HLTAAP001

Recognise healthy body systems

Learner Guide

Aspire
Learning Resources

HLTAAP001
Recognise healthy body systems

Release 1

Learner Guide

Aspire Version 1.1

Aspire
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HLTAAP001 Recognise healthy body systems, Release 1

PO Box 5107, Bentleigh East, VIC 3165 Australia
Phone: (03) 9820 1300

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Cover design Anne-Marie Reeves Design
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Contents

Aspire acknowledges the homelands of all Aboriginal and Torres Strait Islander peoples and pays our respect to Country

Before you begin

This Learner Guide is based on the unit of competency *HLTAAP001 Recognise healthy body systems,* Release 1.

Your trainer or training organisation must give you information about this unit of competency as part of your training program.

How to work through this Learner Guide

This Learner Guide contains a number of features that will assist you in your learning. Your trainer will advise which parts of the Learner Guide you need to read, and which Practice Tasks and Learning Checkpoints you need to complete.

Feature of the Learner Guide	How you can use each feature
Learning content	Read each topic in this Learner Guide. If you come across content that is confusing, make a note and discuss it with your trainer. Your trainer is in the best position to offer assistance. It is very important that you take on some of the responsibility for the learning you will undertake.
Examples	These highlight learning points and provide realistic examples of workplace situations.
Practice Tasks	Practice Tasks give you the opportunity to put your skills and knowledge into action. Your trainer will tell you which Practice Tasks to complete.
Callouts	Callouts reiterate key learning points to help students revise for their assessments.
Weblinks	Weblinks provide learners with additional content to contextualise their learning and develop their understanding.
Videos	Videos provide a visual reference of key concepts to aid comprehension and guide learner exploration. Each video is accessed by a QR code in the Learner Guide (or a button in the eBook version) for ease of access. 
Glossary/margin definitions	Key terms are defined where they first appear to help consolidate understanding. A glossary of terms is provided at the end of the Learner Guide to assist learner revision of key concepts.
Summaries	Key learning points are provided at the end of each topic.
Learning Checkpoints	There are Learning Checkpoints at the end of each topic. Your trainer will tell you which activities to complete. These activities give you an opportunity to check your progress and apply the skills and knowledge you have learnt.
Case studies	Case studies are interspersed throughout the learning content to provide a workplace setting that contextualises key concepts.

Foundation skills

As you complete learning using this guide, you will be developing the foundation skills relevant for this unit. Foundation skills are the language, literacy and numeracy (LLN) skills and the employability skills required for participation in modern workplaces and contemporary life.

These skills are listed below:

Foundation skill area	Foundation skill description
Reading	• Understanding how documents are presented and being able to navigate through documents • Understanding industry and job-specific terminology • Interpreting key information in relevant documents • Understanding routine workplace checklists and documentation
Writing	• Planning, drafting and writing reports and documents • Communicating through written letters, email and online • Recording progress; reporting incidents
Oral communication	• Clarifying instructions • Providing information • Supporting others through encouragement, negotiation and conflict resolution • Using body language to model desired behaviour and responding to others' body language
Numeracy	• Calculating costs, weights, measurements of height and distance • Interpreting measurements
Learning	• Understanding your job role, organisational procedures and legal responsibilities • Managing your work and seeing how well you are going • Making goals for yourself at work • Seeking professional development opportunities for continuous improvement
Problem-solving	• Identifying problems • Working out how to fix a problem using problem-solving processes • Reviewing the outcome
Initiative and enterprise	• Recognising opportunities to develop and apply new ideas • Generating ideas by thinking of new ways to do something • Making suggestions to improve work
Teamwork	• Working well with other people by cooperating, collaborating, encouraging and building rapport

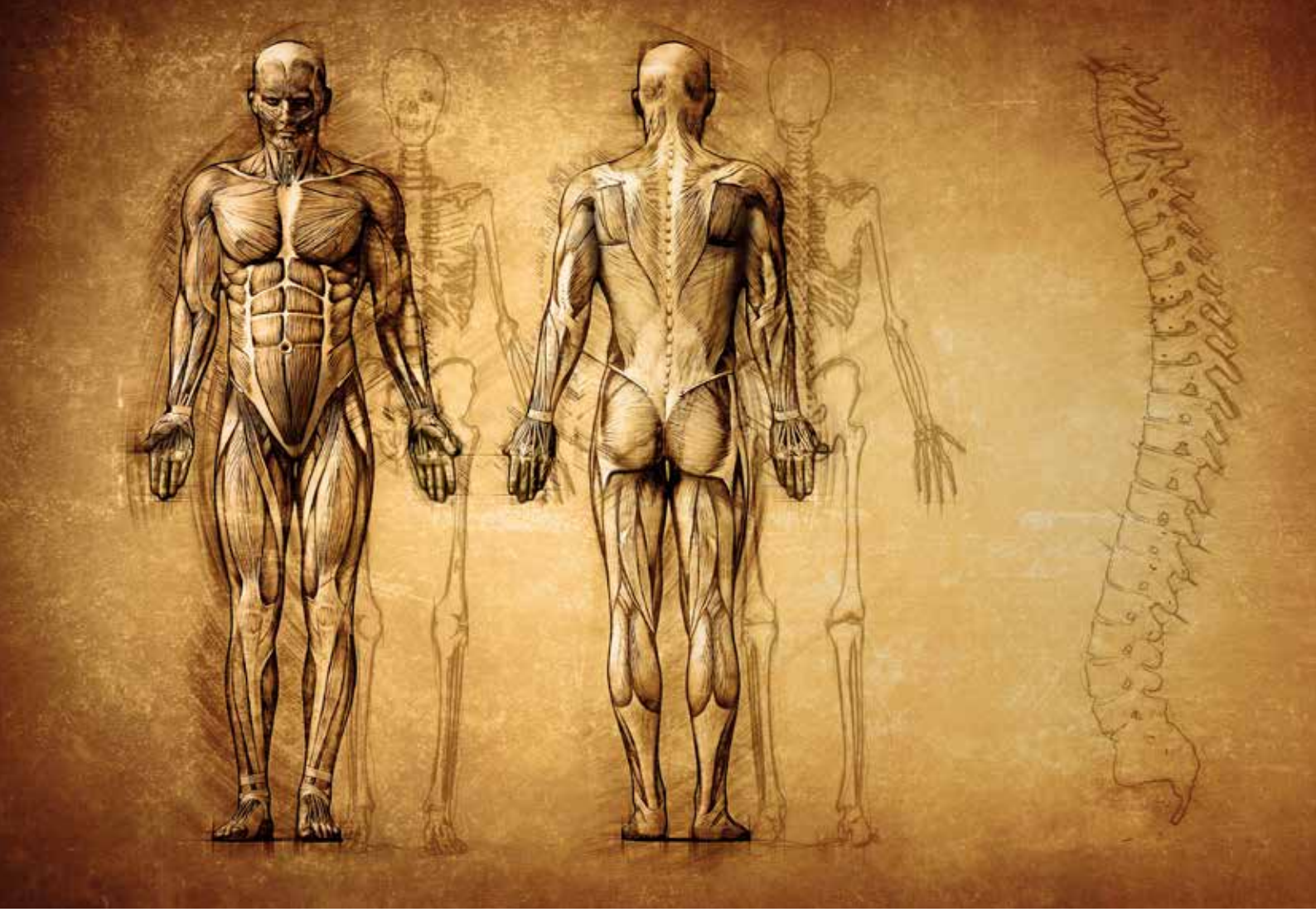
Foundation skill area	Foundation skill description
Planning and organising	• Planning your workload and commitments • Implementing tasks • Completing work on time • Knowing how to deal with hazards and risks
Self-management	• Understanding and applying decision-making processes • Reviewing your behaviour and the impact of your decisions
Technology	• Efficiently using digitally based technologies and systems correctly and safely • Accessing, organising and presenting information • Using equipment correctly and safely

Note: Not every unit of competency will contain all foundation skills.

What do you already know?

Use the following table to identify what you may already know. This may assist you to work out what to focus on in your learning.

Topic	Key outcome	Rate your confidence in each section
Topic 1 Work with information about the human body	1A Use health terminology to describe body systems	❑ Confident ❑ Basic understanding ❑ Not confident
	1B Basic structure, function and location of major body systems	❑ Confident ❑ Basic understanding ❑ Not confident
	1C Interrelationships between body systems	❑ Confident ❑ Basic understanding ❑ Not confident
Topic 2 Recognise and promote the healthy functioning of the body	2A Review factors that contribute to the maintenance of a healthy body	❑ Confident ❑ Basic understanding ❑ Not confident
	2B Understand how relationships between body systems affect healthy functioning	❑ Confident ❑ Basic understanding ❑ Not confident
	2C Enhance work using and sharing information about the healthy functioning of the body	❑ Confident ❑ Basic understanding ❑ Not confident



Topic 1: Work with information about the human body

1A Use health terminology to describe body systems

1B Basic structure, function and location of major body systems

1C Interrelationships between body systems

1A Use health terminology to describe body systems

While the tasks and duties of a role in aged services vary, support workers need to be familiar with medical terminology and medical conditions.

Typical duties of a support worker include providing personal care and contributing to care plans by reporting on the older person's health and wellbeing (physical and mental). A support worker needs to be familiar with correct terminology used to describe parts of the body, so they can communicate accurately to healthcare professionals.

Using correct medical terminology ensures that everyone in the workplace is using a shared language to communicate about their clients. This is in the best interests of the clients and those caring for them. Health information must never be ambiguous or open to interpretation; a client's health may be placed at risk when instructions or information are unclear or able to be misinterpreted.

Here are some contexts where you may see medical terms used to communicate health information:

- terms used in correspondence and medical forms
- terms relating to areas of the client's body requiring attention
- descriptions of symptoms and signs of illness or ill health
- names of diseases and disorders
- names of tests or procedures to diagnose illness
- types of treatments or procedures to treat illness or discomfort
- abbreviations for terms used in health records
- names of instruments, equipment and resources required for treatments
- names of medication or drugs, including generic and brand names.

Learning the basics in health terminology

It is common to look at health terminology and think you are looking at a completely different language – and in many cases you are. Many medical terms come from ancient languages like Latin. There are certain rules that will help you understand complex terms by breaking them down. It is a matter of becoming familiar with these rules and applying them to new medical terms you come across.

Before you learn the medical names and functions of the human body you need to learn basic common phrases that are used. For example in this unit you will be learning about **anatomy** and **physiology**.

Anatomy
The study of the body's structures and the relationships between the body parts.

Physiology
The study of how the human body works, and the chemical and physical reactions that underlie every bodily function.

Understanding the language of health terminology

Some medical terms will be familiar to you, whereas others are very long and difficult to say, let alone understand.

Medical terminology follows a system where two or three components form a word that can be broken down into parts. Each of the parts have specific meanings that, when put together, give the term its meaning.

Most medical terms are made up of three basic components:

- word root (the base of the term or central part of the word)
- prefix (letter groups that come before the word root)
- suffix (letter groups that come after the word root)

Prefixes and suffixes are letters or groups of letters that are not words themselves, but change the meaning of a word when added to a word root.

Here is an example of a term for a particular medical condition that includes these three components:

- **Word:** Hyperthyroidism
- **Components:** Hyper/thyroid/ism
- **Prefix:** hyper (meaning overactive)
- **Word root:** thyroid (refers to the thyroid gland)
- **Suffix:** ism (referring to a condition)
- **Word meaning:** A condition that is caused by an overactive thyroid gland.

At first glance new medical terms may look intimidating; however, you will, with practice, begin to recognise word parts as you see them repeated in different words. You will learn to break down the word into its separate parts, and the meaning of the term will become clear.

Common medical prefixes

A prefix is a group of letters that comes before the root or roots of a word.

Prefixes are generally used to convey the following kinds of information:

- Quantity – the number or amount of something
  - Example: 'tri' means 'three', as in triceps muscle (which has three points of attachment)
- Negatives – that something is 'not', 'without' or 'against'
  - Example: 'anti' meaning 'against', as in antibiotic (which is against (kills) bacteria)
- Degree, size or comparison – whether something is big or small, fast or slow
  - Example: 'mega' meaning 'big', as in megacolon (which is an abnormal increase in size of the colon)
- Time, position or direction – whether something is above or below, before or after
  - Example: 'ante' meaning 'before', as in antenatal (before a baby is born) and 'post' meaning 'after', as in postnatal (after a baby is born).

Here are some examples of prefixes found in medical terms:

Prefix	Meaning
ab-	away from
ad-	towards
ante-	before or forward
anti-	against
brady-	slow
circum-	surrounding
contra-	against
cry-	cold
di-	double or two
dys-	difficult or defective
ect-	outside

Prefix	Meaning
inter-	between or among
intra-	within or on the side
macro-	large
micro-	small
neo-	new
para-	beside
peri-	around
post-	after
pre-	before or in front of
semi-	half
stom- stomat-	opening created

Prefix	Meaning
end-	inside
epi-	on
fore-	before or ahead
glyc-	sugar
hemi-	one half
homeo-	stability or same
hydro-	water
hyper-	over or excessive
hypo-	under or deficient

Prefix	Meaning
sub-	under or beneath
super-	above or over
supra-	above or on the upper side of
syn-	with or together
tachy-	fast
therm-	heat
tox-	toxic or poisonous
trans-	across or beyond
ultra-	excessive

Common medical suffixes

A suffix is a group of letters that come after the root or roots of a word.

Suffixes are always found at the end of the word. Every medical term ends in a suffix.

Suffixes are generally used to convey the following meanings:

- Medical conditions and diseases
  - Example: 'ia' as in hypothermia
- Medical instruments
  - Example: 'graph' meaning 'a recording instrument', as in electrocardiograph
- Diagnostic measurement tools
  - Example: 'scope' as in 'stethoscope'
- The condition of body fluids
  - Example: 'aemia' as in 'leukaemia'
- Senses, body functions or processes – vision, hearing, breathing, growth
  - Example: 'opia' as in 'myopia' refers to a condition related to vision
- Denoting people and areas of specialty
  - Example: 'logist' as in cardiologist

Here is a list of medical suffixes and their meanings used across a wide range of health areas:

Suffix	Meaning
-algia	pain or painful
-asis	condition
-blast	young cell
-crine	to secrete
-cyte	cell
-ectomy	cut out
-emia	blood condition
-graph	instrument to record data
-gram -gramme	record or picture
-ism -osis	condition
-ist	specialist
-itis	inflammation of
-lepssi -lepsy	attack or seizure
-logy	study of
-megaly	enlargement
-oid	resembling
-oma	tumour

Suffix	Meaning
-pathy	disease
-phagia	eating or swallowing
-phili(a)	attraction to
-phobia	fear of
-plasty	plastic surgery
-plegia	paralysis
-poiesis	production
-rrheoea	flowing or discharge
-rupt	break or burst
-scler	hardening
-scope	instrument for examination
-stalsis	contraction
-stenosis	abnormal narrowing
-stomy	creating an opening
-tic	pertaining to
-tomy	incision
-ula -ule	small

Word roots used in medical terms

Word roots indicate the basic meaning of a word.

Word roots can be found on their own or added to another word root to form a new word. Prefixes and suffixes can be added to a word root to change the meaning of the word. For example, the prefix 'para', meaning 'beside', can be added to the word root 'thyroid'. It changes the meaning of the word to 'beside the thyroid'.

Word roots are generally used to convey the following meanings:

- Body structures or anatomy: the cells, tissues, glands, organs, cavities and regions of the body
  - Example: 'pneumon' meaning 'lung', as in pneumonia (a disease of the lungs)
- Body fluids: blood, sweat, tears, saliva, mucus, pus, bile, urine, etc.
  - Example: 'sial' meaning 'saliva', as in sialogram (imaging the salivary glands)
- Chemical compounds: substances such as sugar, protein, fat, oxygen, poison and drugs
  - Example: 'gluc' meaning 'sugar', as in glucose (sugar molecule)
- Physical factors: temperature, light, sound, electricity, radiation
  - Example: 'therm' meaning 'heat', as in thermometer (a device to measure temperature)
- Agents of infection: bacteria, viruses, fungi
  - Example: 'myc' meaning 'fungus', as in mycosis (a disease caused by fungus)
- Colours
  - Example: 'leuk' meaning 'white', as in leukaemia (disease of the white blood cells)

Here are some common word roots and their meanings that you will frequently see in medical terms:

Word root	Meaning	Word example	Word meaning
abdomen	abdomen	abdominopelvic	lower torso
arthr	joint	arthroscopy	procedure that examines the inside of a joint
bacter	bacteria	bacteriocide	substances that kill bacteria

Word root	Meaning	Word example	Word meaning
brach	arm	brachialis	one of the muscles of the arm
card	heart	cardiac arrest	heart attack
carcin	cancer	carcinogen	cancer-causing agent
cerebr	brain	cerebrospinal fluid	fluid found inside the spinal cord
chem	drug/chemical	chemotherapy	group of drugs that kill cancer cells
col, colon	large intestine	colectomy	surgical removal of the colon
cost	rib	costal cartilage	cartilage between the ribs
derm	skin	dermal therapy	treatment for the skin
dent, dont	tooth or teeth	dentist	tooth specialist
dors	back	dorsal	the back of something
fossa	hollow depression or trench	fossa ovalis	opening in the fascia of the thigh
gastr	stomach	gastroenteritis	inflammation of the stomach and intestines
gingiv	gums	gingivitis	inflammation of the gums
hepat	liver	hepatitis	inflammation of the liver
haem	blood	haemoglobin	protein in red blood cells
hyster	uterus	hysterectomy	surgical removal of the uterus
kerat	cornea (skin or eye)	keratin	protein found in the skin
lact	milk	lactation	secreting milk
lip, adip	fat	liposuction	procedure that removes fat from the body

Word root	Meaning	Word example	Word meaning
luec	white	luecocyte	a type of white blood cell
mamm	breast	mammary gland	breast tissue
melan	dark colour	melanoma	a type of dark-coloured skin cancer
natal	birth	neo-natal	newborn baby
neur	nervous system or nerves	neuroscience	study of the nervous system
opthalm	eye	ophthalmology	study of the eye
oss	bone	ossification	becoming bone-like
ov	egg	ova	female egg
pector	chest	pectoralis	one of the muscles of the chest
pelv	pelvic or hip bone	pelvis	area around the hip joint
pulm	lung	pulmonary	relating to the lungs
ren	kidney	renal	relating to the kidney
thorac	chest or rib cage	thoracic vertebrae	vertebrae of the chest area
thromb	clotting of blood	thrombus	blood clot
thyr	thyroid gland	hypothyroid	underactive thyroid gland
ur	urine, urinary system	uremia	high levels of urea in the blood
vas	blood vessel	vasodilation	widening of the blood vessels

Example

Recognising word roots

Luke has been reading about his client's health condition in their care plan. Luke uses his knowledge of medical terms and abbreviations to understand what he is reading:

'Mr Clive has had IDDM for 10 years. He consults his GP regularly and is under the supervision of an endocrinologist and ophthalmologist. Patient reports blood glucose levels (BGL) are within normal levels.'

'Recommendations: Monitor condition of feet for wounds (compromised skin integrity).'

Putting words together

When various components of a word are put together, combining vowels such as 'i' or 'o' are sometimes used to help with the pronunciation.

These are usually added between a word root and the prefix or suffix.

Here are two examples:

- In the term osteopathy, 'oste' is the word root, 'o' is the combining vowel, and 'pathy' is the suffix.
- In the term cardiovascular, two word roots are joined, 'cardi' and 'vascular', with 'o' as the combining vowel.

The following table has examples of word roots used in anatomical terms (relating to parts of the human body).

Complete word	Prefix	Word root	Suffix	Definition
bradycardia	brady- (slow)	-card- (heart)	-ia (condition)	Slow heart rate
electrocardiograph	electro- (electric)	-card- (heart)	-graph (measure)	Device used to measure the electrical activity of the heart
hypertension	hyper- (high/ overactive)	-tension (pressure)		Abnormally high blood pressure

Complete word	Prefix	Word root	Suffix	Definition
ophthalmologist		ophthalm- (eye)	-logy (study of) -ist (specialist)	A specialist who diagnoses and treats eye disorders
periodontitis	peri- (around)	-dont- (tooth)	-itis (inflammation)	Inflammation of the area around the tooth, i.e., the gums

There are many free online dictionaries you can use to look up the meanings of medical terms.

- aspirelr.link/medical-dictionary
- aspirelr.link/oxford-concise-medical-dictionary

Example

Recognising health terminology

Brad is a new support worker attending his first staff meeting. He works in a large residential aged care facility that employs 21 staff. Brad listens carefully to the discussion as various senior staff members and allied health professionals talk about the health and wellbeing of clients.

One of the physiotherapists mentions a client who has been complaining of lower back pain. As the case study is explained, Brad recognises various medical terms used to describe the muscles, organs and bones being treated by the physiotherapist. When he hears the term 'renal', he reflects that the client's issue may be connected to his kidneys.

Interpreting abbreviations

An abbreviation is a shortened form of word. Using abbreviations saves time when documenting health information.

Abbreviations are used as a kind of shorthand to document and communicate written health information.

Abbreviations may be used in many areas of your work, including:

- the names of medical services, hospitals or organisations
- people providing health services to a client
- different areas of medicine, medical procedures, medical equipment and instruments
- recording of medical information.

Every organisation will have a slightly different protocol for using abbreviations to document information. If you are ever asked to make notes documenting your client's health, your supervisor can check your work and help you to complete documents correctly.

Common acronyms and abbreviations

An acronym uses the first letters of several words, e.g., 'ICU' for 'intensive care unit'. An abbreviation is a shortening of a word, e.g., 'abx' for 'antibiotics'. Using acronyms and abbreviations saves time and space in written documents.

The acronyms and abbreviations you use will vary according to the area you work in and the people you support and their health status.

For example, they may be used to:

- shorten the job descriptions of health professionals, such as 'OT' meaning 'occupational therapist'
- refer to diseases, such as 'CF' for 'cystic fibrosis' or 'RA' for 'rheumatoid arthritis'.

Almost all abbreviations are written without full stops or other punctuation; for example, CVD (meaning cardiovascular disease) is not written as C.V.D. Abbreviations are usually capitalised. Exceptions to this rule are those used for medications and prescriptions, which are often in lower case.

The following is a list of common medical acronyms and abbreviations.

