

Highsted Knowledge Organiser, Biology, Term 1, Year 10: Communicable diseases

What I need to know

Health and disease
 Pathogens and disease
 Growing bacteria
 Preventing bacterial growth
 Preventing infections
 Viruses
 Bacteria
 Fungi and protists diseases
 Human defence responses
 Plant diseases
 Plant defence responses

Key Vocabulary:

Aphid
 Bacterium
 Communicable disease
 Fungicide
 Fungus
 Isolation
 Mimic
 Pathogen
 Protist
 Sexually transmitted disease
 Toxin
 Vaccination
 Vector
 Virus

Challenge question:

What are the ways plants and animals defend themselves against pathogens?

Suggested reading:

www.kerboodle.com
<https://www.bbc.co.uk/bitesize/guides/zxr7ng8/revision/1>

Detection and identification of plant diseases

Signs that a plant is diseased

- stunted growth
- spots on leaves
- areas of rot or decay
- growths
- malformed stems or leaves
- discolouration
- pest infestation

Ways of identifying plant diseases

- gardening manuals and websites
- laboratory testing of infected plants
- testing kits containing monoclonal antibodies (Chapter 9 *Monoclonal antibodies*)

Plant defences

Physical barriers

- cellulose cell walls – provide a barrier to infection
- tough waxy cuticle on leaves
- bark on trees – a layer of dead cells that can fall off

Chemical barriers

- many plants produce antibacterial chemicals
- poison production stops animals eating plants

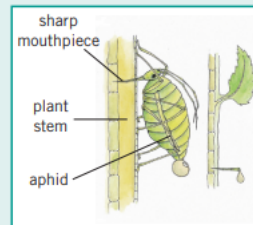
Mechanical adaptations

- thorns and hairs stop animals eating plants
- leaves that droop or curl when touched to scare herbivores or dislodge insects
- some plants **mimic** the appearance of unhealthy or poisonous plants to deter insects or herbivores

Plant diseases and insects

Plant diseases can also be directly caused by insects.

- Aphids** are insects that suck sap from the stems of plants. This results in
- reduced rate of growth
 - wilting
 - discolouration of leaves.



Ladybirds can be used to control aphid infestations as ladybird larvae eat aphids.

Controlling the spread of communicable disease

There are a number of ways to help prevent the spread of communicable diseases from one organism to another.

Hygiene

Hand washing, disinfecting surfaces and machinery, keeping raw meat separate, covering mouth when coughing/sneezing, etc.

Isolation

Isolation of infected individuals – people, animals, and plants can be isolated to stop the spread of disease.

Controlling vectors

If a vector spreads a disease destroying or controlling the population of the vector can limit the spread of disease.

Vaccination

Vaccination can protect large numbers of individuals against diseases.



Communicable diseases

Communicable diseases can be spread from one organism to another.

Viruses live and reproduce rapidly inside an organism's cells. This can damage or destroy the cells.

Viruses	Spread by	Symptoms
measles	inhalation of droplets produced by infected people when sneezing and coughing	<ul style="list-style-type: none"> fever red skin rash complications can be fatal – young children are vaccinated to immunise them against measles
HIV (human immunodeficiency virus)	<ul style="list-style-type: none"> sexual contact exchange of body fluids (e.g., blood when drug users share needles) 	<ul style="list-style-type: none"> flu-like symptoms at first virus attacks the body's immune cells, which can lead to AIDS – where the immune system is so damaged that it cannot fight off infections or cancers
TMV (tobacco mosaic virus – plants)	<ul style="list-style-type: none"> direct contact of plants with infected plant material animal and plant vectors soil: the pathogen can remain in soil for decades 	<ul style="list-style-type: none"> mosaic pattern of discolouration on the leaves – where chlorophyll is destroyed reduces plant's ability to photosynthesise, affecting growth

Bacteria reproduce rapidly inside organisms and may produce **toxins** that damage tissues and cause illness.

Bacteria	Spread by	Symptoms	Prevention and treatment
Salmonella	bacteria in or on food that is being ingested	<i>Salmonella</i> bacteria and the toxins they produce cause <ul style="list-style-type: none"> fever abdominal cramps vomiting diarrhoea 	poultry are vaccinated against <i>Salmonella</i> bacteria to control spread
gonorrhoea	direct sexual contact – gonorrhoea is a sexually transmitted disease (STD)	<ul style="list-style-type: none"> thick yellow or green discharge from the vagina or penis pain when urinating 	<ul style="list-style-type: none"> treatment with antibiotics (many antibiotic-resistant strains have appeared) barrier methods of contraception, such as condoms

Fungi	Spread by	Symptoms	Prevention and treatment
rose black spot	water and wind	<ul style="list-style-type: none"> purple or black spots on leaves, which turn yellow and drop early reduces plant's ability to photosynthesise, affecting growth 	<ul style="list-style-type: none"> fungicides affected leaves removed and destroyed

