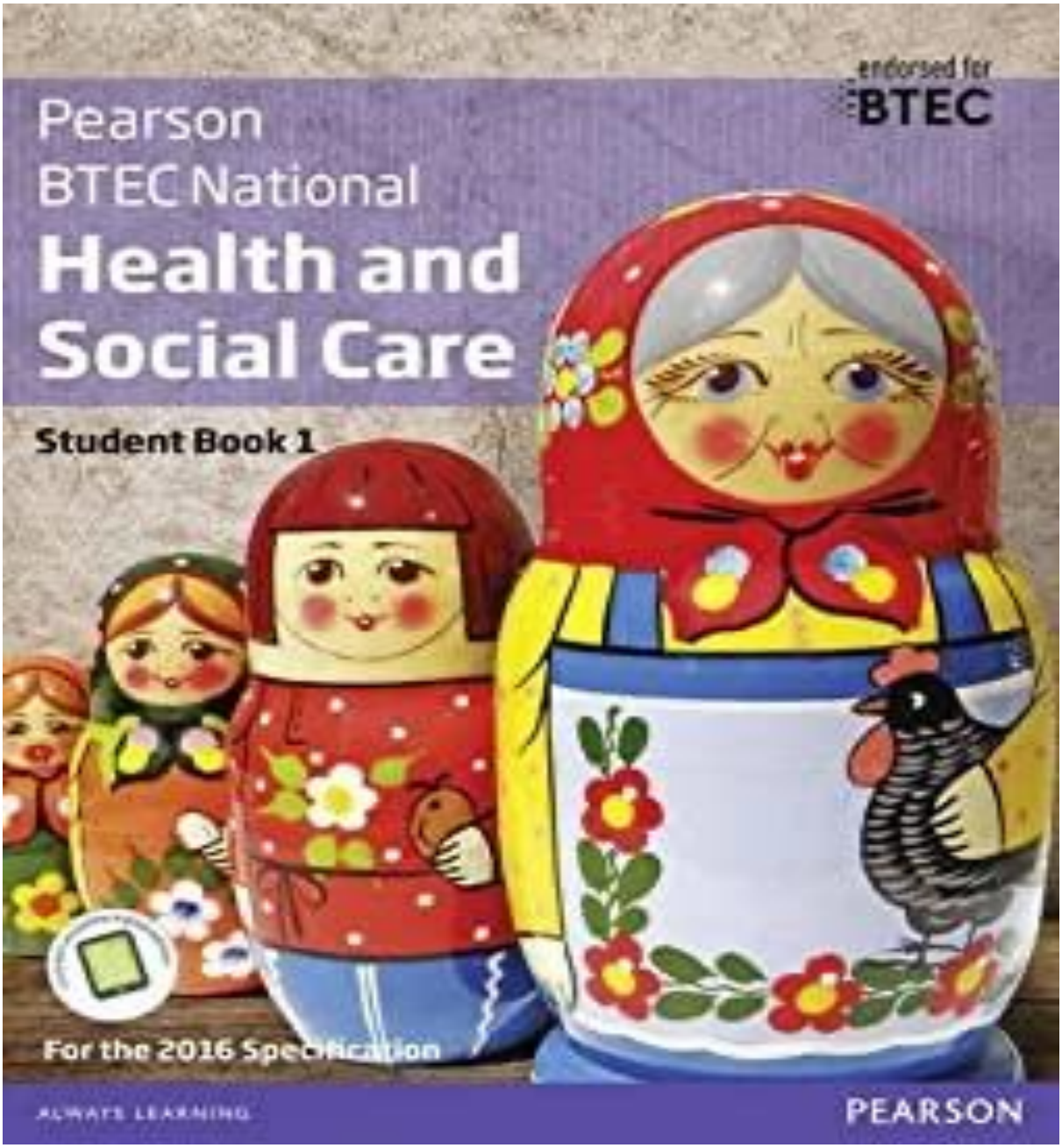
Level 3 BTEC Extended Diploma Health and Social Care



Passport to Y13

Name: _____

What will I be studying?