Acronym/ abbreviation	Meaning
ABI	acquired brain injury
ACF	aged care facility
Abx	antibiotics
ADM	admission
AHW	allied health worker
AOD	alcohol and other drugs
BP	blood pressure
BID	two times a day (from Latin *bis in die*)
BMI	body mass index
BMR	basal metabolic rate
BS	blood sugar
BGL	blood glucose levels
CALD	culturally and linguistically diverse
CHW	community health worker
CPR	cardiopulmonary resuscitation
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular disease
DOB	date of birth
DSP	disability support pension
EN	enrolled nurse
ENT	ear, nose and throat
ECG	electrocardiogram
FH	family history
GI	gastrointestinal
g	gram
HACC	home and community care
ICU	intensive care unit

Acronym/ abbreviation	Meaning
IDDM	insulin-dependent diabetes mellitus
IV	intravenous
kg	kilogram
L	left
LOW	loss of weight
LRQ	lower right quadrant
Max	maximum
mg	milligram
Mid	middle
NOK	next of kin
OPD	once per day
OT	occupational therapy
O	oxygen
P	pain
QID	four times a day (from Latin *quater in die*)
R	right
Sup	superior
URI	upper respiratory infection
UTI	urinary tract infection
VS	vital signs
WBC	white blood cells
WBAT	weight bearing as tolerated
W/O	without
WT	weight
x	times
XR	x-ray
YO	years old

Example

Using abbreviations

Dev has been employed as a support worker in an organisation that has a health clinic. He is becoming familiar with the abbreviations the doctors use in their documentation and when speaking to each other. He has been compiling his own list of commonly used abbreviations so he can learn them. So far his list includes:

- ABI
- BID
- COPD
- IDDM
- LOW
- VS
- WT

Practice Task 1

Question 1

Match each prefix on the left to its definition on the right.

peri-	slow
brady-	under-active
inter-	between
sub-	around
trans-	below
hypo-	across

Question 2

Match each suffix on the left to its definition on the right.

-rupt	cell
-phobia	cut out
-ectomy	study of
-cyte	tumour
-logy	fear
-oma	break or burst

Question 3

Using your knowledge of prefixes and suffixes, identify which of the following statements about the heart are correct? Select yes or no for each one.

a. Cardiology is the study of the heart	Yes / No
b. A cardiologist is a medical specialist for the heart	Yes / No
c. Tachycardic is a condition where the heart is beating too slowly	Yes / No
d. Cardiomegaly is a general term for disease of the heart	Yes / No
e. Pericarditis means inflammation around the heart	Yes / No

Question 4

Match each acronym or abbreviation on the left to its meaning on the right. Use an online medical dictionary if you need to look up some of these abbreviations.

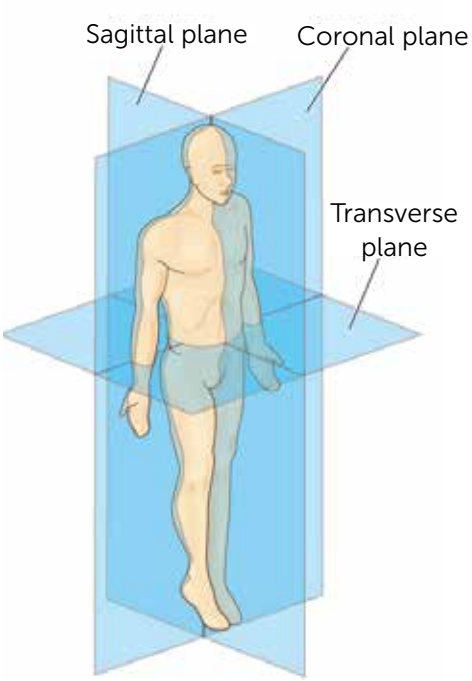
Rot	antibiotics
GI	blood pressure
Soln	chronic obstructive pulmonary disease
COPD	gastrointestinal
IV	intensive care unit
Tx	intravenous
BP	lower back pain
Abx	next of kin
ICU	rotation
LBP	solution
XR	therapy or treatment
NOK	x-ray

1B Basic structure, function and location of major body systems

The human body is an incredibly complex assemblage of different systems working together.

To be able to understand the workings of the human body, you must first know how to use the correct terminology to explain the organisation of the body related to:

- location, direction and planes
- cavities
- cells, tissues and organs.



Location, direction and planes

These anatomical terms explain *where* on the body you are focusing on. If a client has a sharp pain that you are concerned about, you need to be able to communicate, orally and in writing, exactly where on the body the pain is. This is important, as a nurse or doctor needs to know what part of the body may be injured/infected. For instance, stomach pain could suggest something completely different from chest pain.

Video: Anatomical terms
Watch this video that explains anatomical terms and their use in describing the human body: aspirelr.link/yt-anatomical-terms

Videos: Mapping the body
Watch these videos to understand mapping the body:

- Mapping the body, part 1: Views, planes and directional terms: aspirelr.link/yt-mapping-body-1
- Mapping the body, part 2: Cavities, quadrants and regions: aspirelr.link/yt-mapping-body-2

Location, direction and planes

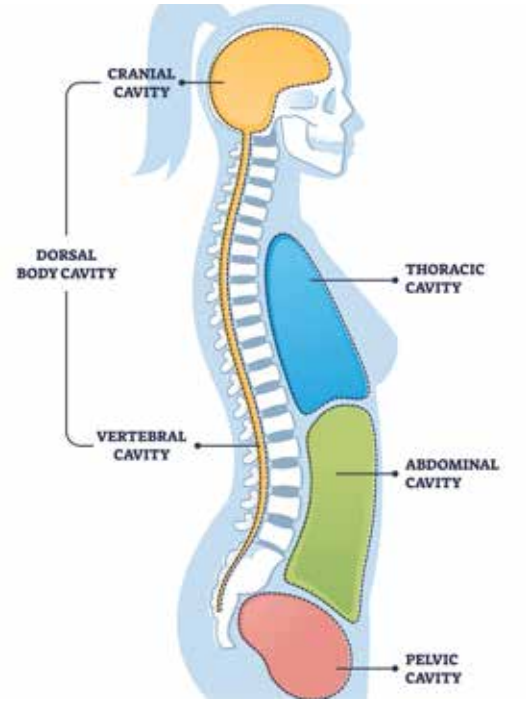
The following table has common terminology used in anatomy that explain location, direction and planes within the body:

Anatomical term	Definition
superior	towards the head
inferior	towards the feet
anterior (ventral)	towards the front
posterior (dorsal)	towards the back
medial	towards the middle of the body

Anatomical term	Definition
internal (deep)	away from the surface of the body
external (superficial)	towards the surface of the body
proximal	towards the trunk (main mass) of the body
distal	away from the trunk (main mass) of the body
lateral	towards the side of the body

Cavities

Cavities are spaces in the body that hold important body parts called organs (e.g., the heart, lungs, brain). The cavity protects the organs with fluid and a membranous and/or bony structure that gives them space to function.



Video: Body Cavities

Watch this short video explaining cavities: aspirelr.link/yt-body-cavities

Name of cavity			Main contents
dorsal body cavity	cranial cavity		brain
	vertebral canal		spinal cord
ventral body cavity	thoracic cavity		heart, lungs
	abdominopelvic cavity	abdominal Cavity	digestive organs, spleen, kidneys
		pelvic cavity	bladder, reproductive organs

The building blocks of the human body

Cells, tissues and organs make up the body systems.

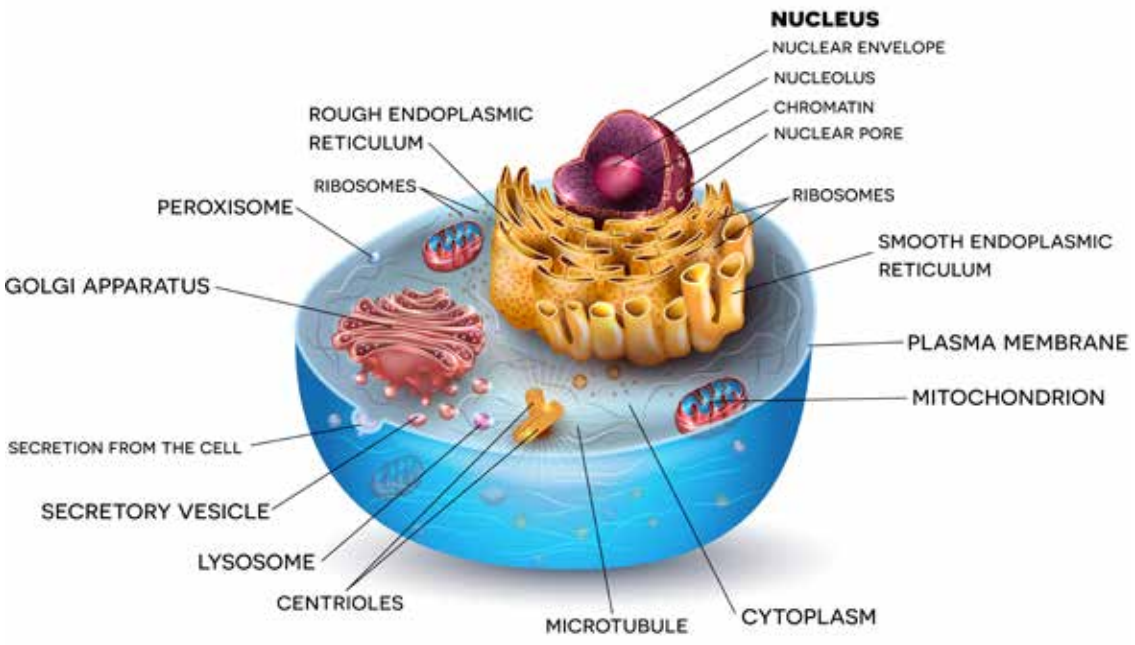
The body is made up of 'building blocks' called cells that form tissues, bones, blood, organs and organ systems. In order to understand how the organs and organ systems work (the physiology of the body) you must at least have a basic understanding of how the 'building blocks' go together. This is very important when a healthcare team is trying to understand what's happening, and decide on a course of treatment.

The body is arranged in a hierarchical structure. Each level of organisation depends on the previous layer. Each of the body's systems is made up of a number of organs. Organs are made up of tissues and tissues are comprised of cells.

Cells

Cells are the basic building blocks of all living things. The human body is composed of trillions of cells. Cells themselves have many parts called organelles and each has a different structure and function.

Cells
The basic building blocks of life that provide structure for the body, metabolise food and convert it into energy.



There are several hundred different types of cells, such as:

- stem cells
- bone cells
- blood cells
- muscle cells
- fat cells
- skin cells
- nerve cells
- endothelial cells
- pancreatic cells
- sex cells.

Video: Cell organelles
Watch this short video explaining cell organelles: aspirelr.link/yt-cell-organelles

Tissues

Tissue
Groups of cells that have a highly organised structure and function.

Tissues are groups of cells that come together in a highly organised manner according to a specific structure and function. There are four main tissue types in the body: epithelial, connective, muscle and nervous.

Even though there are several hundred cell types in the body, all of them can be grouped into just four main categories, or tissues. This makes them easier to understand.

These four main tissues are formed from:

Epithelial cells

These cells are tightly attached to one another. They cover the interior of hollow organs, such as blood vessels and digestive organs, or else form the surface, such as the skin. There are dozens of types of epithelial cells. Without epithelial cells, you would have no skin to protect your body from injury and no stomach to digest your food.

For more information on epithelial cells visit: aspirelr.link/epithelial-cells

Nerve cells

These cells are specialised for communication. They send signals from the brain to muscles and glands that control their functions. They also receive sensory information from the skin and the sense organs such as the eyes and ears, and send this information to the brain. There are dozens of varieties of nerve cells in the body, each with their own shapes and functions. You would have no consciousness or control over your body without nerve cells.

For more information on nerve cells visit: aspirelr.link/nerve-cells

Muscle cells

These cells are specialised for contraction. Without muscle cells, you would not be able to move. There are three kinds of muscle cells. They pull and tug on bones and tendons to produce motion. They also form the thick outer walls of hollow organs, such as blood vessels and digestive organs, and can contract to regulate the diameter of these hollow organs.

For more information on muscle cells visit: aspirelr.link/muscle-cells

Connective tissue cells

These cells provide structural strength to the body and also defend against foreign invaders like bacteria. Two types of cells – fibroblasts and fat cells – are native to connective tissue. Other cells migrate into connective tissue from the bloodstream to fight diseases. Special types of connective tissue – cartilage and bone – are designed to be especially strong and rigid.

For more information on connective tissue cells visit: aspirelr.link/connective-tissue-cells

Organs and organ systems

An **organ** is a self-contained group of tissues that performs a specific function in the body. For example, the heart contains cardiac muscle tissue, which is the collection of cells that form the tissues that allows the heart to function. Organs are usually recognisable structures that are components of organ systems that fulfil the various bodily functions necessary for survival.

Organ
A self-contained group of tissues that performs a specific function in the body.

There are 11 main organ systems:

- circulatory system
- digestive system
- endocrine system
- excretory system
- immune system
- integumentary system
- lymphatic system
- musculoskeletal system
- nervous system
- reproductive system
- respiratory system

Video: Human body systems
Watch this video to get a better understanding of the organ systems:
aspirelr.link/yt-human-body-systems

Practice Task 2

Question 1

Match each anatomical term to its definition/description.

Organ	A group of cells that are grouped together in a highly organised way according to their specific structure and function
Cavity	The basic building block of all living beings that provides structure for the body, takes in nutrients from food, converts those nutrients into energy and carries out specialised functions
Tissue	A self-contained group of tissues that performs a specific function in the body
Cell	A space in the body that holds an organ or organs

The body systems

A body system is a collection of organs that work together to perform a specific task. There are 11 body systems in the human body. The various systems work together to ensure the body has sufficient nutrition and oxygen, can expel toxins, and is able to deal effectively with pathogens and disease. Systems also work together to recognise and respond to pain, to ambulate (walk) and to keep the body in balance.

Each of the 11 systems in the human body is reliant on the other systems. When all the body systems are healthy, the person is able to maintain a state of **homeostasis**, by which the internal conditions necessary to maintain life remain stable and constant.

Homeostasis
The bodily state of relative stability and equilibrium necessary for survival, maintained by multiple internal processes.

Organ system	Key organs	Main functions
Cardiovascular system	Heart, blood vessels	Transport of materials through the body; regulation of temperature
Respiratory system	Airway and lungs	Gas exchange; regulation of temperature
Musculoskeletal system	Muscles, tendons, bones and cartilage	Support; protection; movement; blood cell production
Endocrine system	Glands	Control of the body systems and development

Organ system	Key organs	Main functions
Digestive system	Tongue, oesophagus, stomach, small intestine, large intestine, gallbladder, rectum	Digestion of food; waste removal
Urinary (excretory) system	Kidneys, ureters, urethra and urinary bladder	Regulates the amount of water in the body and filters and eliminates from the blood the wastes produced by metabolism
Reproductive system	Male: penis, testes, prostate; female: uterus, ovaries, vagina	Reproduction
Integumentary system	Skin	Support; protection; regulation of fluid levels
Lymphatic system	Spleen, thymus, lymph nodes and lymphatic vessels	The tissues and organs that produce, store and carry white blood cells that fight infections
Nervous system	Brain, spinal cord	Control of behaviour and body systems; cognition
Special senses	Ears, eyes, nose, tongue, skin	Facilitate hearing, sight, smell, taste and touch

Source: https://courses.lumenlearning.com/wm-nmbiology2/chapter/how-bodies-work/

Cardiovascular system

The cardiovascular system (sometimes also called the circulatory system) is made up of the heart and the blood vessels leading to and from the heart.

The heart has four chambers and is made up of muscular walls and various valves.

The cardiovascular system is responsible for transporting blood and nutrients such as glucose throughout the body. It works in conjunction with the respiratory system to provide oxygen to cells, tissues and organs.

Video: The circulatory system

Watch this video to understand the circulatory system and the path that blood follows as it flows around the body: aspirelr.link/yt-circulatory-system

Terminology of the cardiovascular system

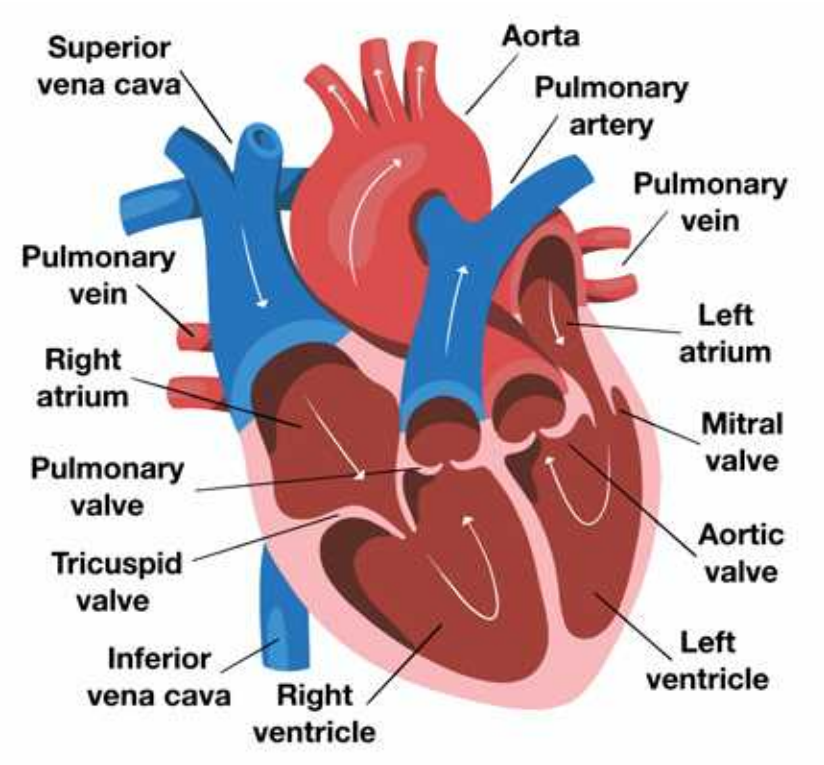
There is specific terminology relating to the structures of the cardiovascular system.

Cardiovascular structure	Explanation
aorta	The aorta is an artery attached to the left ventricle of the heart. Oxygenated blood flows from the heart to the rest of the body via the aorta and other major arteries that branch off from the aorta.
atria (plural of atrium)	The heart is divided into four chambers, the upper two being the two atria – the left atrium and the right atrium. The left atrium receives oxygenated blood from the lungs and pumps it into the left ventricle. The right atrium receives deoxygenated blood from the body and pumps it into the right ventricle.
ventricles	The heart is divided into four chambers. The lower two of these chambers are called the left and right ventricles. Blood is pumped from the atria into the ventricles. The left ventricle pumps oxygenated blood to the body and the right ventricle pumps deoxygenated blood to the lungs.
superior vena cava	A large vein carrying deoxygenated blood into the heart from the head, arms and upper body.
inferior vena cava	A large vein carrying deoxygenated blood into the heart from the lower body.
pulmonary vein	A set of veins that deliver oxygenated blood from the lungs to the heart.
pulmonary artery	The artery carrying blood from the right ventricle of the heart to the lungs for oxygenation.
veins	Blood vessels that bring oxygen-depleted blood towards the heart (with the exception of the pulmonary vein, which carries oxygenated blood).
arteries	Blood vessels that take oxygen-enriched blood away from the heart (with the exception of the pulmonary artery, which carries deoxygenated blood to the lungs).
capillaries	Very small blood vessels that carry oxygenated blood to cells, tissues and organs and carry deoxygenated blood back away from them.

Components of the cardiovascular system

The cardiovascular system consists of the heart, the blood vessels and the blood. The heart is located slightly to the left of the middle chest (thorax) region and has four chambers: two ventricles and two atria. The left side of the heart consists of a top chamber (atria) and a lower chamber (ventricle); this is repeated on the right side of the heart. The atria and the ventricles are separated by valves that open and close in time with the heartbeat. There is a dividing layer of tissue running lengthwise through the middle of the heart called the septum.

The blood vessels of the body consist of arteries, veins and capillaries. The major artery of the body is the aorta and is shaped like a candy cane. Arteries are very strong and elastic and take blood away from the heart.



The major vein in the body is the vena cava, which transports blood back to the heart. Veins are less elastic than arteries and contain small flaps, called valves, that assist with the transportation of blood back to the heart by stopping blood from flowing backwards.

Capillaries are the smallest blood vessels of the body. Capillary walls are only one cell thick, which allows substances to move through the capillary wall and into the cells of the surrounding tissue. The exchange of oxygen and carbon dioxide happens at this level. Capillaries eventually join the arterial and venous systems of the blood vessels at the 'capillary bed'.

Blood

Blood is composed of fluid and cells. The fluid part of blood is called plasma and is straw coloured. It carries blood cells, nutrients, glucose, chemical messages, clotting proteins and waste products throughout the body. Red blood cells, white blood cells and platelets are transported in the plasma.

Red blood cells (erythrocytes) transport oxygen throughout the body. White blood cells (leukocytes) protect the body against infection. Platelets are also found in the blood and assist in the clotting process.

Go to this website for more information on the function of blood cells: aspirelr.link/hematology-blood-basics

Video: The blood
Watch this video to understand the role and make up of blood: aspirelr.link/yt-the-blood

The function of the cardiovascular system

The main function of the heart is to pump blood continually around the body. The left side of the heart pumps blood to the body's cells and the right side of the heart pumps blood to the lungs for the exchange of gases. The septum prevents blood from crossing between the left and right sides of the heart. The atria, ventricles and blood vessels of the heart contain valves that open and close in time with the contraction and relaxation of the heart muscle.

As the blood is delivered from the heart to the cells of the body it transports oxygen, and as it returns back to the heart it takes carbon dioxide to be transported to the lungs for exhalation.

The electrical stimulus of the heart

A person's heartbeat is stimulated by electrical activity. This electrical charge is transmitted through the heart muscle (which is specialised cardiac muscle tissue only found in the heart). The electrical charge starts in the sinoatrial node, and travels through the rest of the heart. The electrical impulse travels across the atria and down the septum causing the atria to contract. The impulse then moves further down the septum and around the ventricles causing them to contract. By this time the atria have relaxed and refilled with blood.

The sinoatrial node is known as the pacemaker of the heart. If it is damaged during a myocardial infarction (heart attack) then the heart may stop (called cardiac arrest) or it may beat at a much slower pace.

Practice Task 3

Question 1

Number the following steps from 1 to 7 in the order blood flows through the heart.

	Left atrium
	Right atrium
	Lungs
	Pulmonary artery
	To the rest of the body
	Right ventricle
	Left ventricle

Question 2

Match each term about blood to its definition/description.