Protists	Spread by	Symptoms	Prevention and treatment
malaria	mosquitos feed on the blood of infected people and spread the protist pathogen when they feed on another person – organisms that spread disease by carrying pathogens between people are called vectors	<ul style="list-style-type: none"> recurrent episodes of fever can be fatal 	<ul style="list-style-type: none"> prevent mosquito vectors breeding mosquito nets to prevent bites anti-malarial medicine

Highsted Knowledge Organiser, Biology, Term 1, Year 10: Heart and lungs

What I need to know

Blood
Blood vessels
The heart
Helping the heart
Breathing and gas exchange

Key Vocabulary:

Alveoli
Aorta
Artery
Atrium
Bronchi
Bronchiole
Capillary
Cardiac
Coronary
Double circulatory system
Plasma
Platelet
Pulmonary
Valve
Vein
Vena cava
Ventricle

Challenge question:

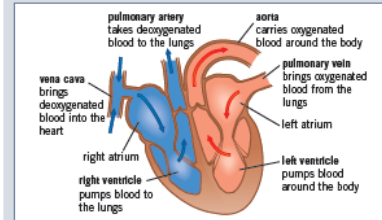
How does gas exchange and the circulatory system work together?

Suggested reading:

www.kerboodle.com
<https://www.bbc.co.uk/bitesize/guides/zsnscrd/revision/2>

The heart

The heart is the organ that pumps blood around your body. It is made from cardiac muscle tissue, which is supplied with oxygen by the coronary artery.



Heart rate is controlled by a group of cells in the right atrium that generate electrical impulses, acting as a pacemaker. Artificial pacemakers can be used to control irregular heartbeats.

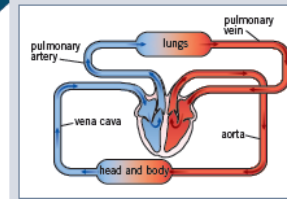
blood is a tissue made up of four main components

- red blood cells – bind to oxygen and transport it around the body
- plasma – transports substances and blood cells around the body
- platelets – form blood clots to create barriers to infections
- white blood cells – part of the immune system to defend the body against pathogens

Double circulatory system

The human circulatory system is described as a **double circulatory system** because blood passes through the heart twice for every circuit around the body:

- the right ventricle pumps blood to the lungs where gas exchange takes place
- the left ventricle pumps blood around the rest of the body.



Blood vessels

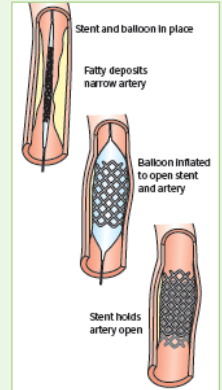
Vessel	Function	Structure	Diagram
artery	carries blood away from the heart (high pressure)	<ul style="list-style-type: none"> • thick, muscular, and elastic walls • the walls can stretch and withstand high pressure • small lumen 	
vein	carries blood to the heart (low pressure)	<ul style="list-style-type: none"> • have valves to stop blood flowing the wrong way • thin walls • large lumen 	
capillary	<ul style="list-style-type: none"> • carries blood to tissues and cells • connects arteries and veins 	<ul style="list-style-type: none"> • one cell thick – short diffusion distance for substances to move between the blood and tissues (e.g. oxygen into cells and carbon dioxide out) • very narrow lumen 	

Heart issues

Coronary heart disease is caused by a build up of fatty material in the coronary arteries, making them narrow, and reducing blood flow. Stents can be used to help keep the coronary arteries open.

Patients with heart failure often have to use artificial hearts before a donor heart becomes available for a heart transplant.

People with faulty heart valves may feel symptoms of breathlessness as valves do not fully open, making the heart less efficient. These can be replaced with biological valves (from animals), or mechanical valves (made from titanium and polymers).

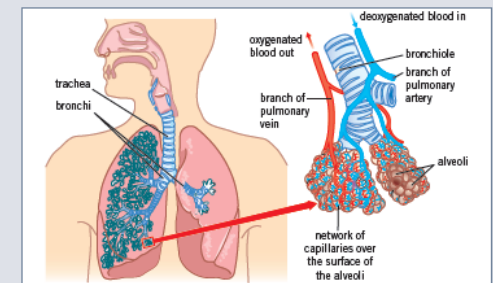


Lungs

When breathing in, air moves

- 1 into the body through the mouth and nose
- 2 down the trachea
- 3 into the bronchi
- 4 through the bronchioles
- 5 into the alveoli (air sacs).

Oxygen then diffuses into the blood in the network of capillaries over the surface of the alveoli.



Key terms