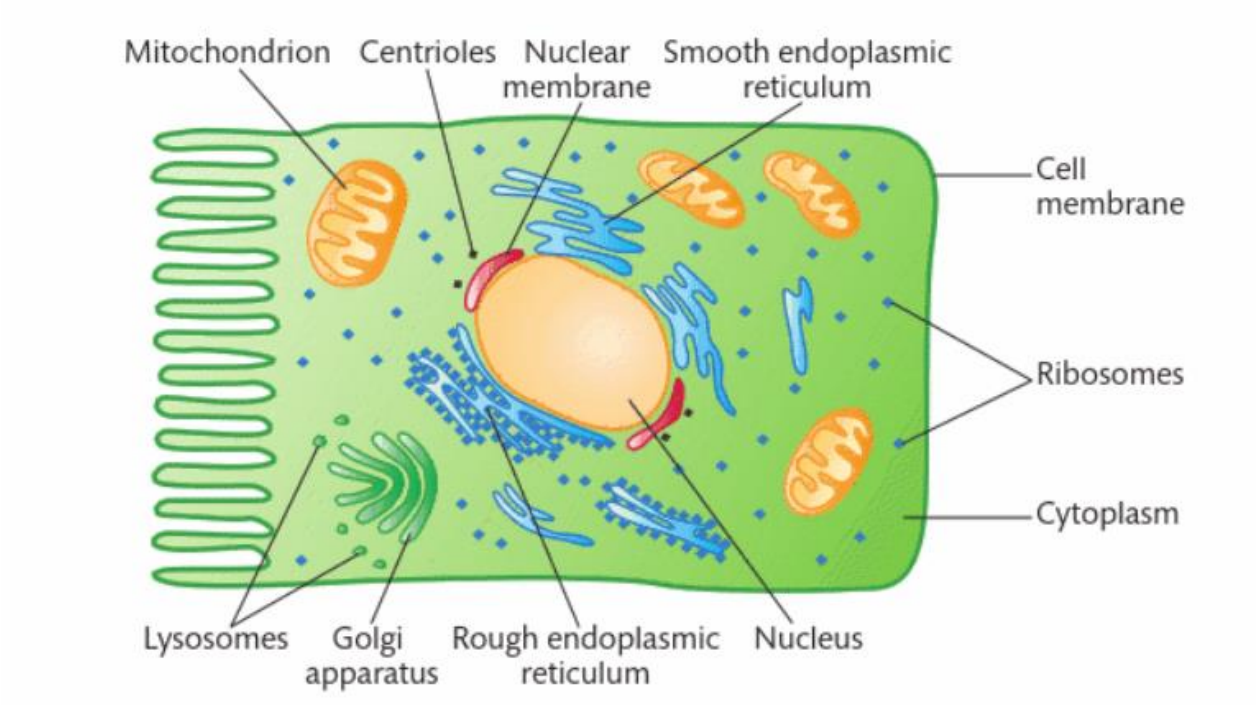
During unit Three, **Anatomy and Physiology for Health and Social Care,** you will focus on:

This unit focuses on the anatomy and physiology of the human body. You will learn the core knowledge of cellular structure and function and the organisation of the body as a whole. You will then build on this to develop a more detailed knowledge of the fine anatomy and physiology of the skeletal and muscular systems and those systems involved in energy metabolism. You will examine energy and the cardiovascular, respiratory and digestive systems and the functioning of body systems associated with energy metabolism. You will consider some common disorders and how homeostatic mechanisms operate in the maintenance of an internal environment. You will investigate the processes relating to natural conception and prenatal development from the point of fertilisation through to birth. You will

The unit will be assessed through one examination of 90 marks lasting 1 hour and 30 minutes. Learners will be assessed through a number of short- and long-answer questions and multiple-choice questions. The questions will assess understanding of the structure of human anatomy and the function of different body systems.

Your SIL Task is to complete the tasks and make notes from the revision book attached to this document. You will be asked to submit your tasks and notes and will be given a 30-minute test on the content in your first lesson.

Task 1 label the human cell



For each of the structures labelled above complete the table.

Organelle / Structure	Physiology (What is its function/what does it do?)

Task 2 Copy this table to a document and complete.

Key term	Definition	Example of where it can be found in the body or how it links to the body.	Picture or symbol to help you remember.
Aerobic respiration			
Anaerobic respiration			
Metabolism			
Basal Metabolic Rate			
Catabolism			
Anabolism			
Law of conservation of energy			

Task 3 – Make notes on the following: **Inheritance and Genetic Conditions**.