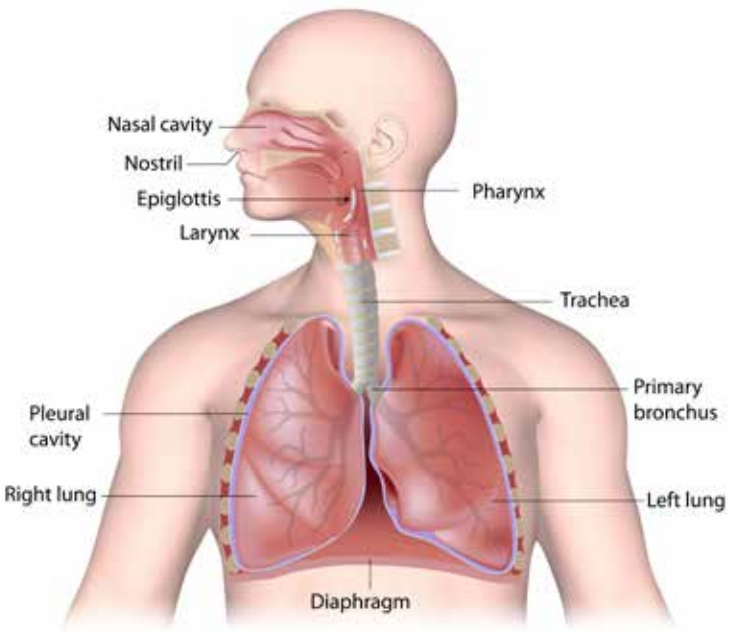
Red blood cells (erythrocytes)	Body fluid that is made up of plasma, red and white blood cells and platelets
Platelets	A watery substance that carries blood cells, nutrients, glucose, chemical messengers such as hormones, clotting proteins, and waste products throughout the body
Blood	The cells that assist in the transportation of oxygen throughout the body
Plasma	The cells that protect the body against infection
White blood cells (leukocytes)	The component of blood that assists in the clotting process

Respiratory system

The respiratory system is located in the head, neck and chest cavity. The main function of the respiratory system is to provide oxygen to the cells of the body and allow for the release of waste carbon dioxide from the body in the exhalation.

Video: Respiratory system - basic anatomy
Watch this video to understand the respiratory system: aspirelr.link/yt-respiratory-system

The respiratory system consists of the lungs, diaphragm, bronchi, trachea, larynx, pharynx and nose.



Air is breathed in through our nose and sometimes mouth. The air is warmed and any unwanted material is caught in the mucous of the nose and expelled from the body when we blow our nose.

The air then enters the oropharynx, which is a shared passageway for food and air. A little flap of tissue called the epiglottis closes the airway when we swallow, stopping foods and liquids from entering the trachea. The air continues through the larynx, where the vocal cords are located and then travels through the trachea, before it enters the lungs.

The lungs are two large hollow organs located in the chest cavity. They are divided into lobes and are protected by the rib cage and various muscles.

The air touches the surface of the lungs where oxygen transfuses through the alveoli (small grapelike structures at the end of the bronchioles) and across the capillary wall into the blood. At the same time, carbon dioxide leaves the capillary to be expelled from the lungs. Any particles of dust or pollen that enter the lungs are trapped in the mucous that is secreted by the goblet cells of the lungs and swept in an upward fashion by cilia (small hair like structures that line the respiratory passage) to be expelled by the body through coughing or sneezing. The lungs also have specialised cells called macrophages that engulf foreign material and thus protect the body.

Practice Task 4

Question 1

Number the following steps from 1 to 5 in the order that air/oxygen flows through the respiratory system.

	The oxygen component of air reaches the surface of the lungs where it transfuses through the alveoli.
	Air enters the nose and is warmed and 'cleaned' of any unwanted particles.
	The air continues through the larynx and then travels through the trachea.
	The air then enters the oropharynx. The epiglottis closes the airway when food travels through to the stomach, stopping it from entering the lungs.
	The oxygen moves across the capillary wall into the blood, and carbon dioxide leaves the capillary to be expelled from the lungs.

Question 2

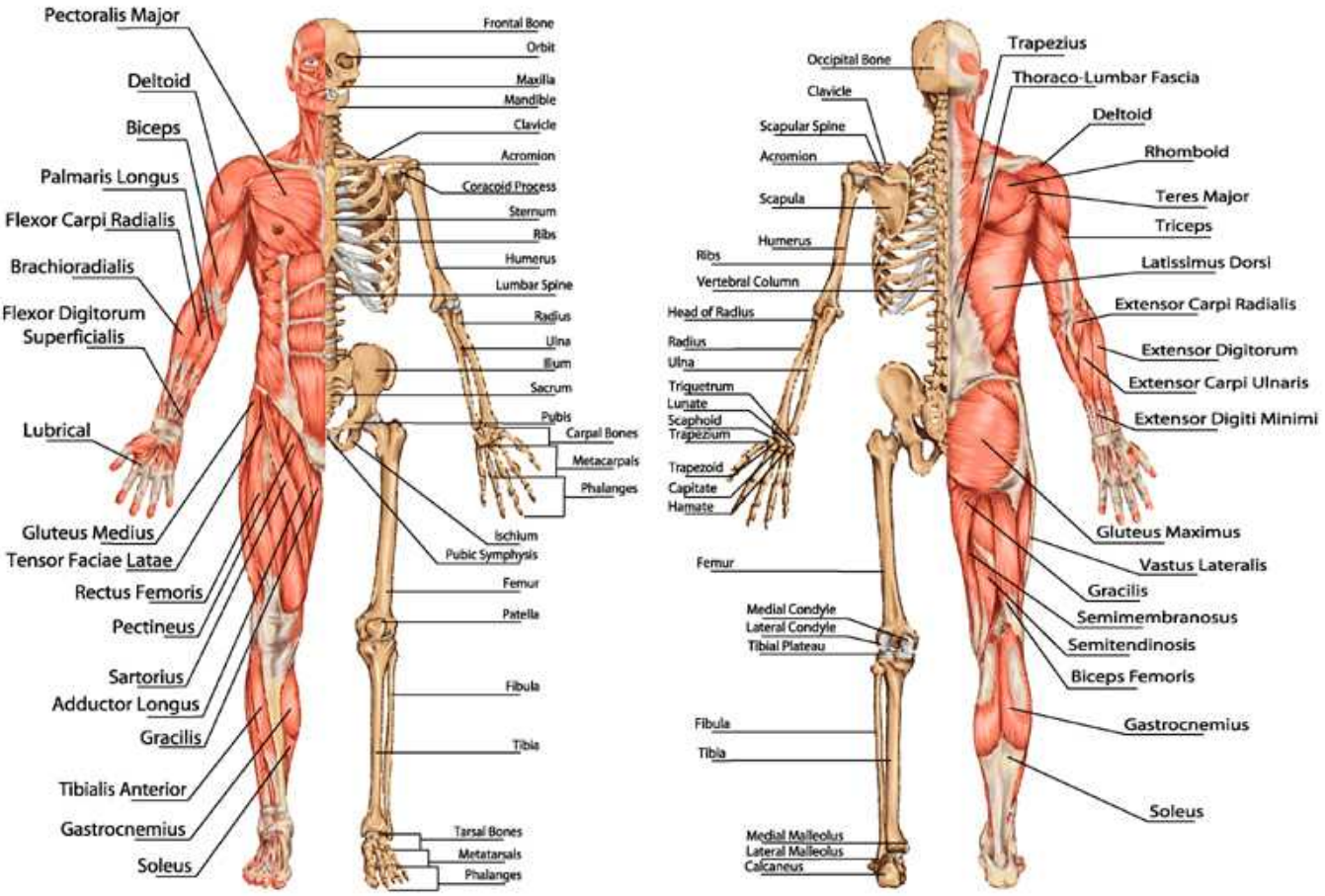
Which of the following are used by the respiratory system to stop us from breathing in pollen, dust and other foreign bodies? Tick all that apply.

- ❑ The epiglottis
- ❑ Sneezing and coughing
- ❑ The tongue
- ❑ Specialised cells called macrophages
- ❑ Mucous and cilia

Musculoskeletal system

The musculoskeletal system incorporates two major systems: the muscular system and the skeletal system. The muscular system is made up of almost 700 muscles. It holds us upright and governs movement and posture, and moves blood and other substances through the body.

The skeletal system comprises the 206 bones of the human body from the skull to the toes. The skeleton plays a number of roles: some bones, such as the skull and the rib cage protect the brain and the lungs respectively. Other bones help a person stay upright. The skeleton acts as a frame for the body's muscles, other tissues and skin; it also makes movement possible.



Video: Introduction to the musculoskeletal system

Watch this video to understand the musculoskeletal system:

aspirelr.link/yt-musculoskelatal-system-1

The skeletal muscles work with the skeletal system to:

- enable ambulation (walking) and other movement
- support the upright posture
- regulate the flow of food from the mouth to the anal sphincter
- control breathing by changing pressure in the lungs
- regulate temperature
- enable nonverbal communication – facial muscles are used to smile and frown and to create rapport and show disapproval.

Terminology of the skeletal system		Function
Structures	bones	provide the form and structure of the body and protect organs such as the brain, lungs and heart
	axial skeleton	forms the head and main trunk of the body and consists of the skull, spinal column (vertebrae), ribs and sternum
	appendicular skeleton	forms the extremities of the body and consists of shoulder girdle, arm bones, pelvic girdle and leg bones
	long bones	hard, dense bones that provide structural strength and mobility, e.g., the femur
	ligaments	a band of tough fibrous connective tissue that connects two bones or structures made of cartilage, or holds a joint together
	tendons	a flexible but inelastic cord of strong fibrous collagen tissue that attaches a muscle to a bone
Bones	carpus	the bones of the wrist that connect to the forearm and the finger bones
	clavicle	the bones extending from the (left and right) shoulders down to the sternum
	femur	the long bone of the upper leg
	fibula	the smaller of the two calf bones
	humerus	the bone located in the upper arm
	patella	the knee bone
	pelvis	the large bones located in the hip region at the base of the spine
	phalanges	the bones of the fingers and toes
	radius	one of the two bones of the forearm
	ribs	the bones located in the torso that protect the lungs and heart
	skull	the large bone mass of the head that protects the brain
	sternum	the breast bone at the front of the body
	tibia	the larger of the two calf bones
	ulna	one of the two bones of the forearm
	vertebrae	the bones of the spinal column

Terminology of the muscular system		Function
Movement	abduction	moving a body part away from the body
	adduction	moving a body part towards the midline of the body
	extension	straightening a joint to increase the angle between two bones or body parts
	flexion	bending a joint to decrease the angle between two bones or body parts
	rotation	moving a body part around an axis
Structures	cardiac muscle	an involuntary muscle that forms the wall of the heart and contracts to pump blood around the body
	skeletal muscles	voluntary muscles that attach to the skeleton and make it possible to move
	visceral muscles	involuntary muscles found in organs or organ systems such as the respiratory and digestive systems
	tendons	a flexible but inelastic cord of strong fibrous collagen tissue that attaches a muscle to a bone
	fascia	a special kind of connective tissue that attaches muscle to muscle
	cartilage	the firm, flexible connective tissue found in the larynx, external ear and articulating surfaces of joints
	deep muscles	muscles located closer to the internal organs than to the surface of the body
	superficial muscles	muscles located close to the surface whose movements are visible to the eye

Practice Task 5

Question 1

Which of the following statements are correct? Select yes or no for each one.

a. Skeletal muscles are voluntary muscles, which means that they can be contracted and relaxed by conscious thought.	Yes / No
b. The larynx, external ear and articulating surfaces of joints are called deep muscles.	Yes / No
c. Cardiac muscle makes up the walls of the heart and is responsible for pumping blood around the body.	Yes / No
d. Abduction means moving body parts away from the body and adduction is moving them closer to the midline.	Yes / No
e. The axial skeleton forms the extremities of the body and consists of the shoulder girdle, arm bones, pelvic girdle and leg bones.	Yes / No

Question 2

Match each musculoskeletal term to its definition/description.

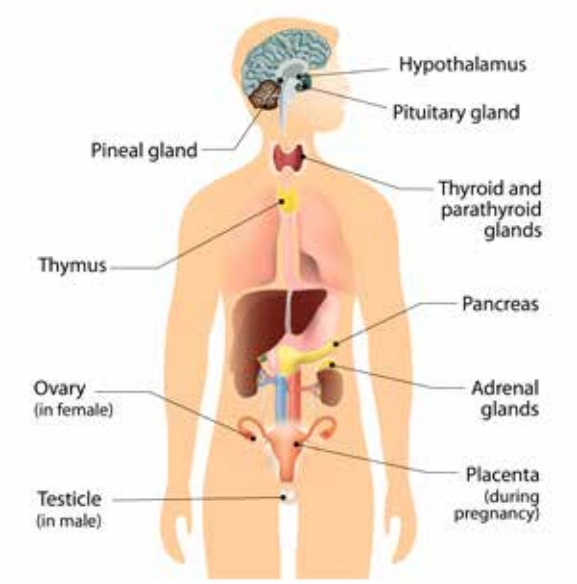
Long bones	A band of tough fibrous connective tissue that connects two bones or cartilage or holds a joint together.
Cartilage	A flexible but inelastic cord of strong fibrous collagen tissue that attaches a muscle to a bone.
Ligaments	The firm flexible connective tissue found in the larynx, external ear and articulating surfaces of joints.
Tendons	These are hard, dense bones that provide strength structure and mobility, e.g., the femur.

Endocrine system

One of the major functions of the endocrine system is to keep the body in balance. 'Homeostasis' is the medical term that describes these regulatory processes that keep variables stable and within safe limits (e.g., body temperature and blood glucose level). One of the systems that plays a major role in homeostasis is the endocrine system.

The endocrine system produces and secretes hormones that are distributed throughout the body and regulate other functions of the body. Hormones regulate:

- bone density
- growth
- heart rate
- metabolism
- mood
- organ function.



Video: Introduction to the endocrine system

Watch this video to understand the endocrine system: aspirelr.link/yt-endocrine-system

Endocrine glands secrete specific hormones that target other glands, organs of the body or whole body systems. They work to maintain homeostasis. Many of the hormones secreted are vital to body maturation and sexual reproduction and some are essential for vital body functioning.

Terminology of the endocrine system	Function
adrenal glands	• There is an adrenal gland located on top of each kidney. • The adrenal cortex – the outer part of the gland – produces hormones that are vital to life, such as cortisol (which supports metabolic regulation and helps your body respond to stress) and aldosterone (which helps control blood pressure). • The adrenal medulla – the inner part of the gland – produces adrenaline (which helps your body react to stress).

Terminology of the endocrine system	Function
hypothalamus	• The hypothalamus is the structure in the brain that maintains the body's internal balance (homeostasis). • The hypothalamus is the link between the endocrine and nervous systems. • It produces releasing and inhibiting hormones, which stop and start the production of other hormones throughout the body.
ovaries	• The ovaries are part of and maintain the health of the female reproductive system. • They secrete two main hormones: oestrogen and progesterone.
pancreas	• The pancreas has an exocrine and an endocrine function. • The pancreas maintains the body's blood glucose levels. • Primary hormones of the pancreas include insulin and glucagon, which are both needed for blood glucose regulation.
parathyroid	• The parathyroid glands are located on the back lobes of the thyroid gland. They have a separate function from the thyroid gland. • Parathyroid hormone regulates the body's calcium levels. • There are four parathyroid glands, and they are each about the size of a grain of rice.
pineal gland	• The pineal gland is located deep in the brain and was the once known as the 'third eye'. • It produces melatonin, which helps maintain circadian rhythms and regulate reproductive hormones.
pituitary gland	• The pituitary gland is often referred to as the 'master gland', and is also located in the brain. • The hormones of the pituitary gland help regulate the functions of other endocrine glands. • The pituitary gland has two parts – the anterior lobe and posterior lobe – that have two very separate functions. • The hypothalamus sends signals to the pituitary to release or inhibit pituitary hormone production.
testes	• The testes are part of the male reproductive system. • The testes secrete testosterone, which is necessary for physical development in boys. • In adulthood, testosterone maintains libido, muscle strength and bone density.

Terminology of the endocrine system	Function
thyroid	• The thyroid gland is located in your throat and is shaped like a butterfly. • The thyroid regulates your metabolism. • The two main thyroid hormones are T3 and T4.

The function of the endocrine system

The endocrine system is a collection of glands that produce hormones to regulate metabolism, growth, development, tissue function, sexual function, reproduction, sleep and all the functions required for development and everyday life.

- Endocrine glands secrete hormones directly into the bloodstream, which carries them to the target organs or receptor sites.
- A hormone is a chemical message that acts as a 'key in a lock' for its target receptor. They carry specific messages and cannot attach to or 'unlock' another receptor.
- Hormones and their effects are closely regulated by a system of feedback loops. An example of this is the release of insulin in response to the level of glucose in the blood after a meal.

Gland	Hormone	Function
thyroid	thyroxine	regulates metabolism and temperature
	calcitonin	inhibits the release of calcium from the bones
parathyroid	parathyroid hormone	stimulates the release of calcium from the bones
islet cells (in the pancreas)	insulin	decreases blood sugar by promoting the uptake of glucose by the cells
	glucagon	increases blood sugar by stimulating the breakdown of glycogen in the liver
testes	testosterone	regulates sperm cell production and secondary sex characteristics in males
ovaries	oestrogen	stimulates egg maturation and controls secondary sex characteristics in females
	progesterone	prepares the uterus to receive a fertilised egg

Gland	Hormone	Function
adrenal medulla	epinephrine ('fight' hormone)	activates the flight or fight response
	norepinephrine ('flight' hormone)	
adrenal cortex	glucocorticoids	as part of the stress response they increase blood sugar levels and decrease immune response
	aldosterone	regulates sodium levels in the blood
pineal gland	melatonin	controls sleep cycles and reproductive cycles

Source: https://www.pinterest.com.au/pin/358528820344661469/

Practice Task 6

Question 1

Which of the following statements are correct? Select yes or no for each one.

a. The endocrine system is important for homeostasis.	Yes / No
b. The hypothalamus in the brain maintains the body's internal balance (homeostasis).	Yes / No
c. The pineal gland regulates sperm cell production and secondary male sex characteristics.	Yes / No
d. Primary hormones of the pancreas include insulin and glucagon, which both regulate blood glucose.	Yes / No

Question 2

Match each hormone to its definition/description.

Glucocorticoids	Stimulates the release of calcium from the bones
Aldosterone	Regulates metabolism and temperature
Parathyroid hormone	Regulates sodium content in blood
Thyroxine	Part of the stress response: they increase blood sugar levels and decrease immune response

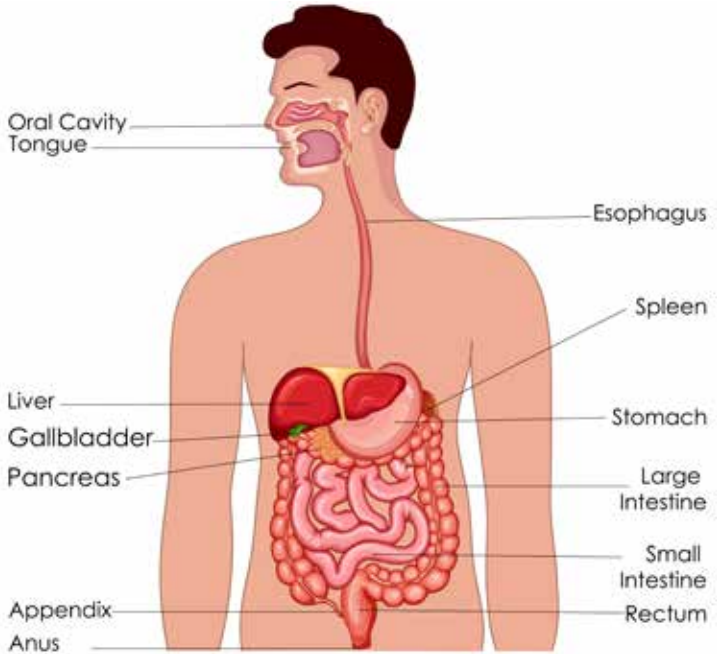
Digestive system

The digestive system breaks down food and makes its nutrients available to the body. The system distributes these nutrients throughout the body and eliminates waste products of digestion.

Video: Introduction to the digestive system
Watch these videos to understand the digestive system: aspirelr.link/yt-digestive-system

The components of the digestive system include:

- mouth
- teeth
- oesophagus
- stomach
- pancreas
- liver
- bile duct
- gall bladder
- intestines
- rectum
- anus.



The function of the digestive system

The function of the digestive system is to transform the food we eat into the nutrients the body requires for healthy functioning. That is, it mechanically and chemically processes food and eliminates waste products.

Humans require six essential nutrients. They are: carbohydrates, protein, fat, vitamins, minerals and water.

- Carbohydrates are the body's preferred source of fuel. Carbohydrates consumed are converted to glucose, which is burned to produce energy. Any excess glucose is stored as glycogen or fat.
- Protein is used to build and repair tissues. Protein is an important building block for bones, muscles, cartilage, skin and blood.
- Fat is another source of energy for the body to use. Fat also contains the fat-soluble vitamins A, D, E and K that are needed by our bodies.

- Vitamins are essential for maintenance and functioning of our body.
- Minerals balance our body's fluid levels and help maintain healthy bones.
- Water is essential for most body functions. It is the main component of every cell, and it maintains blood flow, aids digestion and is the medium of elimination of waste products from the blood.

Location of the digestive system

The digestive system comprises a long winding tube that includes hollow organs along its path, such as the stomach and intestines, as well as accessory organs such as the liver and gallbladder.

It extends from the mouth (the start of the digestive system) to the anus (the end of the digestive system).

Structures related to the digestive system	Function
mouth	Food is chewed into small particles by tearing it with the front incisor teeth and grinding it with the back molar teeth. It is mixed with saliva, which starts the breakdown of starches. The tongue shapes the food into a bolus that is moved to the back of the throat and swallowed.
oesophagus	Food is moved through the oesophagus to the stomach by a wavelike motion called peristalsis.
stomach	The stomach is a hollow organ that churns food into a soupy mixture called chyme. It has a band of tissue at the top called the oesophageal sphincter to stop food from re-entering the oesophagus. Food is mixed with highly acidic gastric juice. A lower band of tissue called the pyloric sphincter relaxes to allow food to pass into the duodenum of the small intestine.
small intestine	Food moves through the small intestine by peristalsis. The digestive juices of the small intestine break the food down into smaller molecules of starch, protein and carbohydrates. These digestive nutrients are absorbed through the wall of the small intestine into the bloodstream.
pancreas	The pancreas secretes pancreatic juice that breaks down starches, fats and proteins into smaller molecules in the small intestine. Fats are absorbed through the central lacteal into the lymphatic system.
liver	The liver produces bile that mixes with the fat to enable it to be absorbed more easily. Nutrients in the bloodstream are processed for the body's use in the liver.
gall bladder	The gall bladder is a small sac that stores the bile produced by the liver until it is required.

Structures related to the digestive system	Function
large intestine	All products not absorbed by the body during digestion pass into the large intestine. Water is absorbed and the waste material is formed into a stool (faeces, or poo). This is stored in the rectum until it is expelled from the body during a bowel movement.

Practice Task 7

Question 1

Number the following steps from 1 to 4 in the order food moves through the digestive tract.

