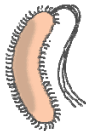
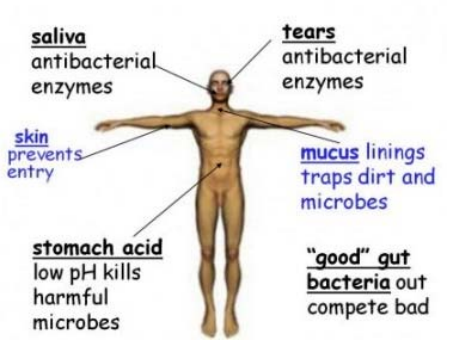
Biology Crib Sheet: Topic 3

Pathogen = micro-organism that causes disease

Type of pathogen	About the pathogen	Example of disease
Bacteria 	Make toxins that damage cells	Salmonella food poisoning Caught by eating food that contains the bacteria. Bacteria make toxins that cause fever, stomach cramps & vomiting. Gonorrhoea Bacteria spread through unprotected sex. Causes genital discharge. Some strains of the bacteria are now resistant to antibiotics.
Viruses 	Replicate inside your cells – the damage this causes makes you ill	Measles Virus spread in the droplets released when a person coughs or sneezes. Causes fever & red rash – and sometimes serious complications. HIV Virus spread through unprotected sex & drug use. Attacks the immune system, leading to AIDS. Treated with antiretroviral drugs. Tobacco Mosaic Virus Discolours leaves, preventing photosynthesis.
Fungi 	Form thread-like arms called hyphae, which penetrate defences. Spread by making spores.	Rose black spot Fungus spreads through wind or water, causing leaf spots that prevent photosynthesis.
Protists 	Single-celled eukaryotes – often carried by another animal that spreads the disease (called a vector).	Malaria Vector = mosquitoes. Causes potentially fatal fever.

First Lines of Defence



How diseases are spread	Preventing the spread of disease
Infected water (e.g. cholera)	Good hygiene (e.g. hand washing)
Air (breathing in droplets produced when a person infected with influenza coughs/sneezes)	Isolating people with the disease
Direct contact (e.g. touching a floor infected with athlete's foot fungus)	Destroying vectors

Painkillers
Relieve symptoms, but don't cure the disease e.g. aspirin

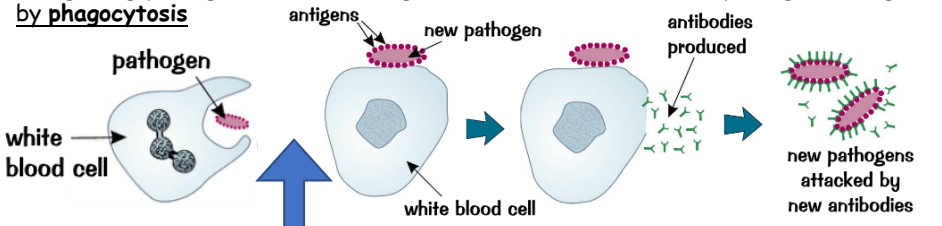
Many are sourced from plants (e.g. aspirin from willow trees) or microbes (e.g. penicillin from mould)

Some bacteria have mutated to become **resistant** to antibiotics (e.g. MRSA)

Antibiotics
Kill bacteria, but NOT viruses

The **immune system** is made of **white blood cells**, which destroy pathogens by:

1. Engulfing pathogens by **phagocytosis**
2. Producing **antibodies**, which attach to pathogens' antigens



If you're infected by the same pathogen again, the body quickly produces antibodies to kill the pathogen before it makes you ill – you are **immune** to that pathogen.

Vaccines contain **dead/weakened pathogens**. The body recognises their antigens and you become immune – but the weakened pathogens don't make you ill.

DRUG TESTING

Stage 1 – Preclinical
Test on human cells in the lab

Stage 2 – Animal testing
Test on 2 different animals to find out if the drug works, what dose should be used and if it is safe.

Stage 3 – Clinical trials
Test on healthy human volunteers to check for **side effects**. THEN test on people with the disease. Volunteers are randomly split into 2 groups:

- **Real drug**
- **Placebo (fake drug)**

Neither they nor the doctors know who is in each one (**double blind**) to prevent **bias**.
The drug only passes the trial if it works better than the placebo.
Results are checked by other scientists in the **peer review** process