Slide 1 – What is genetic inheritance?
Slide 2 – Why do genetic variations occur?
Slide 3 – Down's syndrome
Slide 4 – Phenylketonuria (PKU)
Slide 5 – Sickle Cell Disease
Slide 6 - Cystic Fibrosis
Slide 7 – Huntington's chorea (Huntington's disease)
Slide 8 – Diagnostic testing for genetic and chromosomal disorders
Slide 9 - Chorionic Villus Sampling (CVS)

Task 4 - Make notes on the following pages:

You will be given a 30 minute test on the following in your first lesson back.

Below is the content you are expected to make notes on ready for a quick knowledge check in your first lesson.

Essential content

The essential content is set out under content areas. Learners must cover all specified content before the assessment.

A The structure and organisation of the human body

A1 How cells work

- The function and structure of cells, including membrane, nucleus, ribosomes, rough and smooth endoplasmic reticulum, mitochondria, centrioles, lysosomes and Golgi apparatus.

A2 Characteristics of tissues

The function, structure and location of:

- epithelial – simple (cuboidal, columnar, squamous, ciliated), compound (simple, keratinised)
- connective – blood, cartilage, bone, areolar, adipose
- muscle – striated, non-striated, cardiac
- nervous – neurones, neuroglia.

A3 The structure and function of body organs

- Location, structure and function of heart, lungs, brain, stomach, liver, pancreas, duodenum, ileum, colon, kidneys, bladder, ovaries/testes, uterus, skin.

A4 Energy in the body

- Transformation of energy (chemical, heat, sound, electrical, light).
- Energy metabolism – role of energy in the body, anabolism and catabolism (aerobic and anaerobic respiration).
- Basal metabolic rate.

You may choose to make mild maps, Cornell notes or flash cards of the content, ready for the test.

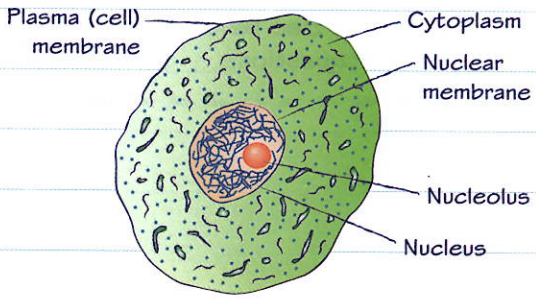
Had a look ☐ Nearly there ☐ Nailed it! ☐

Cell structure and function

The cell is the fundamental unit of all living organisms. Cells are made up of a collection of molecules. The size and shape varies depending on the cell's specialised function. In order for cells to survive in the body they must carry out a variety of functions.

Basic cell structure

Revise what you know about animal cell structure before learning about human cells in more detail.



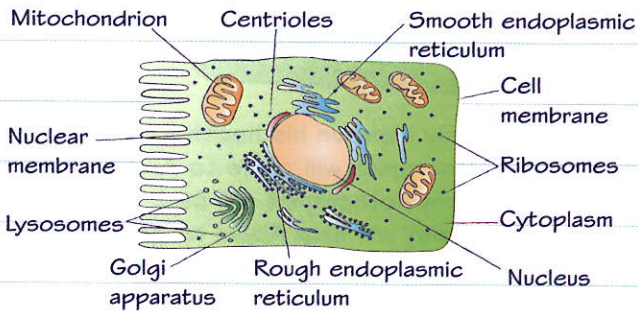
Cell functions

All cells share some basic functions. Others also have specialist functions.

- **Respiration:** cells require and absorb oxygen to produce heat and energy.
- **Growth:** cells grow to maturity by manufacturing proteins. They may then divide or specialise.
- **Excretion:** waste products pass out through the cell membrane.
- **Irritability:** cells can respond to a physical, chemical or thermal stimulus.

Human cell structure in detail

- **Cell membrane:** an outer coating which selectively transports substances into and out of the cell.
- **Nucleus:** the control centre of the cell, regulating its general and specialist functions.
- **Ribosomes:** made of ribonucleic acid (RNA) and protein, they manufacture other proteins.
- **Rough and smooth endoplasmic reticulum:** this manufactures, stores and transports materials within and outside of the cell.
- **Mitochondria:** situated in the cytoplasm, these supply the cell's energy source.
- **Centrioles:** essential for cell division.
- **Lysosomes:** contain enzymes which digest worn out parts of the cell for recycling and elimination of waste products.
- **Golgi apparatus:** modifies and stores manufactured protein and transports it out of the cell.



Make sure that you can draw and label a diagram of a human cell.