	All waste products not absorbed by the body travel through the digestive system to the large intestine. Water is absorbed and the waste material is formed into a stool. This is stored in the rectum until it is expelled from the body during a bowel movement.
	Food is chewed into small particles through tearing with the front incisor teeth and ground with the back molar teeth. It is mixed with saliva that commences the breakdown of starch. The tongue then shapes the food into a bolus that is moved to the back of the throat and swallowed.
	Food is moved through the oesophagus by a wavelike motion called peristalsis towards the stomach.
	Food moves through the small intestine by peristalsis. The digestive juices of the small intestine break the food down into smaller molecules of starch, protein and carbohydrates. These digestive nutrients are absorbed through the wall of the small intestine into the bloodstream.

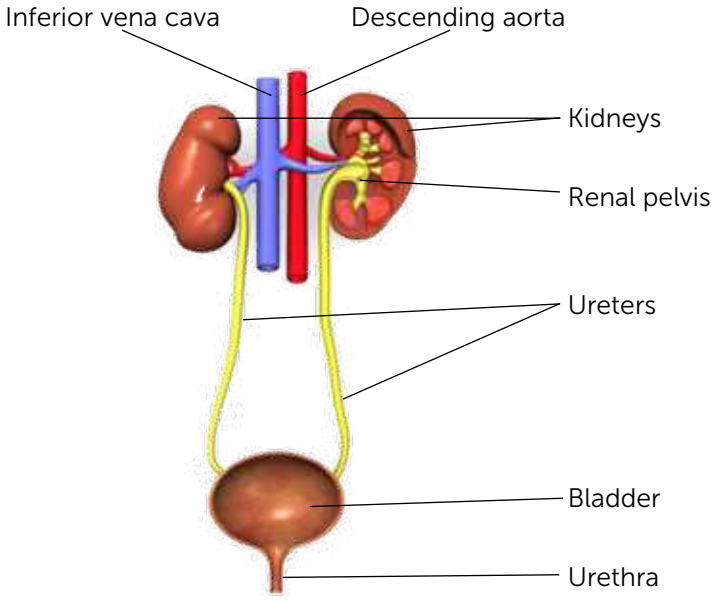
Question 2

Match each term explaining the nutrients the body requires for healthy functioning to its definition/description.

Minerals	Essential for most body functions including to keep every cell in the body healthy, to maintain blood flow, to aid digestion and to help get rid of by-products from the blood.
Water	The body's preferred source of fuel. When consumed, they are converted to glucose, and any excess glucose is stored as glycogen or fat.
Fat	A building block for bones, muscles, cartilage, skin and blood and is used to build and repair tissues.
Carbohydrates	Another source of energy for the body to use that also contains the fat-soluble vitamins A, D, E and K that are needed by our bodies.
Protein	Essential for maintenance and functioning of our body.
Vitamins	Essential for balancing our body's fluid levels and help maintain healthy bones

Urinary system including the function of the kidneys

The urinary system, also called the excretory system, allows the body to filter the blood and eliminate liquid waste called urea. This system also helps to keep chemicals (such as potassium and sodium) and water in balance. Urea is produced when foods containing protein (such as meat, poultry and certain vegetables) are broken down in the body. Urea is carried in the blood to the kidneys where it is removed, along with water and other wastes, in the form of urine.



Video: The human urinary system

Watch this short video on the urinary (excretory) system: aspirelr.link/the-human-urinary-system

Structure	Explanation	Function
Kidneys (two)	This pair of purplish-brown organs is located below the ribs toward the middle of the back.	• To remove waste products and medicines from the body • To balance the body's fluids • To balance various electrolytes • To release hormones to control blood pressure • To release a hormone to control red blood cell production • To help with bone health by controlling calcium and phosphorus
Ureters (two)	These narrow tubes carry urine from the kidneys to the bladder.	Muscles in the ureter walls contract and relax which forces urine downward, away from the kidneys.
Urinary bladder	This triangle-shaped, hollow organ is located in the lower belly. It is held in place by ligaments that are attached to other organs and the pelvic bones.	The bladder's walls relax and expand to store urine and contract and flatten to empty urine through the urethra.
Urethra	This tube allows urine to pass from the bladder to the outside of the body.	• The urethra connects the bladder to an external opening that allows the urine to be passed from the body. The structure varies between men and women. • A man's urethra is located in his penis and is 18–20cm long. • The opening to a woman's urethra is located in front of the vaginal opening and the tube is much shorter, being 3–4cm long.

The kidney contains thousands of small filters called nephrons, which are the functional unit of the kidney and filter around 180 litres of blood per day. Each nephron is made up of a very small filter, called a glomerulus, which is attached to a tubule. As blood passes through the nephron, fluid and waste products are filtered out.

Waste products and fluid not required by the body leave in the form of urine. This fluid is transported by the ureters to the bladder. The bladder is able to expand to hold urine. When the bladder is stretched beyond a certain level, receptor cells in the wall of the bladder send a message to the brain that creates the urge to urinate. The body then expels the urine through the urethra to exit the body.

- Normal, healthy urine is a pale straw or clear yellow colour.
- Darker yellow or honey-coloured urine often means you need more water.
- A darker, brownish colour may mean a liver problem or severe dehydration.
- Pinkish or red urine may mean blood in the urine.

Any fluid or substance that is required by the body is reabsorbed by the nephrons and returned to the bloodstream.

Practice Task 8

Question 1

Which of the following statements are correct? Select yes or no for each one.

a. The urinary system helps the body to get rid of liquid waste called urea.	Yes / No
b. The kidneys remove waste products from the body and keep the body's fluids and electrolytes in balance.	Yes / No
c. The bladder is not able to stretch to hold urine.	Yes / No
d. Any fluid or substance that is required by the body is reabsorbed by the nephrons and moved back into the bloodstream.	Yes / No
e. Normal healthy urine is bright yellow or honey-coloured.	Yes / No

Reproductive system

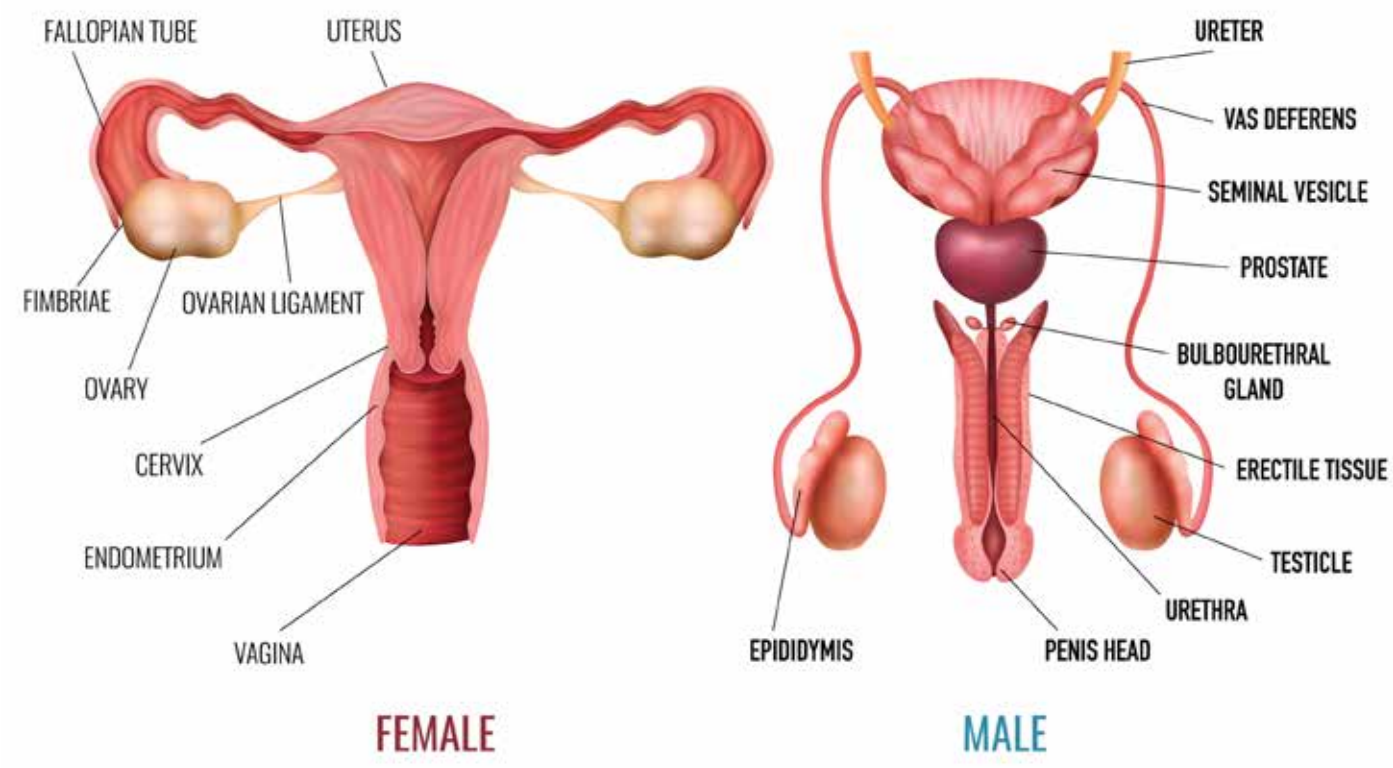
As the name suggests, the reproductive system of females and males is the system by which humans develop into sexually mature adults capable of procreation. It governs the development of secondary sex characteristics such as breast development in females, and the growth of pubic hair in both males and females.

Video: Reproductive system
Watch this video on reproductive system physiology: aspirelr.link/yt-reproductive-system

Structure of the reproductive systems

The female and male reproductive systems differ in structure but have the same overall functions:

- To cause the maturation of the human body (the secondary sex characteristics that develop a boy into a man and a girl into a woman)
- To make reproduction possible – the creation of a new person



	Male	Female
Function of the reproductive system	• To produce and transport gametes (sperm) and its protective fluid, semen • To eject the sperm into the female reproductive tract • To produce and secrete male reproductive hormones	• To produce gametes (ova, or eggs) • To secrete sex hormones (such as oestrogen) • To provide a site for fertilisation • To gestate a foetus if fertilisation occurs • To give birth to a baby • To breastfeed a baby after birth

	Male	Female
Internal structures	• Testes – two oval organs secured by the spermatic cord located within the scrotum, the testes produce testosterone – the male sex hormone – and contain many coiled tubes called the seminiferous tubules that produce the sperm cells. • Epididymis – a long coiled tube that transports and stores sperm cells, which mature within this structure. • Vas deferens – a tube that takes the sperm from the epididymis to the urethra. • Ejaculatory ducts – the fusion of the vas deferens and the seminal vesicles, they empty into the urethra. • Urethra – the tube that carries both urine and sperm-laden semen to the outside of the body. • Seminal vesicles – little sacs that are attached to the vas deferens that produce a fluid that provides nutrients to the sperm cells. • Prostate gland – located below the bladder, it produces fluid to also nourish the sperm cells. The urethra runs through the prostate gland.	• Vagina – the canal that joins the cervix to the outside of the body. The vagina can also be called the birth canal. • Cervix – the opening to the uterus. • Uterus – a hollow pear-shaped organ that stretches to hold a developing foetus. • Ovaries – small oval shaped glands that produce the ova (eggs) and female hormones. • Fallopian tubes – the passage through which the ova travel to the uterus and within which fertilisation takes place.
External structures	• Penis – consists of three parts, the base that is attached to the abdomen, the shaft or body of the penis and the glans or head of the penis. The glans is covered with a layer of skin called the foreskin. • Scrotum – a loose sac of skin that contains the testes (testicles), nerves and blood vessels; the scrotum controls the internal temperature of the testes.	• Labia majora – the outer lips of the vulva, they contain sweat and oil glands and after puberty are covered with hair. • Labia minora – the inner lips of the vulva that surround the opening to the vagina and urethra. • Clitoris – covered by a fold of skin and consisting of erectile tissue.

	Male	Female
Hormones	• Follicle stimulating hormone (needed to produce sperm – spermatogenesis). • Luteinising hormone (stimulates the production of testosterone). • Testosterone (stimulates the development of male characteristics including muscle mass, fat distribution, bone mass, facial hair, voice change, development of the sex organs and sex drive).	• Follicle-stimulating hormone (FSH) causes maturation of an egg in the ovary, and Luteinizing hormone (LH) stimulates the release of the egg. These are released from the brain and travel in the blood to the ovaries. (These hormones stimulate the growth of about 15 to 20 eggs in the ovaries). • Oestrogen and progesterone are involved in maintaining the uterus lining and cause eggs to mature in the ovaries once a girl has reached puberty. These are then released at regular intervals during the menstrual cycle.

The female reproductive system: menstruation

- At puberty the female reproductive cycle initiates monthly cycles of hormonal activity (the menstrual cycle) to prepare the body for potential pregnancy. If pregnancy does not occur, the uterus sheds its lining in a process called menstruation.
- The menstrual cycle has two phases, the follicular phase and the ovarian phase.
- The follicular phase commences on the first day of the period. Follicle stimulating hormone and luteinising hormone are circulated to stimulate the ovaries to produce ova. These hormones also stimulate the increase of oestrogen.
- The ovarian phase of the menstrual cycle also consists of two phases, the ovulatory phase and the luteal phase. The ovulatory phase commences when oestrogen levels rise, which results in the release of an ovum. This is ovulation. The ovum is then caught by the fimbriae (finger-like projections) at the end of the fallopian tubes. The ovum progresses through the fallopian tube where fertilisation can take place.
- After ovulation, the follicle that released the ovum starts secreting progesterone, which prepares the lining of the uterus for implantation of the fertilised ovum. The lining becomes thick and lush. If no fertilisation takes place, this lining breaks down and is expelled from the body during menstruation.

Sexuality

All people have a right to express their sexuality. As a support worker, you need to understand this right and be considerate of how people may express their sexuality differently. This is just as important for older adults as it is for any other age group and must be addressed with appropriate respect and confidentiality. You can assist the people you support by:

- respecting their privacy and upholding principles of confidentiality
- speaking to your manager about referring them to an appropriate professional (counsellor, therapist or psychologist) if they express concerns about their attractiveness, sex life or relationships
- ensuring that individuals participate in a full range of social activities that support them to find a partner, should they wish to
- not judging their sexual choices.

Practice Task 9

Question 1

Match each term about the male reproductive system to its definition/description.

Vas deferens	Stimulates the development of male characteristics including muscle mass, fat distribution, bone mass, facial hair, voice change, development of the sex organs and sex drive
Testes	Little sacs that are attached to the vas deferens that produce a fluid that provides nutrients to the sperm cells
Urethra	Two oval organs secured by the spermatic cord located within the scrotum
Testosterone	The tube that carries urine from the bladder to the outside of the body
Seminal vesicles	A tube that takes the sperm from the epididymis to the urethra

Question 2

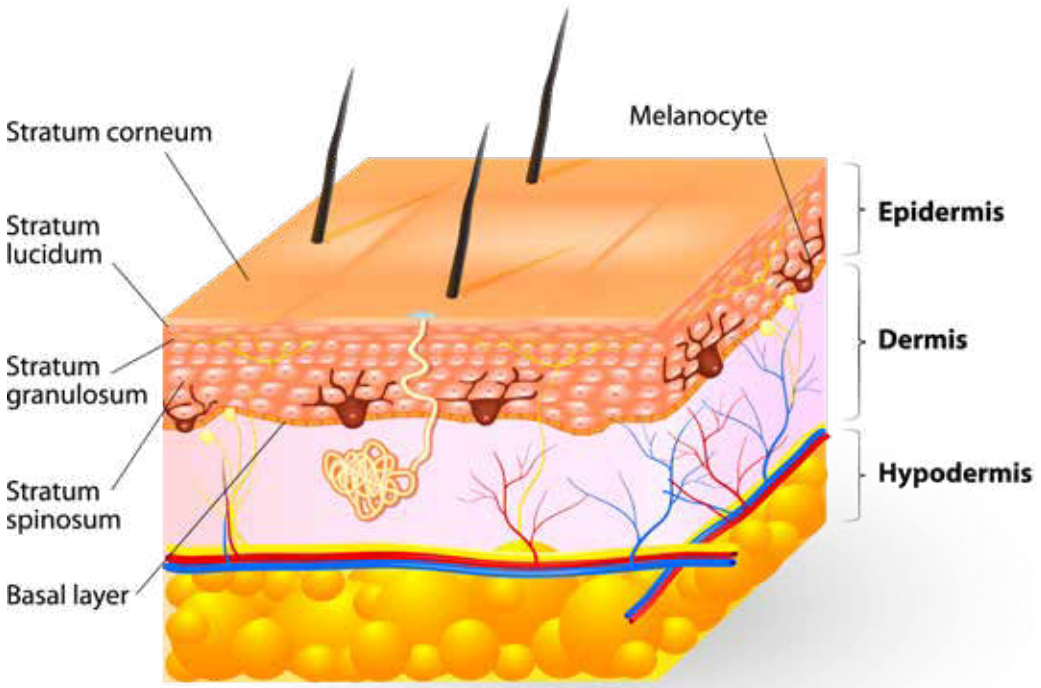
Number the following steps from 1 to 4 in the order of the menstruation phases.

	The follicular phase commences on the first day of the period. Follicle stimulating hormone and luteinising hormone are circulated to stimulate the ovaries to produce ova.
	During the menstrual phase the lining becomes thick and lush. If no fertilisation takes place, this lining breaks down and is expelled from the body during menstruation.
	The ovulatory phase commences when oestrogen levels rise, which results in the release of an ovum.
	During the luteal phase the follicle that released the ovum starts secreting progesterone, which prepares the lining of the uterus for implantation of the fertilised ovum.

The integumentary system

The integumentary system is made up of the skin, exocrine glands (that secrete substances outside of the body), hair and nails. This system plays a number of roles. The skin is the most important organ in the integumentary system. It:

- acts as a barrier and protects internal organs
- synthesises Vitamin D, an essential substance that helps build and maintain bones
- allows us to respond to pain, pressure, touch and changes in temperature to keep us safe from injury and infection.



Video: Skin
Watch the following video on the skin: aspirelr.link/yt-skin

Structures of the integumentary system

The integumentary system consists of many structures to support the functions of the body.

Structure	Function
ceruminous glands	• These are exocrine glands found only in the ear canal • They produce a waxy secretion called cerumen (earwax) • Cerumen protects and lubricates the ear canal
dermis	• The deep layer of skin found beneath the epidermis • Contains nerves, blood and blood vessels • Consists of two layers: the papillary layer that contains papillae to provide nutrients and oxygen for the epidermis, and the reticular layer that contains collagen and elastin fibres to provide strength and elasticity for the skin • It contains the nerve cells that sense pressure and pain in the skin
epidermis	• The outer layer of the skin • The outer layer of the palms of the hands and soles of the feet are thicker than other layers of the epidermis
hair	• Made of keratin, hair covers most of the body except for the lips, the palms of the hands and the soles of the feet • Protects the skin from UV radiation • Insulates the body by trapping a layer of warm air
nails	• Found at the ends of fingers and toes and consist of hardened keratin • Reinforce and protect the end of the fingers and toes • Allow the person to scrape and manipulate small objects
sebaceous glands	• Exocrine glands found in the dermis of the skin • Produce sebum, an oily fluid that is transported through a duct to hair follicles • Protects and lubricates the hair cuticles • Waterproofs the skin • Increases the elasticity of the skin

Structure	Function
subcutaneous layer	• Consists of areolar connective tissue to allow the skin to stretch and move • Connects the skin with the muscles and bones • Contains fatty adipose tissue to store fat • Provides insulation to the body
sweat glands	• There are two types of sweat glands: eccrine sweat glands and apocrine sweat glands • Eccrine sweat glands are found throughout the skin and produce fluid consisting of water and salt, which is transported to the surface of the skin via a duct and cools the body when it evaporates • Apocrine sweat glands are found in the axilla and pubic regions of the body. they are inactive until puberty. The ducts empty into hair follicles and produce an oily liquid that is used by the skin's bacteria. This secretion produces body odour

Functions of the integumentary system

The integumentary system has many functions including protection, temperature regulation, Vitamin D synthesis, sensation and excretion.

Function	Explanation
keratinisation	Keratinisation is the hardening of cells to provide protection from the external environment. The soles of your feet and your hands develop calluses if exposed to the environment and frequent use.
temperature regulation	• If the body becomes too hot (hyperthermia) the temperature is reduced by sweating and vasodilation of the blood vessels. Red blood cells enlarge, letting heat out and giving the skin a flushed appearance that is warm to the touch. • If the body becomes too cold (hypothermia) the skin assists to raise the body temperature through the contraction of arrector pili muscles (goose bumps) and vasoconstriction of the blood vessels. The hair stands upright due to the contraction of the arrector pili muscles and traps the air around the body to insulate it. The red blood cells become smaller and the skin becomes pale and cool to the touch.
Vitamin D synthesis	When UV rays touch the skin, the skin converts it into Vitamin D, which promotes calcium absorption in the gut. It is important to get enough Vitamin D so that you absorb enough calcium to maintain strong bones.
protection	Harmful bacteria cannot penetrate unbroken skin. Cells in the epidermis are constantly replicating to repair any damage to the skin. Specialised cells in the skin produce melanin that absorbs UV light to prevent cells of the body from changing and forming cancerous cells.

sensation	The skin allows the body to sense information from the external environment through touch, pressure, vibration, temperature and pain.
excretion	The sweat glands in the skin allow the body to eliminate water, electrolytes and other waste products that are not required and could be harmful to the body.

Practice Task 10

Question 1

Which of the following relate to the function of the epidermis?

- ❑ It is made of keratin and covers most of the body except for the lips, the palms of the hands and the soles of the feet
- ❑ The epidermis is the outer layer of the skin
- ❑ It produces a waxy secretion called cerumen (earwax)
- ❑ The outer layer of the palms and feet are thicker than other layers of the epidermis
- ❑ Protects and lubricates the hair cuticles

Question 2

Which of the following statements relate to the purpose of body hair?

- ❑ Made of keratin, it covers most of the body except for the lips, the palms of the hands and the soles of the feet
- ❑ It allows the body to eliminate water, electrolytes and other waste products that are not required and could be harmful to the body
- ❑ It protects the skin from UV radiation
- ❑ It insulates the body by trapping warm air around the body
- ❑ It stands upright due to the contraction of the arrector pili muscles and traps the air around the body to insulate it

Question 3

Which of the following statements about sebaceous glands are correct?

- ❑ They are exocrine glands found in the dermis of the skin
- ❑ They produce sebum, an oily fluid
- ❑ Sebum is transported through a duct to the hair follicle
- ❑ They protect and lubricate the hair cuticles
- ❑ Sebum waterproofs the skin

Question 4

Match each term related to the skin and its functions to its definition/description.