Cell division

Human cells **reproduce** by the process of **mitosis,** when structures like chromosomes and centrioles **replicate**. Then the cell **divides** into two identical daughter cells.

Nucleic acids

- **DNA** (deoxyribonucleic acid) carries the cell's **genes** as **chromosomes**. Genes are coded 'instructions' for making proteins and for cell function.
- All three types of **RNA** are involved in the decoding (**transcription**) of DNA to make proteins.

Enzymes

Enzymes are the **protein catalysts** that enable metabolic reactions at low temperatures. Enzymes are involved in all the cell functions of respiration, growth, excretion and irritability.

Now try this

Describe how proteins are involved in all cell functions.

You could cover the role of proteins in growth, the control of cell reactions and the manufacture of other proteins.

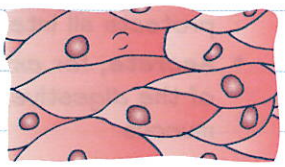
Tissue types: connective tissue

Tissues consist of many of the same type of cells, classified according to structure, location, size, shape and function. Connective tissue is one of the four tissue types.

Tissue types

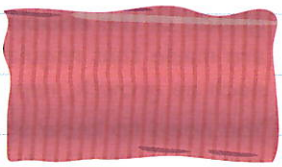
There are **four** main types of tissue, which each then have subtypes:

1. **Epithelial tissue** – thin sheets of epithelial cells make up the coverings and linings of the body and its organs and organ systems (page 114).

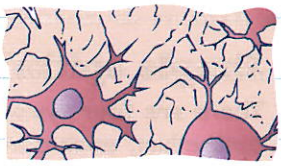


2. **Connective tissue** – has a supportive, structural role in the body, but also includes blood (this page).

3. **Muscle tissue** – contraction of muscle tissue gives movement, and also aids internal processes such as digestion and circulation (page 115).



4. **Nervous tissue** – conducts electrical impulses through the body, enabling the fast transfer of information (page 115).

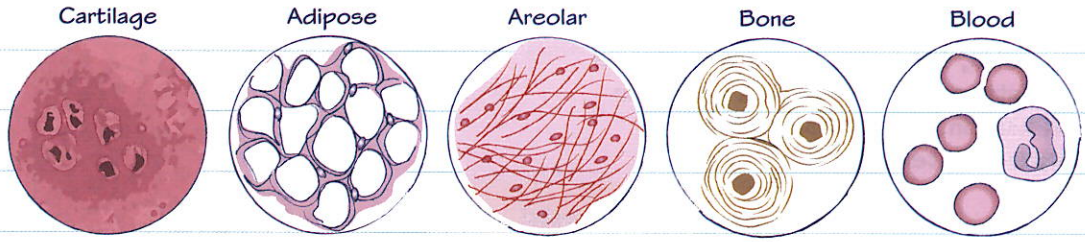


You need to know where these different tissue types may be found in the body and how they are adapted to their functions.

The functions of connective tissue

- To provide **structural** support, such as for **bones** and **cartilage** in the skeletal system, and **areolar tissue** which bonds tissues like skin and muscle.
- To **protect** – the skull protects the brain, and the ribs protect the heart and lungs.
- To **transport** substances in the **blood.**
- To **insulate** (**adipose** tissue contains fatty deposits to help to prevent heat loss).

Main connective tissue types



Now try this

Complete a table like this to show the four main tissue types and their functions in the body.

Tissue type	Function
Epithelial	
	transfer of information via electrical impulses
Muscle	
	structure, support and transport in the body

Tissue types: epithelial tissue

Tissues consist of many of the same type of cells, classified according to structure, location, size, shape and function. Epithelial tissue is one of the four tissue types.

Epithelial tissues

Epithelial tissues cover the body and line cavities, hollow organs and tubes. They are also found in glands of the **endocrine system**, where hormones are made that regulate different bodily functions, such as growth, reproduction and sleep.

You need to know about the **four** types of **simple epithelial tissue** and the **two** types of **compound epithelium**.

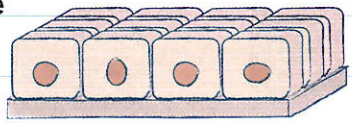
Functions

The functions of epithelial tissues are to:

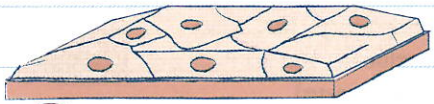
- **protect** underlying structures, for example skin protects all internal tissues and organs
- **secrete**, for example **goblet cells** in the lining of the digestive system secrete enzymes and mucous
- **absorb**, for example the lining of the lungs absorbs oxygen from the air.

Simple epithelial tissue

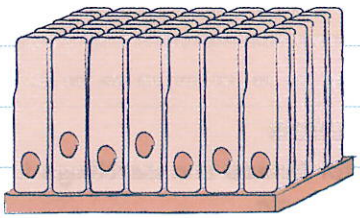
There are **four** types of simple epithelium, each consisting of a single layer of cells.



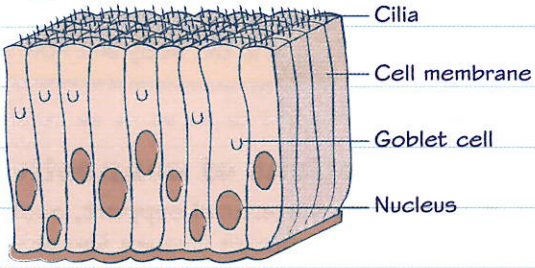
1 Simple cuboidal



2 Simple squamous



3 Simple columnar



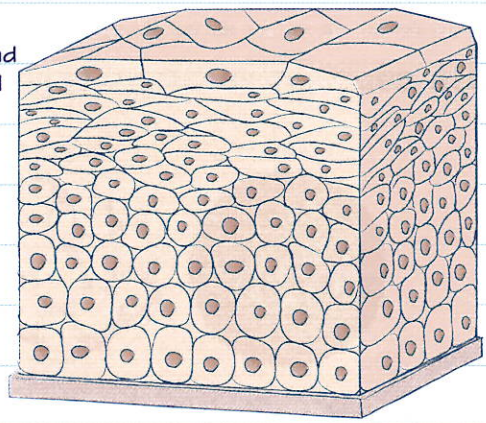
4 Ciliated

You need to know the differences between the four types of simple epithelium.

Compound epithelium

1. **Simple compound epithelium** consists of several layers of cells, the outer layer of which may be worn away.
2. In **keratinised compound epithelium** like our skin, the outer layers of cells are dead, flattened and filled with a protein called keratin. This gives the tissue a waterproof outer layer.

Simple compound epithelial tissue



Simple compound epithelial tissues are found where the body is subject to wear and tear.

Now try this

1 Identify the tissue shown in the photomicrograph and suggest where in the body such tissue might be found.

2 Make a sketch of the tissue shown and label it.

Think about the structures shown in the photomicrograph and how these relate to the function of the tissue. This will give you a clue about where in the body it could be found.

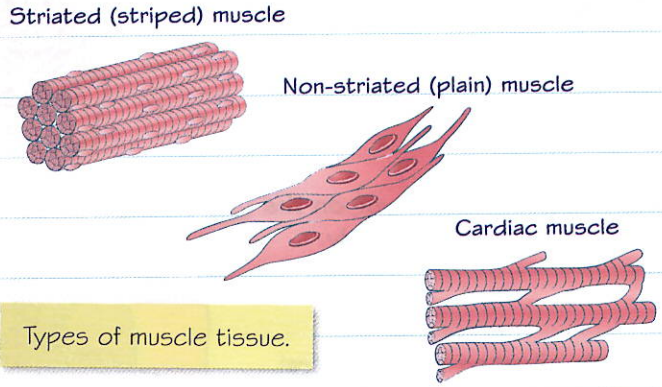
Include these labels: cilia, nucleus, goblet cells. Use the relevant figure above to help you find the correct positions for these labels.

Tissue types: muscle and nervous tissue

Tissues consist of many of the same type of cells, classified according to structure, location, size, shape and function. Muscle and nervous tissue are two of the four tissue types.

The three main muscle tissues

1. **Striated** (skeletal or voluntary) tissue is under conscious control, enabling us to move our bones.
2. **Non-striated** (smooth or involuntary) tissue is concerned with many internal body processes and functions, such as peristalsis in the digestive system.
3. **Cardiac** tissue is found only in the heart wall. It is not under conscious control and never tires.