Protection	The hardening of cells to provide protection from the external environment. The soles of your feet and your hands develop calluses if exposed to the environment and frequent use.
Excretion	When UV rays touch the skin, the skin converts it into Vitamin D which promotes calcium absorption in the gut.
Keratinisation	Harmful bacteria cannot penetrate unbroken skin. Cells in the epidermis are constantly replicating to repair any damage to the skin.
Vitamin D synthesis	The skin allows the body to sense information from the external environment through touch, pressure, vibration, temperature and pain.
Sensation	The sweat glands in the skin allow the body to eliminate water, electrolytes and other waste products that are not required and could be harmful to the body.

The lymphatic system

Immunity
The state of being insusceptible or resistant to a pathogen or infectious disease.

The lymphatic system plays an important role in **immunity** by defending the body against pathogens (disease-causing organisms), by filtering, removing and reacting to them.

People with compromised immune systems or inefficient lymphatic systems need special care. They should be kept away from allergens and people with contagious diseases. The lymphatic system forms part of the immune system.

The lymphatic system is made up of:

- nodes located at various places throughout the body, including in the neck, under the arms, in the abdomen and intestines, near the genitals and near the knees
- capillaries and blood vessels
- the thymus
- the spleen
- red bone marrow.

Video: The lymphatic system
Watch this video on the lymphatic system: aspirelr.link/yt-lymphatic-system

Structures of the lymphatic system

The lymphatic system collects fluid and particles that have moved into the tissue spaces. Initially the vessels are very thin with openings to allow fluid and material to enter. The vessels gradually change and the walls become thicker and vein-like with valves to keep the fluid moving in one direction. People with excess fluid in their tissue have a condition called oedema. Their tissue/limbs become swollen and in severe cases, fluid can leak through the skin.

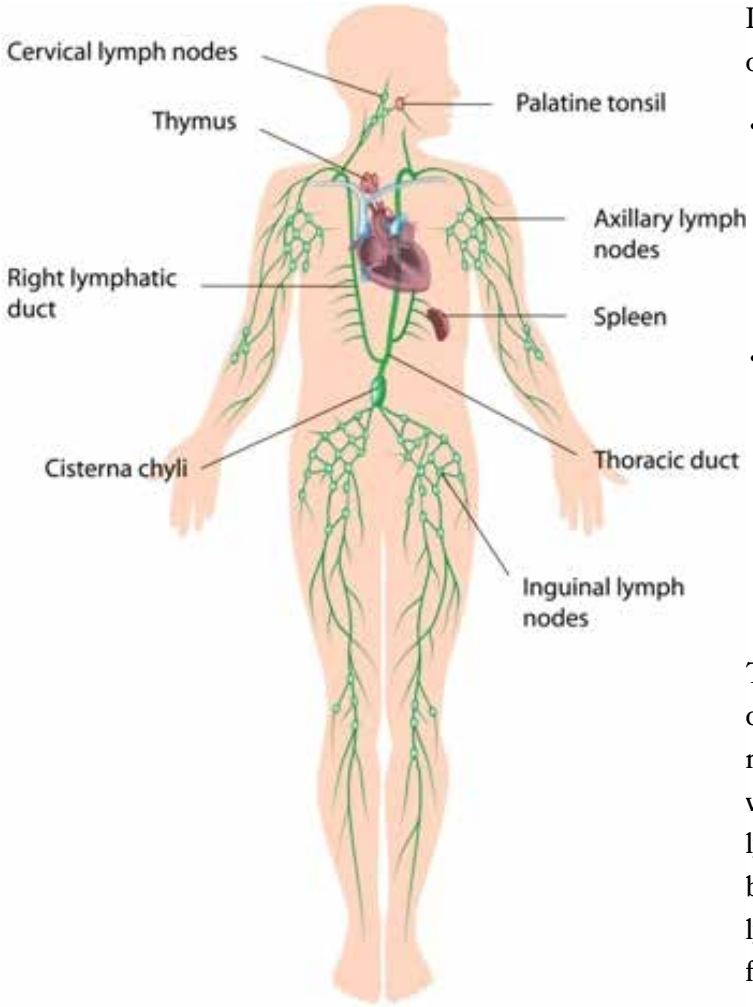
Along the pathway, the fluid passes through lymph nodes, which filter the lymphatic fluid. The main cells found in the lymphatic fluid are lymphocytes, white blood cells dedicated to fighting infection. In the nodes, special cells (lymphocytes and macrophages) collect and destroy harmful matter, such as bacteria. When an infection is present the lymph nodes become swollen as more of the special cells are required to collect the bacteria.

Some body organs also form part of the lymphatic system. These organs are the tonsils, adenoids, spleen and thymus. Other lymphatic tissue is found throughout the body.

The lymphatic fluid is eventually returned to the circulatory system, emptying into the large venous vessels of the neck.

Structure	Function
lymph	Lymph is a clear fluid containing white blood cells called lymphocytes. When it is returned to the blood stream it is called plasma
lymphocytes	White blood cells that fight infection
nodes	Small organs that filter lymphatic fluid
red bone marrow	Component of bone tissue that produces lymphocytes
spleen	The spleen is located on the left side of the body above the kidneys. It filters the blood and removes old red blood cells. It creates white blood cells called lymphocytes to produce antibodies to kill foreign microorganisms such as bacteria. You can live without a spleen
thymus	The thymus is located in the chest above the heart. It stores immature lymphocytes until they mature to become specialised cells (T cells) that destroy infected or cancerous cells. The thymus is only active in childhood. At puberty it becomes inactive and is replaced by fatty tissue
tonsils	The tonsils are made up of lymphatic tissue and are the first defence against harmful microorganisms that enter through the mouth and nose

Location of the lymphatic system



Lymphoid organs are categorised as primary or secondary organs.

- The primary organs for the immune system are the bone marrow found within all bones of the body and the thymus, which is located in the chest and active before puberty.
- The secondary lymphoid organs include the spleen, lymph nodes, tonsils, appendix and Peyer's patches. Tonsils are found in the back of the throat, lymph nodes are scattered throughout the body, and the spleen, appendix and Peyer's patches are located within the abdomen.

The lymphatic system is similar to the cardiovascular system in that it covers all regions of the body. It consists of glands vessels, nodes, tissues and organs. When the lymphatic system is working to protect the body from disease, the nodes that consist of lymphatic tissue increase in size and can be felt through the skin.

Location	Structures
head and neck	• adenoids • cervical nodes • lingual tonsils • palatine tonsils
upper torso	• axillary nodes • broncho mediastinal trunk • broncho pulmonary nodes • intercostal nodes • jugular trunk • mediastinal nodes • right lymphatic duct • spleen • subclavian trunk • thoracic duct • thymus gland

Location	Structures
lower torso	• appendix • cysterna chyli • iliac nodes • inguinal nodes • intestinal trunk • lumbar trunk • Peyer's patches
arm and hand	• cubital nodes
leg and foot	• popliteal nodes

Practice Task 11

Question 1

Which of the following statements are correct? Select yes or no for each one.

a. The lymphatic system plays an important role in defending the body against pathogens, by filtering, removing and reacting to them.	Yes / No
b. The secondary lymphoid organs for the immune system are the bone marrow found within all bones of the body; and the thymus located in the chest before puberty.	Yes / No
c. The primary lymphoid organs include the spleen, lymph nodes, tonsils, appendix and Peyer's patches.	Yes / No
d. Red bone marrow produces lymphocytes, which are white blood cells that fight infection.	Yes / No
e. Lymph is a clear fluid containing white blood cells called lymphocytes which is filtered through small organs called nodes.	Yes / No

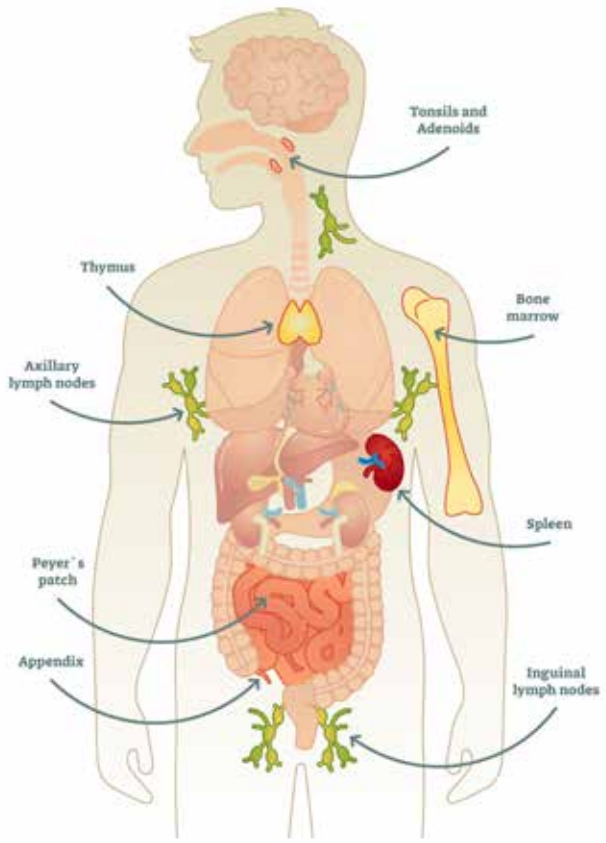
Immune system

The immune system's main function is to fight infection. The way it does this is through the production of special cells and chemicals. These are white blood cells and antibodies. The main components of the immune system are white blood cells and lymphoid organs.

Infection response
1. Recognition – identification of foreign material
2. Activation and mobilisation – a signal is sent through the attachment of a T cell to the foreign microorganism or B cell recognition, and white blood cells travel to the site
3. Regulation – damage to the body by the immune response is controlled by suppressor T cells
4. Resolution – confining the invading material and eliminating it from the body; the white blood cells then self-destruct and are ingested; however, some are not destroyed and become memory cells

Video: The immune system

Watch this video on the immune system: aspirelr.link/yt-the-immune-system



The immune system is closely linked to the lymphatic system and the circulatory system. The main components of the immune system are specialised white blood cells that help the body overcome infection. These specialised cells are B cells and T cells. These white blood cells are made in the bone marrow and the thymus, the primary lymphoid organs.

Secondary lymphoid organs are found throughout the body and consist of the spleen, lymph nodes, tonsils, appendix and Peyer's patches in the intestines.

Cells within the immune system that assist with the fight against infection or foreign material include:

- killer cells that attack infection
- suppressor cells that stop the immune response
- helper cells that assist to make antibodies.

Components of the immune system

The components of the immune system are white blood cells and the lymphoid organs. Specialised white blood cells that fight infection can move freely throughout the whole body and travel within the lymph fluid and the blood.

Immune system components	Function
antibody	Antibodies are produced by B cells and attach to the antigen of the invading microorganism, either identifying it for further attachment or neutralising it immediately.
antigens	An antigen is a substance that is recognised by the immune system and can stimulate a response.
B cells	B cells are white blood cells that produce antibodies in response to an antigen.
basophils	Basophils are white blood cells that release histamine (allergic response) and attract other white blood cells to an area.
helper T cell	Helper T cells are white blood cells that help produce antibodies and activate killer cells.
immune response	An immune response is the reaction of the immune system to an antigen.
killer T cells	A killer T cell attaches to infected cells and cancer cells and kills them.
phagocytes	Phagocytes are cells that ingest and kill or destroy invading microorganisms, other cells and cell fragments.
phagocytosis	Phagocytosis is the process of a cell engulfing and ingesting an invading microorganism, another cell, or a cell fragment.
T cell (T lymphocyte)	A T cell is a white blood cell that is involved in acquired immunity and that may be one of three types: helper, killer or regulatory.

The immune system at work

The immune system defends the body against foreign or dangerous invaders such as:

- microorganisms
- parasites
- cancer cells
- foreign tissues and organs (transplants).

It is able to detect what belongs to the body and what does not belong, and will initiate an immediate response to the threat. This is known as the immune response. The immune response can be an increase in production of white blood cells by the nodes and organs; movement of the white blood cells to a particular location of the body; and fever.

Our immune system helps protect us when the first line of defence of the body is overcome. This happens, for instance, when we cut ourselves and microbes enter through this opening. Microbes may be viruses, bacteria and parasites. Viruses tend to be airborne and usually enter the body through the respiratory system.

A chemical message is sent to the white blood cells by the damaged cells of the body. The white blood cells move to the affected area and engulf the invading microorganisms. A secretion (pus) is produced, which is a mixture of lymph fluid, white blood cells and dead microorganisms.

Fever can be part of the immune response and is the body raising its temperature so it becomes a less favourable host. Fever also supports the immune response.

The body also tries to organise second lines of defence against the invading microorganisms. Special lymphocytes (B cells) try to identify if they have been in contact with the microorganism previously. If they have they can generate the antibodies, made from previous exposure, to overcome the microorganisms.

Immune system first line of defence
Physical or mechanical barriers to infection: • the skin • the cornea of the eye • membranes lining the respiratory, digestive, urinary and reproductive tracts.
Immune system second line of defence
• Innate immunity – through breastfeeding or having had the disease • Acquired immunity – through immunisation

Practice Task 12

Question 1

Which of the following statements are correct? Select yes or no for each one.

a. Immune system cells assist with the fight against infection or foreign material. They include killer cells that attack infection, suppressor cells that stop the immune response and helper cells that assist to make antibodies.	Yes / No
b. Phagocytosis is the process of phagocytes engulfing and ingesting an invading microorganism, another cell, or a cell fragment.	Yes / No
c. B cells are white blood cells that release histamine (allergic response) and attract other white blood cells to an area.	Yes / No
d. T cells are a white blood cell that is involved in acquired immunity and that may be one of three types: helper, killer or regulatory.	Yes / No
e. The immune system can detect what belongs to the body and what does not belong and will initiate an immediate response to the threat. This is known as the immune response.	Yes / No

Nervous system

The nervous system is responsible for communicating information received by the senses to the brain, processing this information and communicating the response to the muscles of the body.

The nervous system is divided into two parts:

- **The central nervous system** is made up of the brain and spinal cord. These structures are protected by bone – the skull and vertebral bones of the spine – and the cerebrospinal fluid that cushions the brain and spinal cord.
- **The peripheral nervous system** is made up of sensory neurons, ganglia and nerves that connect the rest of the body to the spinal cord. These nerves are covered by a special insulating tissue called the myelin sheath.

The two aspects of the nervous system enable communication within the body with respect to the external and internal environment. The way in which this communication takes place is through the transmission of signals fired by the neurons and conducted along the nerve pathways of the body.

Video: The nervous system
Watch this video on the nervous system: aspirelr.link/yt-nervous-system

Structures of the nervous system

The central nervous system, comprising the brain and spinal cord, is housed within the bony structures of the skull and vertebral column. They provide good protection for these vital organs.

The peripheral nervous system consists of the sensory and motor nerves that reach each part of the body. There are 12 cranial nerves and 31 spinal nerves that are able to transmit information to and from the brain.

Components of the nervous system

Each component of the nervous system comprises many parts. Information from many sensory organs is transmitted along various pathways until it reaches the brain, where information processing takes place.

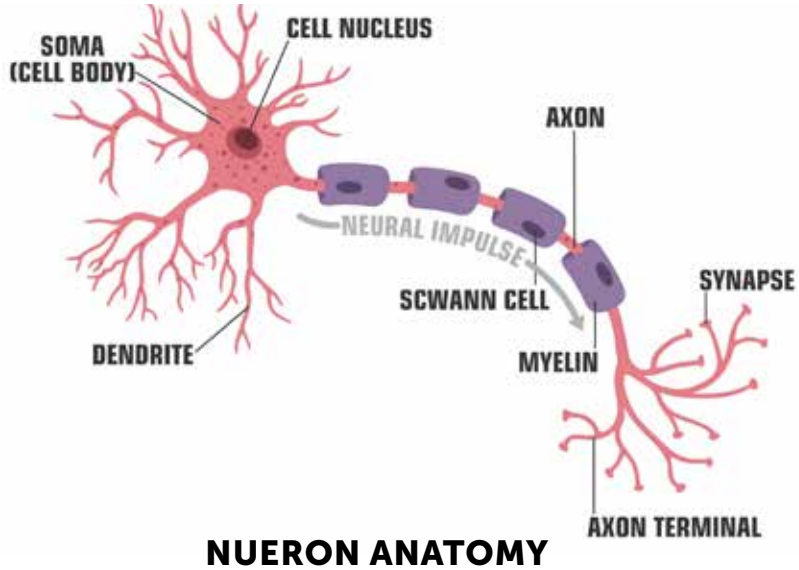
For example, the eye takes in information from the environment. Light enters through the pupil, and travels through the lens to the optic disc. An impulse is generated and is transmitted along the optic nerve to the brain for processing.

Structure	Function
brain	The brain is made of grey matter on the outside (nerve cell bodies) and white matter on the inside (nerve processes). The brain is divided into four main parts: • The cerebrum, the largest part, is the centre for thought and intelligence. It is divided into two hemispheres. The left side controls movement and activity for the right side of the body; and vice versa. There are specialised areas that control speech, hearing, smell, sight, memory, learning and motor and sensory functions. • The cerebral cortex sits on the outside of the cerebrum and controls learning, reasoning, language and memory. • The cerebellum is located below the cerebrum towards the back of the skull. Its functions are to control voluntary muscles, balance and muscle tone. • The medulla is part of the brainstem (together with the pons and midbrain) and controls heart rate, breathing, swallowing coughing, vomiting and other vital processes of the body.
lobes of the brain	The brain is divided into lobes that have particular functions. • The frontal lobe – general intellect and motor control • The temporal lobe – auditory input and interpretation • The parietal lobe – general sensory input and interpretation • The occipital lobe – visual input and interpretation • The insular lobe – emotion and self-perception

Structure	Function
spinal cord	The spinal cord also consists of white and grey matter like the brain. The spinal cord extends from the medulla to the second lumbar vertebra. It is the message path between the brain and the body.
peripheral system	The peripheral system consists of the two parts: the autonomic nervous system and the somatic nervous system. • The autonomic nervous system controls the heart, smooth muscle (organs) and glands and is concerned with the 'fight or flight' system, and the 'resting and digesting' system. • The somatic nervous system controls our skeletal muscles, which are under voluntary control. • There are 12 cranial nerves and 31 spinal nerves.
nerves	• Nerves are made up of cells called neurons. A neuron has a cell body and an axon (tail-like part). Electric impulses fire along the axon. • The axon is covered by a myelin sheath that is needed for the impulse to be transmitted. If it is missing the impulse cannot travel effectively, as in diseases such as multiple sclerosis. • At the end of the axon the message has to cross the gap between the neurons called the synapse. Chemical transmitters take the message to the next cell. Some diseases, such as Parkinson's disease, cause an insufficiency of these chemicals.

Functions of the nervous system

The brain processes the information from the nerves. Sensory neurons transmit messages to the brain, and motor neurons take messages from the brain to the body.



NUERON ANATOMY

Nerves are made up of many neurons, which transmit or relay the messages to each other along a pathway called a nerve. Each nerve is made up of a number of neurones.

The message is transmitted via electrical impulses along the axon and via a chemical messenger at the space between each neuron (the synapse). The first component of the neuron is the dendrite, which captures the chemical message and transfers it to the cell body and then through the axon.

The nervous system also has a specialised pathway known as a reflex arc to protect the body under certain potentially dangerous circumstances. It is a pathway of impulse transmission that travels from the sensory nerve to the spinal cord and directly out again via a motor nerve to muscles that can act on the danger. At the same time the message is conveyed to the brain. An example of a reflex arc is when you blink your eye when a puff of wind hits it, or take your hand away from a hot stove even before you register pain. This is a way the body protects itself from harm.

The optic nerve	The optic nerve is located in the back of the eye. It is the second cranial nerve. There is a nerve to both the right and left eye. These nerve fibres separate at an X-shaped space in front of the brain. At this point of the optic nerve, the part of the nerve close to the nose crosses over.
The auditory nerve	The auditory nerve transfers auditory information from the cochlea to the brain. It is the eighth cranial nerve. The function of the cochlear nerve is to gather auditory data from the environment.

Practice Task 13

Question 1

Which of the following statements are correct? Select yes or no for each one.

a. The spinal cord extends from the medulla to the second lumbar vertebra. It is the message path between the brain and the body.	Yes / No
b. Nerves are made up of cells called neurons. A neuron has a cell structure that is round in shape like other cells in the body.	Yes / No
c. The reflex arc is a pathway of impulse transmission that travels from the sensory nerve to the spinal cord and a message is sent directly to muscles via a motor nerve. A message is sent to the brain at the same time.	Yes / No
d. The peripheral system consists of two parts: the autonomic nervous system and the somatic nervous system.	Yes / No

Question 2

Match each part of the brain to its definition/description.

Medulla	The largest part, the centre for thought and intelligence. It is further divided into two hemispheres. There are specialised areas that control speech, hearing, smell, sight, memory, learning and motor and sensory functions.
Cerebellum	The outside of the cerebrum; its functions include learning, reasoning, language and memory.
Cerebrum	Located below the cerebrum towards the back of the skull; its functions are to control voluntary muscles, balance and muscle tone.
Cerebral cortex	It controls the heart rate, breathing, swallowing, coughing, vomiting and other vital processes of the body. Together with the pons and midbrain, it helps form the brainstem.

Special senses

The special senses are vision, hearing, smell, taste and equilibrium. These senses are used to detect changes in external stimuli so that one can react and respond appropriately. Examples of external stimuli include fumes, temperature, sounds and changes in movement.

The nose, ears, eyes and mouth are responsible for sensing external stimuli. This stimulus (the smell, sound, image or taste) is interpreted by the brain. Damage to the brain or certain brain disorders may alter the way the smell, taste, aural or visual information is perceived. Sensation and perception are interlinked, but they are distinct processes.

Smell

The sense of smell is the ability to detect odours. Smell is used to detect danger, such as fumes and gases. A person with a diminished sense of smell cannot taste food and may not notice their own odours, leading to social embarrassment.

Smell is only one of the nose's functions. Noses also warm and filter the air we inhale, and prevent foreign bodies from entering the respiratory system.