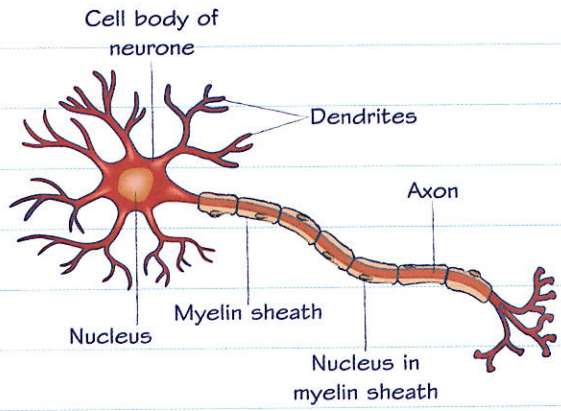
Types of muscle tissue.

Characteristics of muscle tissue which contribute to muscle functioning

- **Contractability**: the ability to shorten and thicken.
- **Irritability**: the ability to respond to stimuli created by nerve impulses.
- **Extensibility**: the ability to stretch.
- **Elasticity**: the ability to return to its original shape following contraction.

The two types of nervous tissue

1. **Neurones** (with properties known as excitability and conductability)
   - A neurone is a specialised nerve cell that receives stimuli, converts it to a nerve impulse and transmits this to other neurones, muscles and glands.
   - Neurones occur as single cells and in groups in certain areas of the body, such as the spinal cord.
   - A neurone consists of a cell body, an axon and many dendrites.
2. **Neuroglia** (glial or non-excitable cells)
   - These support and protect the neurones.
   - They are smaller and more numerous than neurones, forming over 50% of brain tissue.



Neurones receive stimuli at the dendrites. A nerve impulse travels along the axon to the terminals. These form connections with other neurones, muscles or glands.

Now try this

Complete a table like the one below.

Muscle tissue type	Location in body	Function
Striated		
Non-striated		
	heart	

Had a look ☐ Nearly there ☐ Nailed it! ☐

Major body organs

You need to know the locations of the major organs in the human body, and the structure and functions of each. Make sure you can label them.

Brain, skin, heart and lungs

Brain: in the skull. The **nervous centre** that controls all life functions.

Skin: a protective layer on the outer surface of the body.

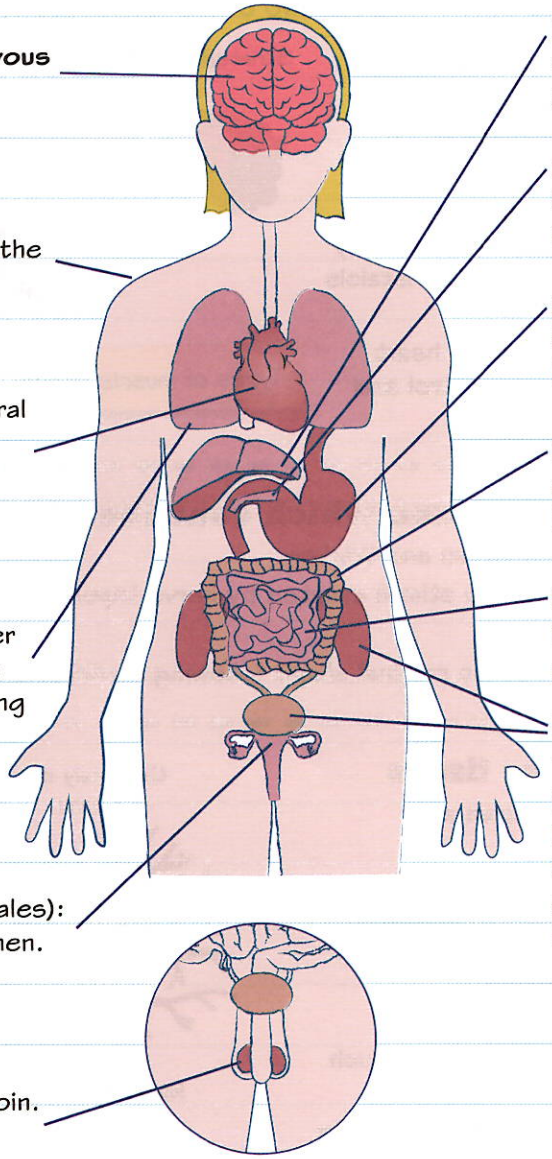
Heart: situated in the central chest area. Circulates the **blood** to all tissues, which is essential for life.

Two **lungs:** located on either side of the heart. Facilitate the exchange of gases during **respiration**.

Sexual organs

Uterus and **ovaries** (in females): situated in the lower abdomen. Involved in reproduction.

Testes (in males): in the groin. Secrete testosterone and produce sperm.



Digestive organs

Liver: in the upper right of the abdomen. Involved in **digestion** and **excretion** of waste products.

Pancreas: behind the stomach. Secretes vital digestive **enzymes**.

Stomach: around the midline of the body, slightly to the left. Important in **digestion**.

Large intestine: (cecum and **colon**) where water reabsorption takes place.

Small intestine (duodenum and ileum): where the main food **absorption** takes place.

Kidneys and bladder

Two **kidneys:** on either side of the body, above and slightly behind the large intestine. Secrete urine, which is collected and stored in the **bladder** ready for excretion.

Now try this

Complete the table by adding the name of an organ that is part of each organ system. Can you add more than one example for some systems?

Organ system	Example organ(s)
Nervous system	
Cardiovascular system	
Respiratory system	
Digestive system	
Reproductive system	

Look at the organs in bold above and work out the organ system for each from the description of its function.

Energy metabolism

Humans use the chemical energy stored in food molecules as an energy source for life processes. We also use the simple products of digestion to build the new complex molecules that our bodies require.

Transformation of energy

An important law of physics is **the law of conservation of energy**. According to this law energy can neither be created nor destroyed. It can, however, be tranformed from one form into another. Forms of energy include chemical, heat, sound, electrical and light.

Bodies are good at converting the chemical energy in food into other forms of energy, for example into heat energy to keep warm, kinetic energy to move about, electrical energy to send nerve impulses and sound energy to speak or make noises.

What is metabolism?

The body converts ingested food into the chemicals and energy it needs to grow and function.

- Cells can build up complex molecules from the simple products of digestion.
- In cells, chemical processes release stored energy from the products of digestion.

The rate at which energy is released from cells is known as the **metabolic rate.** Metabolism involves two processes: **catabolism** and **anabolism.**

Basal metabolic rate (BMR)

This is the rate of metabolism when the body is at rest, in a warm environment, and when food has not been consumed for at least 12 hours. In this state, the energy released is just sufficient to meet the essential needs of the vital organs, such as heart, lungs, brain, and kidneys, thereby keeping the body alive.

Catabolism

The chemical breakdown of complex substances, such as carbohydrates, proteins and glucose, is accompanied by the release of energy.

- If the body has plenty of oxygen, **aerobic respiration** takes place. The products are carbon dioxide and water, which are excreted through the lungs.
  In cells, aerobic respiration takes place in the **mitochondria**.
- If there is insufficient oxygen, **anaerobic respiration** occurs. The product is lactic acid.
  In cells, anaerobic respiration takes place in the **cytoplasm**.

Anabolism

Anabolism is the opposite of catabolism. It is the building up of larger molecules from smaller ones, for example proteins from amino acids. Examples of anabolism include:

- building muscle tissue
- creating new cells
- mineralising bone.

Now try this

1 Compare anabolic and catabolic reactions.
2 Compare aerobic and anaerobic respiration.

Remember, catabolism and anabolism are opposite types of reaction.

They take place under different conditions and have different products.

Suggested additional SIL

Task 3 – History of public health

Produce a document no more than two sides that outlines the history of public health. You may wish to do a timeline, PowerPoint slide, spider diagram or written document. Please include

- Beveridge Report 1942,
- Public Health Act
- Alma-Ata Declaration
- Ottawa Charter for Health Promotion 1986
- Creation of the NHS
- Creation of the World Health Organisation

Suggested additional SIL

Task 4: Research

Create a PowerPoint presentation outlining how the following agencies promote public health. Include

- What are they?
- How are they funded?
- Who's health are they responsible for promoting?
- Examples of health campaigns, policy or other areas they have designed or have influence over.

1. WHO.
2. Department of Health
3. Public Health Agency
4. Clinical Commissioning Groups (CCGs)

Task 5: Have your say
(Research task. No longer than an hour.)

Suggested additional SIL

Read the article and decide which public health achievement you think has been the most important. Time yourself to take no longer than an hour to read the information and reach your decision. https://www.rsph.org.uk/our-work/policy/top-20-public-health-achievements-of-the-21st-century.html Prepare notes to discuss your ideas.

Task 6: Models of health promotion

Suggested additional SIL

Definitions and examples (Text book chapter in SIL folder)

Model/Theory	Explanation of the model and the key features.	Can you find an example of a campaign that uses this model?
Health belief model		
Theory of reasoned action		
Theory of planned behaviour		
Stages of change model		
Social learning theory.		