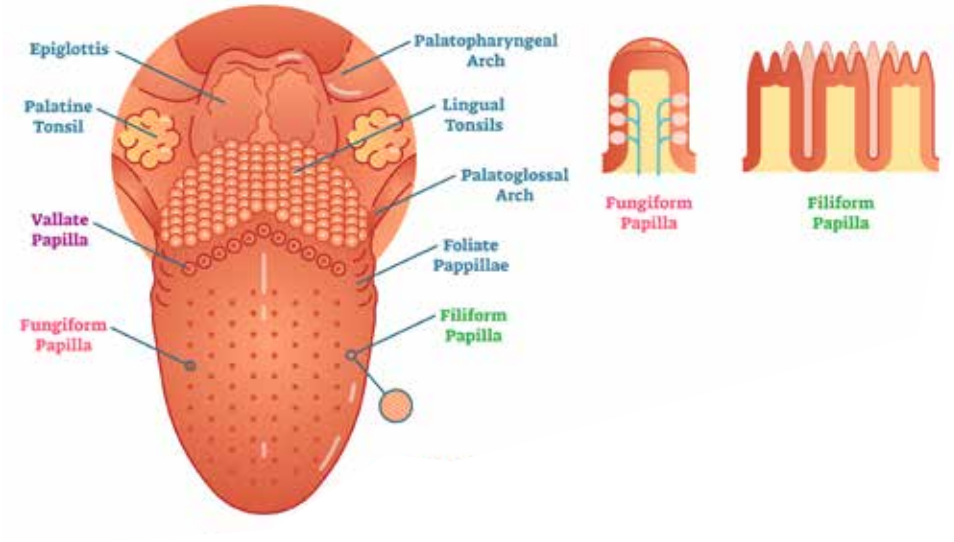
Video: The olfactory sense
Watch this video: aspirelr.link/yt-olfactory-sense

Some terminology that is related to the sense of smell is outlined below.

Terminology	Explanation
Cilia	The tiny hairs in the nose
Nostrils	The two openings of the nose
Olfactory	Relating to the nose and sense of smell
Septum	The walls between the nostrils

Taste

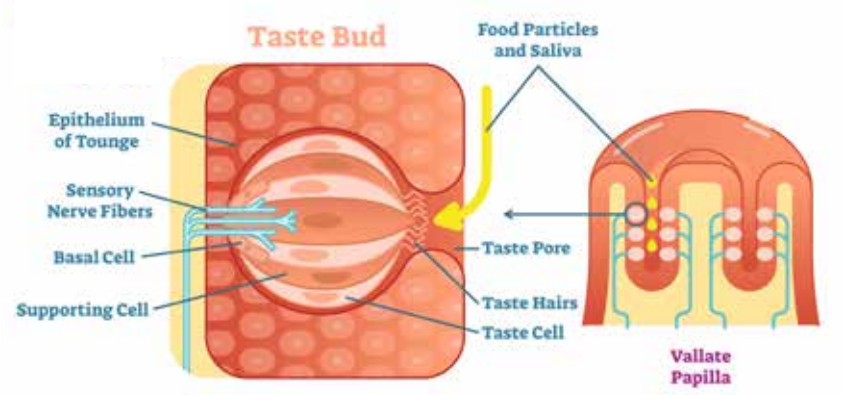
The sense of taste is the ability to detect the flavours of foods and other substances. The tongue has a number of receptors (taste buds) that detect whether food is sweet, sour, salty, bitter or umami.



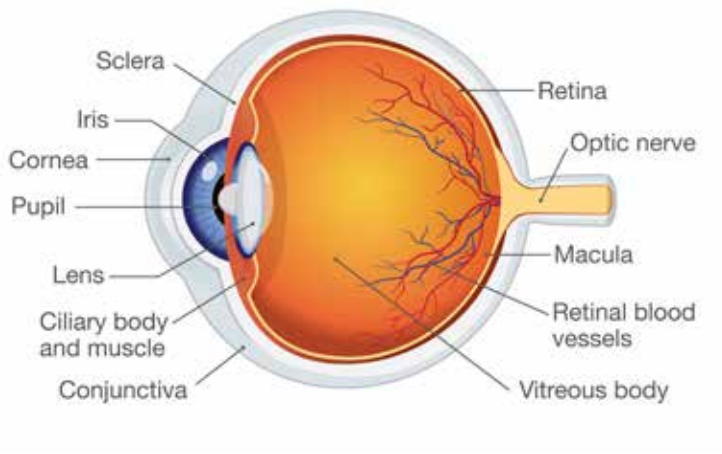
These receptors allow people to detect whether food is off; important for our safety. Taste buds also enhance our enjoyment of food. As people age, these receptors become less effective and can affect an older person's enjoyment of food.

Terminology that you need to understand regarding taste includes:

- oral – by mouth
- xerostomia – dry mouth
- saliva – a fluid secreted into the mouth that helps break down food.



Sight



The eyes provide the sensory stimuli that allow for vision, another important sense. Vision lets people see what is around or near to them. The outer tissue layer of the eye is called the cornea. It is transparent and very sensitive. Light enters the eye through the pupil and is refracted by the lens through the vitreous gel (the liquid in our eyes). A signal is then sent to the brain from the retina via the optic nerve.

People's ability to see can be reduced as they grow older. Vision impairment can also arise as a consequence of disease or illness.

Optical Structure	Function
Cornea	The cornea is the clear outer part of the eye's focusing system located at the front of the eye.
Pupil	The pupil is the opening at the centre of the iris. The iris adjusts the size of the pupil and controls the amount of light that can enter the eye.
Iris	The iris is the coloured part of the eye that regulates the amount of light entering through the pupil.
Macula	The macula is the small, sensitive area of the retina that gives central vision. It is located in the centre of the retina.
Vitreous gel	The vitreous gel is a transparent, colourless mass that fills the rear two-thirds of the eyeball, between the lens and the retina.
Lens	The lens is a clear part of the eye behind the iris that helps to focus light, or an image, on the retina.
Retina	The retina is the light-sensitive tissue at the back of the eye. The retina converts light into electrical impulses that are sent to the brain through the optic nerve.
Optic nerve	The optic nerve is the largest sensory nerve of the eye. It carries impulses from the retina to the brain.

Source: Eye Diagram Handout (nih.gov)

Video: The sense of sight
Watch this video: aspirelr.link/yt-sense-of-light

Equilibrium

Equilibrium means balance. The inner ear plays a role in maintaining bodily equilibrium. The inner ear contains fluid which, along with our vision, helps us determine whether we are moving, stationary, upright or lying down.

Balance disorders can cause vertigo, dizziness and nausea. Balance is particularly important for older people who are more susceptible to breaks and fractures when they fall.

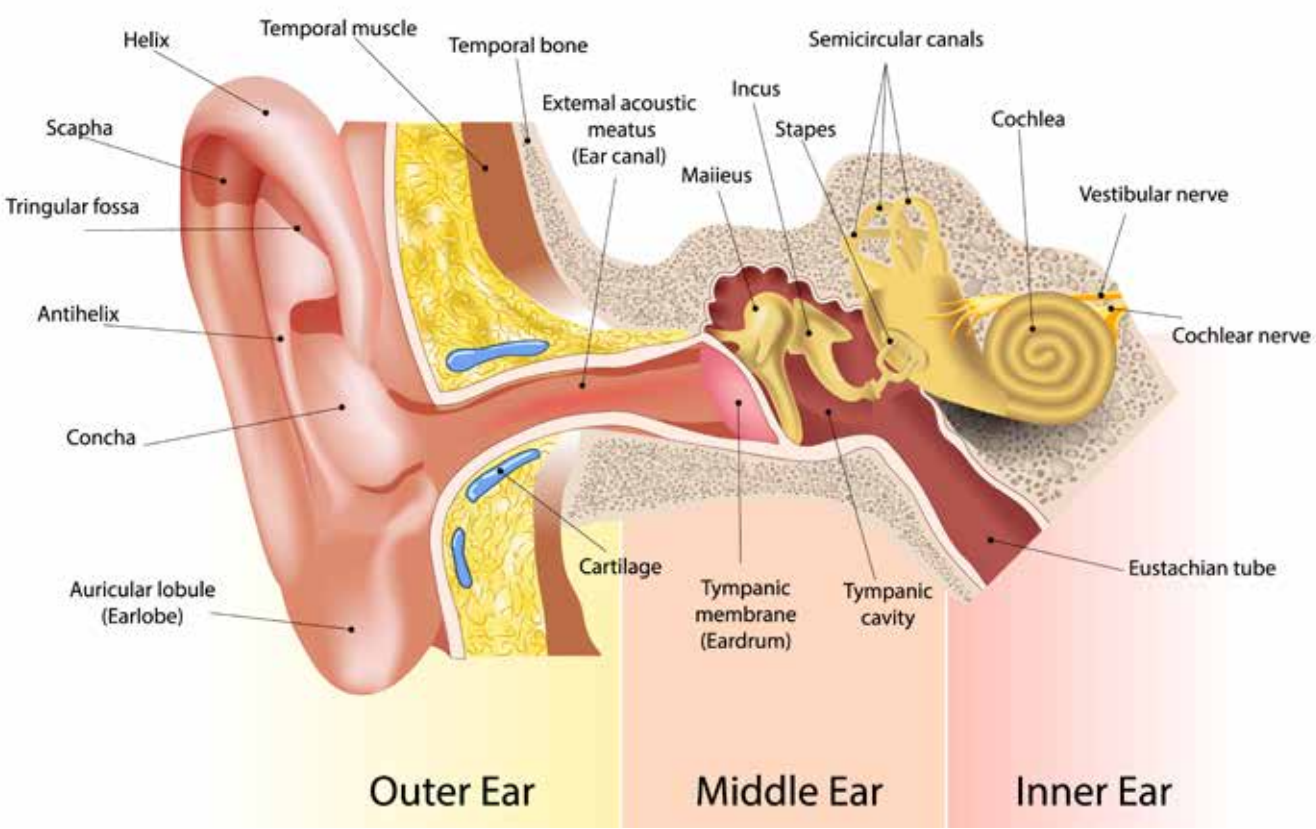
Hearing

The ears are responsible for processing aural information (sound) as well as maintaining balance.

Terminology that you need to understand regarding hearing includes the following:

- audio – relating to sound
- audiologist – a doctor specialising in the ear
- aural – by ear.

Video: The auditory sense
Watch this video: aspirelr.link/yt-auditory-sense



Practice Task 14

Question 1

Name the five special senses of the body and their role.

1C Interrelationships between body systems

The body is a unified and complex assemblage of functioning parts and body systems.

Each of the body systems, and the various organs and structures that comprise them, are designed to perform specific, complex functions. They all work together to ensure the survival and health of the human body, and the lymphatic and immune systems protect the body from disease, infection and illness. For instance, multiple organ systems are interconnected in their functions to:

- ensure the body has sufficient nutrition and oxygen
- expel toxins
- deal effectively with diseases and pathogens.

Systems also work together to recognise and respond to pain, ambulate (walk and move around) and keep the body in homeostatic balance. Within each system there are organs that work together to help maintain optimum health and functioning.

The interrelationships between body systems become more obvious when a disease or illness affects one body system and, as a result, other systems are also affected.

Body system	Summary of function	Interaction with other body systems
Cardiovascular	The cardiovascular system is the transportation system.	The cardiovascular system helps to transport: • gases to and from the respiratory system • metabolic waste products from the musculoskeletal system • hormones for the endocrine system • nutrients obtained through the digestive system • blood to the kidney where it is filtered • lymphocytes for immune system functioning.
Respiratory	The respiratory system ensures the body has sufficient oxygen and releases waste carbon dioxide.	The cardiovascular system transports the oxygen around the body via the blood and removes carbon dioxide, both of which are essential for cell function. All other body systems rely on these processes indirectly, as they need oxygen to survive.

Body system	Summary of function	Interaction with other body systems
Musculoskeletal	The skeleton acts as a frame for the body's tissues and skin – the muscles make ambulation and movement possible.	The musculoskeletal system allows: • the lungs to work • the mouth to chew • the bladder to hold and then release urine • the foetus to be birthed through the vagina • facial muscles to move for communication • the flow of lymphatic fluid.
Endocrine	This system maintains the body in balance. It plays a major role in homeostasis.	The hormones of the endocrine system regulate: • heart rate • breathing muscles that provide air to the respiratory system • the maintenance and development of muscles and the release of adrenaline to mobilise them • mineral balance in the cells in the body, enabling the nervous system to function effectively • the way food is digested within the body • urinary excretion • the onset of puberty, menstruation, sex drive and pregnancy and lactation • the growth and distribution of hair • the lymphatic system's immune response.
Nervous	The nervous system is responsible for communicating information to and from the brain.	The nervous system regulates: • heartbeat within the cardiovascular system • breathing rate • muscle movements • glands in the endocrine system • appetite and faecal movements • urinary functions • lactation • sweating and temperature regulation • the lymphatic system to respond to pathogens.

Body system	Summary of function	Interaction with other body systems
Digestive	The digestive system breaks down food into small chemicals so they can be used by the cells.	Nutrients are absorbed into the blood stream from the small intestine and carried to the cells throughout the body via blood. In this way, the digestive system is connected to the cardiovascular system as well as to the endocrine system, through hormone control of digestive functions; and the nervous system, through responding to messages from the brain.
Urinary	The urinary system eliminates urea and other wastes by filtering the blood.	The urinary system assists each body system by disposing of various metabolic wastes and regulating water and salts, essential for cell functioning.
Reproductive	The reproductive system allows for the continuation of the species through sexual reproduction.	The reproductive system is interdependent with other body systems, for example: • the endocrine system governs all aspects of sexual maturation and reproduction • during pregnancy an increase in blood volume is carried around the body by the cardiovascular system • the nervous system mediates sexual arousal that provides the impetus for sexual intercourse.
Integumentary	The integumentary system acts as a barrier to protect internal organs, synthesises An organ is a self-contained group of tissues that performs a specific function in the body. For example the heart is an organ that is made up of various tissues, including cardiac muscle tissue, which cause the heart to beat. Vitamin D, allows us to feel the outside world, and helps with temperature regulation.	The integumentary system works in concert with other body systems by: • protecting blood vessels • filtering air for the respiratory system • protecting muscles • synthesising Vitamin D, needed to build and maintain healthy bones • acting as a receptor for vital information, such as temperature and pain, for the nervous system • helping with the removal of waste through sweating • supporting the lymphatic system.

Body system	Summary of function	Interaction with other body systems
Lymphatic and immune systems	These systems play an important role in defending against pathogens. Through their various functions, they filter and remove pathogens.	The lymphatic system is part of the immune system and is interconnected with all other body systems. For instance, it: • eliminates pathogens in the blood • removes waste from the lungs • aids in the production and repair of muscles • works with the brain to stimulate defence mechanisms against infection • transports digested fats • assists the kidneys to remove waste.

Note: information about the immune system is combined with the lymphatic system.

Example

Interrelationships between body systems

Lionel is a home and community support worker. Lionel visits Mrs Kumar twice a week to assist with basic household tasks. Mrs Kumar tells him she doesn't go outside much since the weather has turned so cold, and she mentions that she feels weak in the legs and unable to walk far. She also says she had a bone density test that indicated she had osteoporosis. She is now on medication to boost her Vitamin D and calcium levels.

Lionel thinks through what Mrs Kumar has told him and recognises that the symptoms of osteoporosis could match the symptoms Mrs Kumar is describing. Lionel knows that Mrs Kumar is not getting sufficient Vitamin D because she is not spending much time outside. The skin (the integumentary system) is not able to synthesise Vitamin D if it is not exposed to sunlight, which in turn reduces the capacity of the small intestines (the digestive system) to absorb calcium efficiently. This would affect Mrs Kumar's bone density and muscles (the musculoskeletal system).

Lionel reports his conversation with Mrs Kumar to his supervisor who passes on the information to Mrs Kumar's family and then her family doctor. Soon after, part of Lionel's role is to support Mrs Kumar on a walk in the local gardens.

Practice Task 15

Question 1

Provide examples of how the cardiovascular system interacts with two other body systems.

Question 2

Provide examples of how the reproductive system interacts with two other body systems.

Summary

- Support workers need to have some knowledge of medical terminology.
- Many medical terms come from Latin and Greek.
- Interpreting medical terms and using them correctly is essential so you can perform your job safely and effectively.
- Support workers who understand how the body works can carry out a range of tasks effectively and efficiently.
- The body is made up of cells that form tissues, bones, blood, organs and organ systems.
- There are 11 major systems in the body each with their own functions and role in keeping the body alive and healthy.
- The 11 body systems are: the cardiovascular, respiratory, musculoskeletal, endocrine, nervous, digestive, urinary, reproductive, integumentary, lymphatic and immune systems.
- The body's systems work together to ensure the body has sufficient nutrients and oxygen, can expel toxins and waste products, can deal effectively with pathogens, can ambulate and maintain homeostatic balance.
- The special senses are: smell, taste, vision, equilibrium and hearing.
- Each body system is deeply interconnected with and reliant on the other systems.

Learning Checkpoint 1

Work with information about the human body

Part A

1. Complete the table with an example of an abbreviation for each letter of the alphabet. Use online medical dictionaries to help you find the terms.

Letter	Abbreviation	Meaning
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		

Letter	Abbreviation	Meaning
N		
O		
P		
Q		
R		
S		
T		
U		
V		
W		
X		
Y		
Z		

2. Number the following body parts from 1 to 4 from the smallest to the largest unit of body structure.

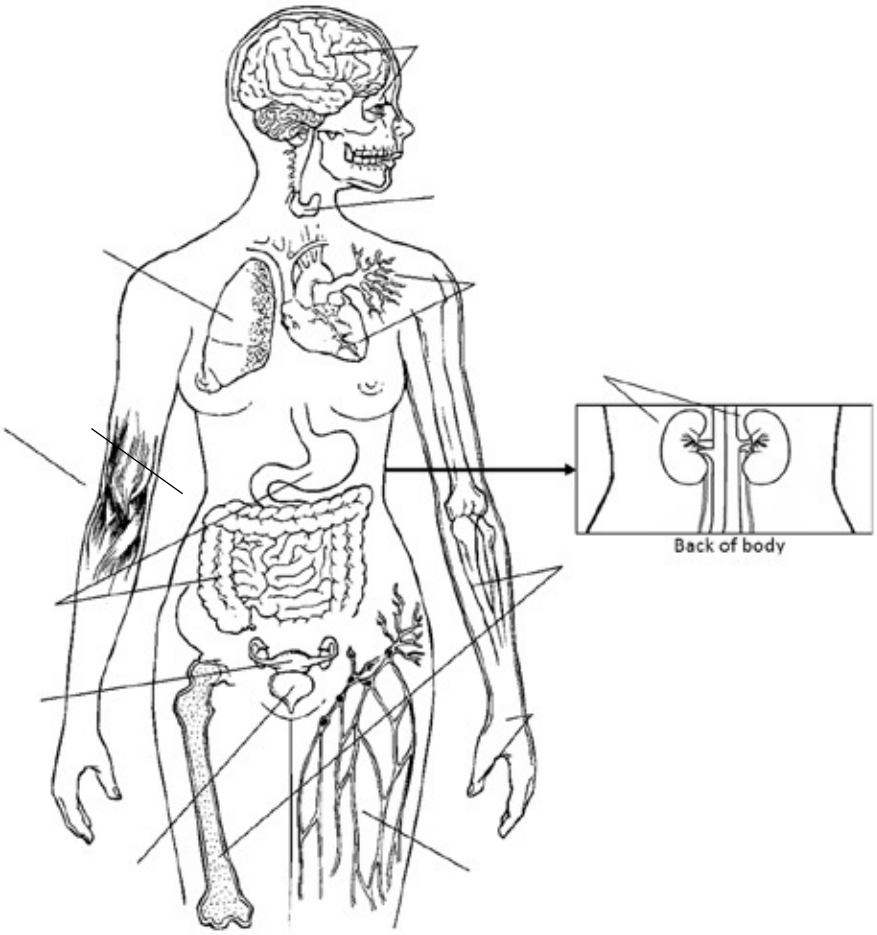
	Organs
	Body systems
	Cells
	Tissues

3. List two main functions for each of the following organs and the body system they belong to.

Structures/organs	Functions	System
thyroid/ parathyroid glands		
brain		
heart		
lungs		
muscles		
bones		
skin		

Structures/organs	Functions	System
stomach		
intestines		
ovaries		
bladder		
kidneys		

4. Identify the location of these structures/organs that form part of the body systems by labelling the following diagram:



5. Complete the following table with information about the interrelations between different body systems.

Nervous	Endocrine	
Urinary	Digestive	
Respiratory	Cardiovascular	
Lymphatic	Urinary	
Digestive	Musculoskeletal	

Integumentary	Musculoskeletal	
Reproductive	Lymphatic	
Immune	Integumentary	

Part B

Read the case studies, then answer the questions that follow.

Case study

Sandeep is providing support to an older couple in their home. Jose has diabetes and is prone to getting ear infections, especially after a cold. These infections make him feel dizzy and unwell. The couple are both lactose intolerant, so they have a special diet that has been created with the help of a dietician.

1. Name a body system affected by Jose's ear infection and the senses affected.

2. Name the organ and body system causing lactose intolerance and the organ affected by this disorder.

3. Diabetes is a common disease where the pancreas does not make insulin. Which of the two body systems is the pancreas part of?

4. Infections occur when the body is overwhelmed by a pathogen. Name two body systems necessary for fighting infection.

Case study

Marita works as a personal support worker at a low-care hostel and is interviewing Bill, a new resident. She asks Bill about his medical history. Bill tells her, 'I had a bit of trouble with a hypa-active thyroid'. Marita asks whether Bill means a *hypo*active or a *hyper*active thyroid. Bill replies, 'I'm not really sure. All I know is that it made me put on weight'. Marita responds, 'It sounds like you had a hypoactive thyroid'. Marita notices that Bill appears to be a healthy weight. She says, 'Are you currently taking any medication for your thyroid?' He says that he is currently taking medication and Marita records this information on his admission form and shows her supervisor her notes before filing them.

5. Provide two examples from the case study that explain how Marita used her knowledge of medical terminology and the body's functions in her interview with Bill.

Topic 2: Recognise and promote the healthy functioning of the body

2A Review factors that contribute to the maintenance of a healthy body

2B Evaluate how relationships between body systems affect and support healthy functioning

2C Enhance work by using and sharing information about the healthy functioning of the body

2A Review factors that contribute to the maintenance of a healthy body

The enjoyment of the highest attainable standard of health is a right of every human being without distinction of race, religion, political belief, or economic or social condition.

Health
A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.

Health is more than just a physically intact, disease-free body. Most people maintain a reasonable level of health by seeking medical help or having medical check-ups when required, having a well-balanced diet, doing physical exercise, monitoring their levels of stress, limiting alcohol and not smoking.

There are several aspects to health in addition to physical health. These are social health, emotional health, spiritual health and mental health.

It is important to understand that mental health plays an enormous and often recognised role in someone's overall health. If someone has poor mental health, it is likely to affect other aspects of their life. The mind can affect the body.

The key point to remember is that the mind and body are connected. Here are some examples:

- A person may stop eating properly and gain/lose too much weight.
- A person may stop socialising and interacting with others, leading them to feeling isolated and lonely.
- A person may stop looking after themselves and risk their own safety.

Wellbeing
A sense of happiness, peace or contentment when we find satisfaction and purpose in meaningful activities and connections with others.

A state of **wellbeing** helps us to build good support systems, believe in ourselves and our ability to cope, and to stay resilient through challenges. Resilience helps protect us from isolation, loneliness, hopelessness, depression and anxiety.

Optimal health of the body is when it is structurally sound and functions as it should. You will be working with people with various levels of health.

Disease
An illness or sickness characterised by specific signs or symptoms.

Disease affects the human body by changing its normal functioning. The signs and symptoms of a disease provide information about how the body's normal functioning has changed, and a range of tests are available to identify what the disease is. The information provided from observations, examinations and test results is used by medical professionals to make a diagnosis and outline a plan for treatment, which can include medication.

Measuring optimal health

Structural or physical health may be determined by:

- internal body temperature
- blood pressure
- blood tests
- height/weight ratio to measure body mass index (BMI)
- resting heart rate
- recover time after exertion/exercise.

These are some of the measurements that nurses, doctors and other medical professionals use to monitor physical health.

Read more about calculating BMI and how it is used to measure whether a person is in a healthy weight range, or over- or underweight. The normal BMI range is 18.5 to 24.9: aspirelr.link/bmi-calculator

Certain chemical compounds are essential for the proper functioning of the body and are therefore essential for health. However other kinds of chemicals, both naturally occurring and manmade, can get into the human body and cause harm. We can inhale them, swallow them or, in some cases, absorb them through skin. Often the body is able to breakdown chemicals or excrete them, but if not they can affect the health of the body, sometimes immediately and sometimes only after prolonged exposure. For this reason, blood tests are used extensively as a screening test because they can provide a lot of information about levels of essential chemicals that get transported around the body.

The cells, tissues and organs of the body must maintain and regulate certain chemical compounds in relatively constant and stable conditions in order to function properly.

The levels of these substances are carefully controlled by different mechanisms to ensure homeostasis.

Strategies to promote health and wellbeing

Understanding the concept of health and how to promote and support a healthy mind and body means you must know basic anatomy and physiology. You also need to know how to recognise risk factors and signs and symptoms of changes in a person's health, and what to do about them.

It is important to use a 'person centred' approach when providing support to clients. There is no 'one size fits all', and support should focus on achieving the person's aspirations and be tailored to their needs and unique circumstances. Always focus on the person and what they *can* do, not on their condition.

Here is a list of some factors that are important for the healthy functioning of the body.

Factor	Importance for health functioning	Maintenance for a healthy body
Nutrition	• Achieving and maintaining a healthy weight can help older people stay more active, manage their health problems better and live life more fully. • When older adults are less active, they may need fewer kilojoules in their diet, but they still need similar amounts of nutrients – sometimes even more. - For example, as people age their calcium requirements increase and they need extra serves of milk, yogurt and cheese to maintain bone health. • Older adults need a certain amount of kilojoules from food to have the energy to take care of themselves and perform tasks independently. • A lack of energy can make it difficult to perform daily tasks, such as **activities of daily living (ADL)**, which includes personal hygiene and other household tasks like housework, shopping and cooking.	• There may be dietary recommendations from a dietician or doctor that need to be followed, such as: - reducing portion sizes (eating less) - reducing discretionary foods and drinks (such as alcohol, and foods containing poor quality fats and added salt and sugar). • The person's individual needs and preferences must be considered when their diet is being reviewed. - The person may not like certain foods or may prefer to eat their food in a particular way.
Hydration	• Good hydration means having enough water in the body. - This is essential for the function of all organs and maintaining homeostasis. • Water makes up 60–80% of cells and 91% of plasma (the liquid portion of blood). • Since so much of the body is made up of water, the importance of good hydration cannot be understated, nor can the serious effects that can come from dehydration.	• Ensuring sufficient fluid intake is especially important when you are caring for older people. • This can be because: - the person may not be able to recognise the need for fluids or have access to fluid replacement. - they may have problems with physical mobility that affects their manual dexterity, such as their ability to hold a cup of water; this may be caused by a stroke or arthritis

Activities of daily living (ADLS)
Fundamental skills required to sustain independent living, relating to nutrition, personal hygiene and mobility. of disease or infirmity.

Factor	Importance for health functioning	Maintenance for a healthy body
	• Dehydration is the condition of having insufficient hydration caused by more water leaving the body than being taken in	- they may have limited self-care abilities and may require assistance with fluid intake - they may have difficulty swallowing, a fear of choking or a fear of incontinence.
Skin integrity	• Skin is the largest organ of the body and provides several important functions. • Older people usually have a higher risk of skin breakdown as their skin's structure and function may change due to ageing and/or the progression of a chronic disease. • This means understanding good skin care practices that help maintain clean and intact skin is important when caring for older people.	• Ways to ensure skin integrity include: - maintaining good nutrition and hydration - practising good skin hygiene (ensuring skin is clean and dry) - preventing skin breakdown (adequate lighting, environment free of potential falling risks) - regular but careful mobilisation - providing protective / supportive devices to stop wear and tear from prolonged sitting/lying (for instance, heel protection devices, seat cushions, a protective mattress) - having a good moisturising regime. • • Support workers should frequently moisturise to protect their skin from breakdown to help prevent infection.
Social interaction	• Human beings are social creatures and need to participate in, feel valued in and be connected to a wider social environment. It is essential for everyone to feel connected to the world, regardless of their apparent ability to understand or interact with others.	• One of the important roles of a support worker may be to facilitate social interactions. - As a member of the support team, it is important to listen to the needs of your clients and communicate with other healthcare workers to see what resources are available to facilitate a more social, interactive life.

Factor	Importance for health functioning	Maintenance for a healthy body
	• Social interaction can be considered from two perspectives: interpersonal relationships and community participation. Both of these add value, enjoyment and purpose in life.	• Many national and state-based aged care organisations run support group meetings and social activities. - For example, the Australian Red Cross companion services are social connection programs that are part of the Community Visitors Scheme (CVS). They provide support and links to people and groups in the community. Their programs include home visits, social outings, group activities, peer support and social phone calls.

You can learn more about Australian Red Cross companion services here: aspirelr.link/bmi-calculator

Example

Maintaining mental and physical health

Shauna is a young woman living with spina bifida. Shauna requires a wheelchair to mobilize as her legs are unable to support her weight.

Each week Shauna attends an exercise session after work for an hour. At weekends she has a pool exercise class followed by a swim at the local beach with her friends. They often go out for coffee afterwards. Shauna discusses meals with her mother and they plan the week's meals ahead of time. Shauna enjoys cooking and tries to eat healthily.

She understands that good nutrition, exercise and having a good social network are important to maintaining her mental and physical health.

Movement

The benefits of keeping as active as possible are well known and this is also true for older people. Exercise is beneficial for:

- improving memory and brain function (all age groups)
- protecting against many chronic diseases

- aiding in weight management
- lowering blood pressure and improving heart health
- improving quality of sleep
- reducing feelings of anxiety and depression
- improving joint pain and stiffness
- maintaining muscle strength and balance
- increasing the life span.

When a person exercises their body releases endorphins that can lift their mood, ease depression, relieve stress and anxiety, enhance self-esteem and improve a person's whole outlook on life. The impact of little or no exercise on a person's life can be significant. Aside from the physical costs, it can restrict a person's interaction with others and their involvement in social activities.

There are two types of activity: passive and active.

Passive exercise/activity

Passive activity involves the movement of the limbs without much effort, for instance, sitting and performing ADLs. Passive exercises can be used to prevent stiffness and regain the range of motion in one's muscles. Passive exercises (also known as passive range of motion (ROM) exercises) can improve how far the client can move their joints in different directions.

Active exercise/activity

Active forms of exercise and activity involve movement where physical effort is exerted and muscles are active. Examples include walking, stretching, swimming and other forms of exercise. Active exercises help strengthen the communication between the brain and body for increased movement and muscle strength.

When participating in passive activity, the body's systems are still working, using energy, water and nutrients while creating waste. The body still needs to maintain its temperature, the heart still needs to circulate blood and the digestive system still needs to extract nutrients. When we are moving, these systems all work harder.

As a support worker you need to understand your clients' level of mobility and ability to ambulate, their independence in self-care and their usual living situation if you are to implement appropriate and effective mobility and self-care interventions.

Areas of daily life you can assist with and encourage include:

- **Incidental activities**
- **Exercise**

Incidental activity
Physical activity that occurs as part of everyday self-care activities.

  - Exercise doesn't necessarily mean going to the gym or jogging. For some people it may mean doing physical enjoyable tasks around the house that provide increased movement, such as gardening or walking a pet.
  - Sports and other forms of exercise also present opportunities to engage in group activities and the environment, which can, in turn, reduce isolation.
  - Remember, you must know your clients' abilities and potential barriers, fears, strengths and weaknesses so you can encourage them appropriately to safely exercise and hopefully to enjoy it.

- **Encouraging independence with activities of daily living (ADLs)**
  - A person can maintain their dignity and independence by attending to their ADLs.
  - To do so, you must support them by letting them know that you are there to assist them but will not just do everything for them. This might look like providing a minimal amount of assistance while encouraging optimal participation.
  - Assistance may be required on an ongoing basis or it may be short term until the person's condition improves or their abilities and confidence increase.

Some people feel self-conscious about their weight, disability, illness, or injury, and find it difficult to find the motivation to remain active or exercise. As a support worker, you can check that there are no physical barriers to participation such as stairs, rough ground or spaces that aren't safe or easy to navigate.

Video: Mobility aids
Watch this video about mobility aids and the correct use of walkers to suit different needs for older people: aspirelr.link/yt-mobility-aids

Example

Encouraging independence and mobility

Mary is back at home following a stroke. She has left sided weakness and feels nervous when she walks around the house, fearing she may fall. Rupert, her support worker, notices she is only eating chocolate bars, nuts and biscuits. When Rupert asks about her diet, Mary says she doesn't want to cook anything as she thinks she may fall and end up back in hospital. She also says she doesn't know how to get the food from the kitchen to the sitting room while using the four-pronged cane her physio has instructed her to use.

Rupert suggests that they cook together, starting with small things like toast and boiled eggs. He sits with Mary and they write a list of foods and drinks that she might like to prepare.

Rupert documents his observations and reports to his supervisor. Mary agrees to have an occupational therapist come to her home to discuss moving around her home safely and cooking for herself.

Example

Promoting wellbeing in a person with dementia

Park is a 75-year-old man with mild dementia who lives in a nursing home. He is usually seen walking around the facility and in the gardens. He loves outdoor activities, such as gardening, outdoor bowls and walking in the garden. Recently, Park has been sick with a chest infection and has not been able to do these activities. His mood has been low, and he hasn't been seen smiling much.

After a few weeks, you notice that when he is mobilising, he is unsteady on his feet and needs assistance to walk any distance. Park has been seen by the GP, and he no longer has a chest infection; however, his mood has not improved.

You suggest to Park that he might like to go for a walk in the garden with you each day before lunch. The sunshine and exercise might help to lift his mood, and the regular exercise could help his mobility.

Park agrees, and over the next couple of weeks you walk with Park outside, walking further each day. You notice over this time that Park's mood has improved, as has his walking. He has more colour in his cheeks and is taking more interest in his surroundings.

Practice Task 16

Question 1

Match each kind of movement on the left to its description on the right.

Activities of daily living	Movement of the limbs with little effort. Used to prevent stiffness and regain range of motion in muscles.
Incidental activities	Movement where physical effort is exerted, such as walking, stretching and exercising.
Active exercise	Activity that occurs as part of everyday activities, for example, walking to the toilet, stairs, transferring and dressing.
Passive exercise	Activities required to sustain independent living, such as bathing, dressing and undressing, movement and mobility, toileting, food preparation and eating.

Read the case study, then answer the questions that follow.

Case study

Fetu lives in a residential aged care community. He is still mobile but requires assistance with his activities of daily living. He enjoys cooking traditional Samoan food and his doctor has told him that he needs to lose some weight because he has arthritis. Fetu finds it difficult to grip things when his arthritis is bad, such as opening containers, turning taps on and off and holding a knife and fork. He uses a range of assistive technologies and devices in his kitchen to help him maintain his independence. They allow him to continue to cook food to share with his family and friends.

Question 2

Which of the following statements are correct? Select yes or no for each one.

a. Fetu is at a higher risk of skin damage because of his age.	Yes / No
b. To achieve and maintain a healthy weight Fetu could do some exercise to be more physically active every day.	Yes / No
c. Encourage Fetu to drink more of the drinks he enjoys, such as coffee and soft drinks, and a beer at the end of the day.	Yes / No
d. Fetu requires social interaction for his health and wellbeing and sense of belonging.	Yes / No

2B Evaluate how relationships between body systems affect and support healthy functioning

Some people are more vulnerable to imbalances in homeostasis because of a pre-existing disease or condition.

A pre-existing condition might be something that interferes with a person's mobility, which in turn decreases their ability to exercise, reduces their capacity to perform ADLs, affects their appetite and deters them from adequate hydration. Support workers are part of a team that needs to help maintain good health and wellbeing, while also be proactive in preventing deterioration or further compromise in their clients' health.

Maintaining homeostasis is accomplished by the various processes and functions of body systems acting together. It is essential for healthy functioning. Processes required by the body include:

- thermoregulation (not being too hot or too cold)
- fluid and electrolyte balance
- efficient elimination of waste products from the body
- maintenance of healthy blood pressure
- protection from infection.

Thermoregulation

Thermoregulation is the maintenance of an optimal internal body temperature. It is critical for survival for every human being at every stage of life, as temperature effects enzyme function in every cell of the body. Many factors can affect the body's temperature, not only the external temperature.

Thermoregulation
The maintenance of optimal internal body temperature.

Normothermic: the healthy internal body temperature for the average person is between 37°C and 37.8°C. Your body has a small amount of flexibility, however, any large temperature fluctuation will affect your body's ability to function.

Hypothermic: the body temperature falls to 35°C or lower, which can potentially lead to cardiac arrest, brain damage and death.

Hyperthermic: the body temperature rises to 42 °C or higher, which can lead to brain damage and death.

Factors that can raise your internal temperature include:

- fever
- exercise
- digestion.

Factors that can lower your internal temperature include:

- drug use
- alcohol use
- metabolic conditions, such as an under-functioning thyroid gland.

Systems and organs involved in maintaining body temperature

The following table lists the body systems involved in thermoregulation. A variety of processes – including the regulation of body fluids, eliminating waste and fighting infection – can all contribute to temperature regulation.

System	Organs and mechanisms to maintain temperature
Integumentary system	The **skin** senses heat and cold in the external environment and sends messages, which induce a reaction if the body is too hot or cold. **Sweat glands** produce sweat that cools the body through evaporative cooling if the body is too hot. **Arrector pili** muscles in the skin contract when it's cold, causing 'goose bumps' as hairs stand erect. This warms the body by trapping heat.
Nervous system	The **hypothalamus** acts as a thermostat and is the master controller of thermoregulation in the body. It initiates heating and cooling mechanisms of the other body systems.
Musculoskeletal system	**Muscles** produce heat by shivering to increase the body temperature if it is too cold.
Cardiovascular system	The **blood vessels** under your skin dilate (get wider) when the body is too hot. This increases blood flow to the skin where it is cooler, causing heat to be lost through radiation. This is called **vasodilatation**. Similarly, blood vessels constrict when the body is too cold, minimising heat loss to the environment. This is called **vasoconstriction**.
Endocrine system	When the body is cold, the **thyroid gland** releases hormones to speed up the body's metabolism. This increases the energy the body creates and thus the amount of heat it produces.

Assisting people to maintain an optimal body temperature

Older people may be impaired in their capacity to thermoregulate for a number of reasons, both physiologically and for external reasons.

- Age or disease/disability can lead to reduced muscle mass and a decreased shiver reflex, with a resultant difficulty to stay warm enough.
- When extreme weather events occur, creating an extremely hot or cold environment, financial constraints may deter the person from using electricity/gas for heating and cooling.
- Conditions that affect the central nervous system (such as Parkinson's disease, multiple sclerosis or various tumours) can interfere with thermoregulation by impairing afferent sensing (the body detecting the external temperature) and central control (the body's capacity to respond).
- Having a compromised immune system impedes the body's ability to regulate a fever when a person has an infection.
- Certain medications and other substances can disrupt thermoregulation and cause a temporary rise in body temperature, for example:
  - antimicrobials, such as antibiotics
  - nonsteroidal anti-inflammatory drugs (NSAIDs)
  - first generation anticonvulsants
  - antidepressants
  - antihypertensive drugs
  - opioids
  - sedatives
  - alcohol.

If a person is unable to maintain a healthy and comfortable body temperature independently, the support worker may need to support them to get warm or to cool down. This should always be done in consultation with a supervisor who will ensure that the person's care plan includes this important information.

The support worker should determine the cause of the altered temperature and adjust the care they provide, as follows.

Altered homeostasis	Intervention
Hyperthermia: Care of a person with an elevated temperature	• Ensure the person drinks adequate fluids, as a higher body temperature will cause an increase in sweating as the body attempts to cool itself down. • Ensure the environment is at an appropriate temperature by using cooling devices and/or fans. • Wash the person's limbs and torso with cool or tepid water. • Ensure they are wearing appropriate clothing, such as a cool cotton sheet or loose cotton pyjamas.
Hypothermia: Care of a person with a lowered temperature	• Ensure they are wearing adequate clothing – immobile people usually feel cooler than a person who can mobilise. • When you are showering or providing personal hygiene to the person, ensure they are covered as much as possible and that windows and doors are kept closed to minimise draughts. • Ensure the environment is at an appropriate temperature by using heating devices and offering blankets and/or a hot water bottle. • Offer warm drinks and food.

Maintaining fluid and electrolyte balance

Electrolytes are charged ions (chemical elements) that the body obtains through the nutrients in food. They are transported in the blood stream and are necessary for important physiological functions, such as conducting nervous impulses, muscle contractions, keeping the body internally hydrated and regulating the body's pH (acid and alkaline) levels.

Older adults are susceptible to dehydration and electrolyte abnormalities. For instance:

- poor mobility can restrict people's access to fluid intake
- external causes such as **polypharmacy** and unmonitored **diuretic** usage can contribute to dehydration
- physical and mental decline can impair the body's capacity to regulate water and electrolytes
- conditions that cause water retention and related electrolyte abnormalities are more likely.

These factors can be interrelated and exacerbated by physiological or psychosocial stress.

Polypharmacy
Regular use of five or more different kinds of medication.

Diuretics
Chemical substances that increase the loss of water from the body.

Electrolyte balance

As discussed in the last section, it is important to assist people to maintain their body fluids by ensuring their fluid intake is adequate. In medical wards and where nursing care is required, special charts are used to record the intake and output of fluids and food consumed by the person.

In order to function efficiently, the human body needs to maintain a stable balance of electrolytes. Electrolytes are electrically charged ions that transmit electrical impulses to our heart, muscle and nerves. Muscles rely on sodium, calcium and potassium to contract, and if we do not have enough of these electrolytes our muscles will not work properly. Electrolytes also assist in maintaining a healthy fluid balance. If we have too much sodium in our blood it may cause high blood pressure or fluid retention.

Electrolytes are found in food, especially fruit and vegetables, and fluids such as fruit juices and coconut water. Electrolytes are not replaced by drinking water.

Electrolyte	Explanation	Electrolyte disorders
Sodium	• Controls the amount of fluid in the body • Regulates blood volume • Maintains muscle and nerve function • Is obtained mostly through table salt that is added to food	• Hyponatremia (too little sodium) can be caused by excessive fluid loss through the skin (from sweating or burns); vomiting or diarrhoea; poor nutrition; alcohol use disorder; overhydration; disorders of the thyroid, hypothalamus, or adrenals; liver, heart, or kidney failure; and certain medications (including diuretics and seizure medications). • Hypernatremia (too much sodium) can be caused by inadequate water consumption; severe dehydration; excessive loss of bodily fluids as a result of prolonged vomiting, diarrhoea, sweating or respiratory illness; and certain medications (including corticosteroids).

Electrolyte	Explanation	Electrolyte disorders
Chloride	• Maintains stable fluid content in blood, cells and around the cells • Maintains acidity levels in the body • Obtained mostly through table salt that is added to food	• Hypochloremia (too little chloride) can be caused by severe dehydration, kidney failure and being on dialysis. • Hyperchloremia (too much chloride) can be caused by cystic fibrosis, eating disorders (e.g., anorexia nervosa) and acute kidney failure.
Potassium	• Helps transport nutrients into cells and waste products out • Regulates the heartbeat and muscle function • Obtained by eating meat, milk, fruit and vegetables	• Hypokalaemia (too little potassium) can be caused by eating disorders, severe vomiting or diarrhoea, dehydration and medications (including laxatives and diuretics). • Hyperkalaemia (too much potassium) can be caused by severe dehydration, kidney failure, severe acidosis (e.g., diabetic ketoacidosis) and medications (including some blood pressure medications and diuretics).
Magnesium	• Maintains normal nerve and muscle function • Maintains the immune system • Assists to stabilise blood glucose levels • Promotes the formation of bones and teeth • Assists in the synthesis of DNA and RNA • Obtained by eating nuts, spices, leafy green vegetables, coffee and tea	• Hypomagnesemia (too little magnesium) can be caused by alcohol use disorder, malnutrition, nutrient malabsorption, chronic diarrhoea, excessive sweating, heart failure and medications (including some diuretics and antibiotics). • Hypermagnesemia (too much magnesium) can be caused by Addison's disease and end-stage kidney disease.

Electrolyte	Explanation	Electrolyte disorders
calcium	• helps in the formation of bones and teeth • aids transmission of nerve impulses • part of the blood clotting process • causes muscle contraction • obtained by eating dairy products, leafy green vegetables, seafood, legumes and fruit	• Hypocalcemia (too little calcium) can be caused by Vitamin D deficiency, pancreatitis, prostate cancer, nutrient malabsorption and certain medications, (including heparin, osteoporosis drugs, and antiepileptic drugs) • Hypercalcemia (too much calcium) can be caused by kidney disease, thyroid disorders, lung diseases (e.g., tuberculosis), certain types of cancer, excessive use of antacids or calcium/Vitamin D supplements and medications (such as lithium).
phosphate	• strengthens bones and teeth • assists with energy production in cells • tissue growth and repair • component of cell membranes and DNA • obtained by eating egg yolks, milk, nuts, lentils and pulses, oats and mushrooms	• Hypophosphatemia (too little phosphate) can be caused by acute alcohol abuse, severe burns, starvation, Vitamin D deficiency, overactive parathyroid and medications (some antacids). • Hyperphosphatemia (too much phosphate) can be caused by low calcium levels, chronic kidney disease, severe breathing difficulties, underactive parathyroid, severe muscle injury and excessive use of phosphate-containing laxatives.

Factors affecting fluid and electrolyte imbalances

Influencing factors	Explanation
Excessive water loss from the body	Fluid and electrolyte disorders are most often caused by a loss of bodily fluids through prolonged vomiting, diarrhoea or sweating. They may also develop due to fluid loss related to burns.
Dehydration	Dehydration is harmful amount of fluid loss from the body. Common early signs of dehydration include: • headache • tiredness • loss of concentration • urine output decreases and the urine becomes darker in colour. More severe dehydration can present as: • extreme thirst • having a very dry mouth • rapid breathing • a fast heart rate and low blood pressure • fever • have little or no urine output • being irritable, drowsy or confused. If a person is mildly dehydrated, the best thing they can do is to drink more water. Drink small amounts of water regularly. Oral rehydration solutions purchased from the pharmacy can assist with the fluid and electrolyte balance. Severe dehydration needs immediate medical treatment, usually in hospital where fluids and electrolytes are given through an intravenous drip.
Water retention	One of the main causes of water retention is poor diet: excess sodium and sugar can lead to water retention. It can also be caused by: • excess insulin • lack of mobility • being overweight • pregnancy • certain medications • underlying medical problems.

Influencing factors	Explanation
Polypharmacy	Polypharmacy is when a person is regularly taking five or more different medications. These can include prescribed medications and 'over the counter' medications. It is common that older people and those with multiple chronic conditions are cared for by multiple doctors – perhaps a GP and several specialists. These doctors may not confer with one another and may not know all the medicines a person is taking. People with multiple health problems can therefore end up taking various medications prescribed by different doctors. We have incomplete information about the combined effects of medications on the body. Polypharmacy can cause: • falls and fractures (by impairing balance or causing dizziness) • memory problems • hospitalisation • higher risk of death.
Use of diuretics	Diuretics are substances that increase the amount of fluid excreted by the body. Diuretic medications are used for water retention and some cardiac conditions. Other commonly ingested substances, such as caffeine, are also mild diuretics. If overused they can cause: • too little potassium in the blood • too much potassium in the blood (in the case of potassium-sparing diuretics) • low sodium levels • headaches • dizziness • thirst • increased blood sugar • muscle cramps.

Maintaining optimal pH

In order to remain healthy, the body must maintain correct pH levels, which is the acidity/alkalinity of a fluid. The full pH range is 0 to 14, with 7.0 being neutral, 1.0 being extremely acidic and 14 being extremely alkaline. If the pH is above 7.0, the solution is alkaline and if it is below 7.0, it is acidic. In the human body the pH varies depending on the location; for example, the pH of urine is 6.5–7.0 in the morning and 7.5–8.0 in the evening. The intake of food and fluid over the day changes the pH level. The pH of blood has a normal range of 7.35–7.45, whereas the stomach has a pH of between 1 and 3, because it requires a very acidic environment to digest food.

Electrolyte	Explanation	Electrolyte disorders
bicarbonate	• Is excreted and reabsorbed by your kidneys • Regulates the body's pH • The body creates bicarbonate by combining carbon dioxide with water, converting it to carbonic acid and then to bicarbonate	• Metabolic acidosis (too little bicarb) can be caused by a build-up of too many acids in the blood. This is typically the result of the kidneys being unable to remove enough acid from your blood. • Metabolic alkalosis (too much bicarb) can be caused by an extreme lack of chloride, such as from prolonged vomiting.

Efficient elimination of waste products

In order to survive, the human body must eliminate waste products. The body takes in nutrients through food, oxygen from the air we breathe and fluid in foods and drinks. Our body only uses what is required, stores some of the excess for later use and then eliminates the remainder. The breakdown of food and various metabolic processes within the body also create waste products that need to be eliminated.

Organs	Mechanisms of waste removal
Kidneys	The kidneys are two bean-shaped organs that filter the blood and remove excess water and waste products as urine, which is evacuated from the body via the urethra. The waste products in urine are from the breakdown of food and muscle. Your body absorbs all of the nutrients it needs via the bloodstream and any excess substances are eliminated.
Liver	The liver acts as a detoxification system for the body, processing and neutralising drugs and hazardous substances. It breaks down old red blood cells and recycles their components. It removes bilirubin from the body and processes ammonia by converting it to urea, so it can be excreted by the kidneys.
Skin	The sweat glands in the skin secrete waste products and fluid in sweat.
Lungs	The lungs remove the gaseous waste carbon dioxide in the exhalation.
Lymph nodes	The lymph carries the by-products of cell metabolism. From the lymph nodes it is returned to the blood stream where waste products are filtered and excreted.
Colon	Removes waste and toxins, bacteria and parasites from the body in the form of faeces.

Symptoms that various processes of elimination are not efficient include:

- unclear and/or yellowish or red eyes
- lethargy and consistent fatigue
- bad breath
- smelly, concentrated urine
- constipation
- skin problems.

Protection from infection

As discussed throughout this unit, the body is a combination of structures (cells, tissues, organs and organ systems) that have very specific roles but also interact with each other to provide functions that enable the body to maintain homeostasis. Protection from infection is a good example of many structures and body systems working together to keep the body healthy and safe. As with thermoregulation, many body systems play a role in protection from infection.

It is also a very important to remember that when normal functions of the body are compromised, there is a greater vulnerability to infection.

Body system	Explanation
Immune system	The main components of the immune system are: • white blood cells • antibodies • spleen • bone marrow • thymus.
Lymphatic system	The lymphatic system comprises the lymph nodes, red bone marrow and organs such as the spleen and thymus. Lymph fluid collects in the spaces between cells and travels to the lymph nodes where special cells destroy harmful cells.
Integumentary system	The skin is a waterproof barrier that secretes oil with bacteria-killing properties. Nasal hairs trap foreign particles that can be blown or sneezed out.
Respiratory system	Mucous in the lungs (called phlegm) traps foreign particles, and small hairs (cilia) wave the mucous upwards so it can be coughed out.
Digestive system	The mucous lining of the digestive tract contains antibodies, and the acid in the stomach can kill most microbes.

The Australian Guidelines for the Prevention and Control of Infection in Healthcare (published in 2020 by the National Health and Medical Research Council) are a comprehensive guide to infection prevention and control in healthcare: aspirelr.link/nhmrc-infection-control-guidelines

The main points are summarised below. Since the emergence of COVID-19, the emphasis on prevention of infection has spread from the healthcare environment to all aspects of life and the need for safe practice has expanded to include everyone, not just health professionals. Infection control should always be practised, especially with vulnerable people with a compromised health status, such as older people.

Infection prevention/control measure	Explanation
Hand hygiene	The first and most simple way to prevent the spread/introduction of infective agents is hand hygiene, whether using an alcohol rub or soap and water.
Management of sharps, medication vials and safety engineered devices	To minimise the risk of skin breaches, it is important to collect and dispose of sharps correctly in a sharps container.
Routine management of the physical environment	The physical environment should be kept clean and tidy to prevent microbes from reproducing, to reduce the risk of contamination and to avoid trips and falls.
Aseptic technique	This is the method used when the hands need to be completely free of microbes, for instance when attending to compromised skin integrity (wounds) or equipment that enters the body such as dressing on a wound.
Personal protective equipment (PPE)	Gloves, aprons, masks and goggles can protect both the wearer and the client.
Risk management	Knowing the individual needs of the clients and understanding their specific risks (e.g., compromised immune system, poor skin integrity) means you can avoid potential risks.
Health status screening and immunisation	Understanding that immunisation (COVID-19 or flu vaccinations) can prevent transmission of disease to vulnerable clients.
Education and training	Infection prevention is EVERYBODY'S responsibility. Training and education for healthcare workers, clients and their families can ensure that correct infection control measures are utilised to maximise safety.

Hand Hygiene Australia is a good source of information on when, how, how often and why hand hygiene is essential. Although much of the information relates to hospital and residential care settings it can be applied anywhere that workers need to maintain hygiene to protect their vulnerable clients. This has become an enormous issue during the COVID-19 pandemic.

Go to: aspirelr.link/hand-hygiene-australia and complete your hand hygiene course.

Video: Hand washing
Here is a good video demonstrating how to wash hands with soap or alcohol rub: aspirelr.link/yt-handwash

Maintaining blood pressure

Blood pressure is the force of blood, pumped by the heart with each heartbeat, pushing against the walls of the arteries. It is measured by applying pressure (with a blood pressure cuff) to an extremity (an arm or leg) and measuring the pressure exerted by the blood when the vessel is constricted and then released by the blood pressure cuff and measuring the pressure exerted by the heart at rest. The measuring device is called a sphygmomanometer and can be manual or automatic.

Video: Blood pressure
This video explains blood pressure and its importance for the normal functioning of the body. Make a list of what the NHF suggests as ways to maintain healthy pressure: aspirelr.link/yt-blood-pressure

Blood pressure is an important indicator of a person's heart function and other essential body processes.

Although healthy blood pressure varies slightly according to age, the Australian Heart Foundation says ideal blood pressure is around:

- systolic blood pressure at or slightly under 120 mm Hg
- diastolic blood pressure at or slightly under 80 mm Hg

High blood pressure means that the heart needs to work harder to send the blood around the body, whereas low blood pressure can indicate that the heart doesn't have enough strength to pump the blood around the body.

As with the other mechanisms of homeostasis, blood pressure can be managed by a person by:

- eating a healthy diet
- sufficient fluid intake

- exercising/increased mobility
- maintaining a healthy weight
- avoiding toxins (alcohol, smoking, highly caffeinated/sugary drinks, drugs)
- avoiding external stressors
- maintaining positive mental health/socialisation
- effective pain management.

Several body systems are important to the maintenance of blood pressure:

Body system	Explanation
Cardiovascular system	Changes in blood pressure are detected by baroreceptors, which are located in the arch of the aorta and in the carotid sinus.
Nervous system	These baroreceptors send signals to the sympathetic nervous system, which responds by increasing or decreasing the heart rate and contractility, which increases or decreases blood pressure.
Renal system	The kidneys, through hormonal control, increase or decrease urine output to ensure there is a sufficient volume of blood in the system to maintain blood pressure.
Endocrine system	Anti-diuretic hormone (ADH) is produced in the hypothalamus and stored and released from the posterior pituitary gland. It regulates sodium retention and release, which in turn regulates blood volume.

Older people can have a reduced capacity to regulate their blood pressure for several reasons. Because older people are less likely to have an optimal diet, they have an increased likelihood of developing cardiovascular disease, and are more likely to be overweight/obese, which puts additional strain on the heart.

Practice Task 17

Question 1

Match each of the following body systems to its role in regulating body temperature.

Central nervous system	Cold or heat is sensed via receptors in the skin, which send messages to the brain. According to the return signals, sweat glands or arrector pili muscles mediate a response.
Musculoskeletal system	Blood vessels widen to increase blood flow to the surface of the body to release heat through radiation.
Endocrine system	The hypothalamus acts as a thermostat and initiates heating or cooling mechanisms of the other body systems.
Integumentary system	Muscles produce heat by shivering to increase body temperature if body is too cold.
Cardiovascular system	The thyroid gland releases hormones to increase the body's metabolism and body heat.

Question 2

Name at least two electrolytes and their function in maintaining fluid balance and homeostasis.

Question 3

Identify three ways in which the body eliminates waste from the body.

Question 4

Suggest at least four ways you can protect the person you support from infection.

Question 5

List three ways to maintain a healthy blood pressure.

2C Enhance work using and sharing information about the healthy functioning of the body

A change in a person's physical, cognitive, emotional or psychological status can be very subtle and not noticeable to someone who doesn't know them well. Sometimes the change is significant and needs immediate medical attention.

Support workers are part of a team that is responsible for the wellbeing and optimal health of each of their clients. The person's care plan will guide you as to their specific needs. You may be required to:

- assist with personal care, such as bathing, grooming, dressing and eating
- ensure the client's home is organised according to their needs and safety requirements; this may include some light housework
- provide emotional support and encouragement to perform ADLs
- provide mobility assistance, for example to help the client in and out of bed, a chair, or a wheelchair
- transport or escort the client to medical and other appointments
- monitor and report changes in their health, behaviour and needs.

You are likely to be working with clients who have challenges maintaining their health either due to their age or disability. Understanding what is 'normal' for that person means that you will be more able to recognise and report when they are not 'normal'.

For example, there are interventions that can quickly remedy certain health issues – such as treating dry skin with moisturiser after a bath. Then there are conditions that need to be reported immediately to stop a greater deterioration in a person's health, such as when skin is damaged or torn. When supporting people who are vulnerable, and perhaps unable to communicate their needs clearly, it is vital that you take responsibility for monitoring and reporting issues. Something as small as a sore that isn't healing (an ulcer) needs to be referred and assessed by a nurse or doctor so it doesn't escalate into something worse. It may need a wound dressing and perhaps medication prescribed by a doctor.

The same examples apply when a worker notices a change in a client's mood. The person might normally be chatty and keen to be involved in regular activities involving community and family members. A mood change for them might look like a lack of interest or unwillingness to do the activities they normally enjoy, or a certain lethargy and not being interested in talking. Confusion, or a dramatic change in mood can indicate infection or something serious that needs to be investigated. These signs can indicate cognitive impairment, such as dementia.

Here are some other examples where it's important to address concerns before they escalate and become more serious:

- A person feels nauseous so they don't eat, and not eating makes them feel dizzy and lightheaded, which could result in a fall.
- A person feels discomfort when passing urine, so they stop drinking so they don't have to urinate. This causes dehydration, which has a number of potentially serious effects, and the discomfort passing urine could indicate a urinary tract infection (UTI), which needs to be treated.
- A person feels generally confused, which could create an environmental safety concern such as forgetting to turn off the gas after cooking.
- Forgetfulness can also mean the client doesn't take their regular medications, which could make other health issues worse.

Nonverbal communication is important when determining a client's health and wellbeing, meaning that you can pick up on their body language, tone of voice and facial expressions as well as the words they say. Listen to a client when they say they "just don't feel right", because it could be the start of an illness that could be addressed before leading to serious problems. For example, UTIs, which can occur frequently in older and can result in hospitalisation and serious complications if left untreated.

Video: Support worker traits
Watch this video and listen to support workers describe the personal traits required for the work and examples of what the work involves: aspirelr.link/yt-support-worker-traits

The multidisciplinary team

Providing safe, effective healthcare to a client requires a team approach.

It means providing personalised care to each individual, and identifying and attending to their needs, treatments and outcomes. There can be many different professions in a healthcare team. This is because many people have co-morbidities (multiple disease processes) and because each team member specialises in an aspect of the care required.

A multidisciplinary team involves a range of health professionals, from one or more organisations, working together to deliver comprehensive patient/client care.

Multidisciplinary team members could include:

- general practitioners (doctors)
- practice nurses
- community health nurses (who provide care in the person's home)
- support workers
- allied health professionals such as physiotherapists, occupational therapists, dieticians, psychologists, social workers, podiatrists and Aboriginal Health Workers
- health educators – such as diabetes educators – who provide promotion and prevention clinics and other activities.

Effective communication and collaboration among the multidisciplinary team is essential for continuity of care and to prevent errors. Teams may communicate in face-to-face meetings/case meetings, on telephone/video conferences or using video, photographs and written reports to supplement client information obtained from a database.

Your role in a multidisciplinary team requires you to:

- know your client's general state of health and wellbeing – what is normal for them and what is not
- know your client's needs and understand that they can change quickly
- understand the importance of documenting and recording your observations, in particular any changes that you observe
- know when to alert a supervisor or other senior person if the person's condition changes or deteriorates
- communicate clearly and objectively with your client about their needs and communicate this to relevant members of the multidisciplinary team as required
- ensure the client is safe and their care is appropriate and relevant
- ensure that your client maintains as much independence and autonomy as possible, and is always given the chance to be at the centre of decisions regarding their care.

Video: Communication tips for nurses

Watch this video on good communication. Although it says it is for nurses, it is just as applicable for members of a multidisciplinary team: aspirelr.link/yt-nurse-communication-tips

Consider:

- What are the principles of good communication?
- What are some barriers to communication?

Reporting change

Small changes in health can have a large impact on health and wellbeing, including a person's confidence and independence.

The following table has a list and description of a range of issues that affect different body systems. Each of these has signs and symptoms that need to be reported according to organisational policies and procedures. When in doubt about what you are observing in a client, always seek advice from your supervisor.

Indicators of physical change

Examples of possible physical health issues include:

Observed symptom	Health issue that could be causing the symptom
altered thermoregulation	• A fever could indicate the presence of an infection. • Increased body temperature could indicate poor insulin management. • A heat-related illness encompasses heat rash, heat cramps, heat exhaustion and heat stroke. • Decreased body temperature could indicate metabolic problems.
altered dietary intake	Nausea may indicate a digestive tract infection.
altered fluid intake	Excessive thirst can indicate dehydration.
altered elimination	Constipation can indicate poor nutritional input. Diarrhoea can indicate a digestive infection or food intolerance.
altered blood pressure	High blood pressure could indicate an arterial clot, or stress and anxiety. Low blood pressure could indicate dehydration.
altered mood	Confusion or dramatic change in mood could indicate infection, or dementia onset.
altered perception	Changes in sensory function can be due to infection or general 'wear and tear'.
pain	Pain can indicate illness or damage to an organ.

You must be able to recognise and report changes to the right person in a timely fashion. Reporting protocols will be provided to you by your supervisor and outlined in organisational documents such as your job description and policies and procedures. You need to know:

- who to report to
- what must be reported

- how it should be reported
- what follow up you need to do.

Documentation	Explanation
Progress notes	Progress notes are written by everyone in the multidisciplinary team as a way of communicating with each other. They ensure continuity of care and legal evidence of care. It is a form of ongoing documentation summarising the care and support provided, any changes in care, and appointments and social/ family interactions.
Individualised care plan	This is a plan of care, history, goals and timeframes to achieve the goals that is negotiated with the client and their family. It outlines the expected outcomes that will maximise the person's wellbeing and addresses issues or barriers that may impede the person's wellbeing. Where possible, the care plan should be developed in partnership with the client, the family and the multidisciplinary team. The client must always be the focus of the decision-making.
System charts	These are charts that record health measures and observations. They show 'normal' individual findings and can therefore highlight abnormal findings: • TPR chart (temperature, pulse, respirations, blood pressure, oxygen saturation) • Wound care chart • Diabetic management chart • Bowel charts • Continence charts • Fluid balance charts
Medication charts	These are medical orders for medications to be given, and include how, when, dosage etc.

Practice Task 18

Question 1

List at least two examples of health and wellbeing information found in a care plan.

Question 2

Identify five types of healthcare professionals that may be part of a multidisciplinary team that contributes to developing and implementing a persons' care plan.

Question 3

Identify four responsibilities you have as a support worker if you observe a change in a client's physical functioning or mood.

Question 4

Suggest where you might find information on how to report changes in a person's health and provide an example of the type of information required in the procedure.

Summary

- Supporting clients means caring for their physical, psychosocial, emotional and psychological wellbeing, and encouraging their independence and autonomy.
- As a support worker you will work within a multidisciplinary team contributing to the holistic support of your client.
- Your role includes reporting and documenting your clients' needs and changes in health status that may negatively impact their wellbeing.
- Understanding what a state of 'normal' looks like is important so that you can recognise when a client is not 'normal'.
- Effective communication with the client, the multidisciplinary team and the family/friends/carers of the client can contribute to the timely recognition of potential signs of deterioration.

Learning Checkpoint 2

Recognise and promote the healthy functioning of the body

Part A

1. Match each factor relating to the maintenance of a healthy body to its description.

Mobility	Drinking enough liquids to maintain fluid levels to ensure bodily functions can occur.
Skin integrity	The process of taking in food and using it for energy, growth, maintenance and repair.
Hydration	Important so that the integumentary system can act effectively as a barrier to infection.
Social interaction	The ability to move in one's environment with ease and without restriction.
Nutrition	Contributes to cognitive, emotional, spiritual and psychological fulfilment and to improvements in mood and improved hygiene, diet, mobility and function.

2. Identify three examples of when a support worker must report changes to the health of their clients. Provide an example of when to report and to whom.

3. Briefly explain each of the following body regulation processes, and the consequences if they are not functioning well.

- Thermoregulation
- Fluid and electrolyte balance
- Efficient elimination of wastes
- Protection from infection
- Maintaining blood pressure

4. Provide examples of the benefits of exercise and movement for maintaining a healthy body. Include examples of both active and passive exercise in your response.

Part B

Read the case study, then answer the questions that follow.

Case study

Sam is receiving assistance at home following surgery for a total hip replacement. She is overweight and experienced a fall and broke her hip in her own home while hanging out the laundry. Sam is seeing a physiotherapist who has given her exercises to strengthen her hip and has suggested that she take short walks to the local cafe and shops.

Since Sam broke her hip on her slippery back step, she is reluctant to leave the house. Prior to her fall, Sam was very social but she has become withdrawn and unmotivated. She is not moving far from her lounge room chair and is not taking care of her personal hygiene like she used to.

Sam's care plan has four goals. Benito, her support worker, is supporting her to work towards these goals, which are:

1. Improve mobility, muscle strength and confidence in mobilising independently through physical rehabilitation exercises.
2. Improve independence with ADLs including personal hygiene and dietary/fluid intake and elimination.
3. Reduce risks of falls.
4. Improve psychosocial interactions and reduce risk of depression and isolation.

1. Which of the following are Benito's responsibilities to support Sam to meet her goals and maintain her health? Tick all that apply.

- ❑ Encourage Sam to change her goals as there are too many to achieve in a short timeframe.
- ❑ Refer to Sam's care plan for information about her diet and fluids requirements.
- ❑ Support Sam to wash regularly including brushing and flossing her teeth so she can enjoy her meals.
- ❑ Offer to prepare Sam's meals so she doesn't have to get up so often.
- ❑ Report changes in Sam's lack of motivation to do her exercises to the supervisor and document this in the support notes.

2. Benito has observed that Sam is reluctant to do the exercises that the physiotherapist has suggested, which will strengthen her muscles and improve her mobility. Sam tells Banito, 'I can't be bothered' and 'What does it matter?'. Provide two examples of how muscle strength from physical activity can support Sam's health.

Glossary

Activities of daily living (ADLs)

Fundamental skills required to sustain independent living, relating to nutrition, personal hygiene and mobility.

Anatomy

The study of the body's structures and the relationships between the body parts.

Cells

The basic building blocks of life that provide structure for the body, metabolise food and convert it into energy.

Disease

An illness or sickness characterised by specific signs or symptoms.

Diuretics

Chemical substances that increase the loss of water from the body.

Health

A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.

Homeostasis

The bodily state of relative stability and equilibrium necessary for survival, maintained by multiple internal processes.

Immunity

The state of being insusceptible or resistant to a pathogen or infectious disease.

Incidental activity

Physical activity that occurs as part of everyday self-care activities.

Organ

A self-contained group of tissues that performs a specific function in the body.

Physiology

The study of how the human body works, and the chemical and physical reactions that underlie every bodily function.

Polypharmacy

Regular use of five or more different kinds of medication.

Thermoregulation

The maintenance of optimal internal body temperature.

Tissue

Tissues are groups of cells that have a highly organised structure and function.

Wellbeing

A sense of happiness, peace or contentment when we find satisfaction and purpose in meaningful activities and connections with others.