

1 - Pathogens (micro-organisms that cause communicable diseases)	
<b>Communicable disease</b>	Infectious disease caused by <b>pathogens</b> -> easily spread.
<b>Bacteria</b>	<b>Small prokaryotic</b> cells -> produce <b>toxins</b> that cause <b>cell damage</b> .
<b>Virus</b>	<b>Not cells</b> -> <b>reproduce</b> inside body cells -> causes cells to <b>burst</b> .
<b>Fungi</b>	Some <b>single celled</b> -> others made of <b>hyphae</b> -> produce <b>spores</b> .
<b>Protist</b>	<b>Single celled eukaryotes</b> -> often transferred by <b>vectors</b> .
<b>Spread</b>	By <b>contaminated food</b> and <b>water</b> , <b>air</b> and <b>direct contact</b> .
<b>Reducing spread</b>	Being <b>hygienic</b> , destroying <b>vectors</b> , <b>isolation</b> , and <b>vaccination</b> .
2 - Communicable Diseases	
<b>Measles</b>	<b>Viral</b> -> spread by <b>coughs/sneezes</b> -> causes <b>rash</b> and <b>fever</b> -> can lead to <b>pneumonia</b> or <b>encephalitis</b> -> <b>vaccination</b> available.
<b>HIV</b>	<b>Viral</b> -> spread by <b>sexual contact</b> / <b>sharing needles</b> -> <b>flu-like</b> symptoms -> control with <b>antiretroviral drugs</b> -> attacks <b>immune system</b> -> can lead to <b>AIDS</b> .
<b>Tobacco mosaic virus</b>	<b>Viral</b> -> <b>mosaic</b> pattern on <b>leaves</b> (discolouration) -> affects <b>photosynthesis</b> -> affects <b>growth</b> -> spread by <b>contact</b> .
<b>Rose black spot</b>	<b>Fungal</b> -> <b>purple</b> or <b>black spots</b> on <b>leaves</b> -> leaves turn <b>yellow</b> and <b>drop off</b> -> affect <b>photosynthesis</b> and <b>growth</b> -> spread in <b>water</b> / <b>wind</b> -> use <b>fungicides</b> -> <b>strip</b> and <b>destroy leaves</b> .
<b>Malaria</b>	Caused by <b>protist</b> -> spread by <b>mosquitoes (vectors)</b> when <b>feeding</b> -> causes <b>fever</b> -> can be <b>fatal</b> -> stop mosquitoes <b>breeding</b> -> use <b>insecticides</b> and <b>nets</b> .
<b>Salmonella</b>	<b>Bacterial</b> -> contaminated food causes <b>food poisoning</b> -> <b>toxins</b> cause <b>fever</b> , <b>vomiting</b> , <b>diarrhoea</b> -> <b>poultry</b> given <b>vaccination</b> .
<b>Gonorrhoea</b>	<b>Bacterial</b> -> <b>sexually transmitted</b> -> <b>pain</b> when <b>urinating</b> and <b>yellow/green discharge</b> -> treat with <b>antibiotics</b> (but some strains resistant) -> prevent by using <b>condoms</b> .
3 - Natural Barriers	
<b>Skin</b>	Physical <b>barrier</b> -> secretes <b>antimicrobial</b> substances.
<b>Nose</b>	<b>Hair</b> and <b>mucus</b> to <b>trap</b> pathogens.
<b>Airways</b>	<b>Mucus</b> traps pathogens -> <b>hairs</b> on <b>cilia cells</b> sweep mucus.
<b>Stomach</b>	Produces <b>hydrochloric acid</b> -> <b>kills</b> pathogens in <b>food/drink</b> .

4 - Immune System Response to Pathogens	
<b>Phagocytosis</b>	White blood cells <b>engulf</b> and <b>digest</b> pathogens.
<b>Antibodies</b>	White blood cells produce <b>specific shape antibodies</b> -> <b>lock</b> onto <b>antigens</b> on surface of pathogen.
<b>Antitoxins</b>	<b>Counteract</b> toxins produced by <b>bacteria</b> .
5 - Vaccinations and Drugs	
<b>Vaccinations</b>	<b>Small amounts</b> of <b>dead</b> or <b>inactive pathogens</b> are injected.
<b>Vaccination response</b>	White blood cells produce <b>specific shape antibodies</b> -> <b>lock</b> onto <b>antigens</b> on surface of pathogen.
<b>Future infection response</b>	White blood cells have <b>memory</b> of the <b>antigens</b> -> <b>rapidly</b> produce <b>specific shape antibodies</b> before person gets ill.
<b>Painkillers</b>	<b>Relieve pain</b> and <b>reduce symptoms</b> but <b>don't kill</b> pathogens.
<b>Antibiotics</b>	<b>Kill bacteria</b> (specific antibiotics needed for specific bacteria) -> <b>cannot kill viruses</b> (they reproduce inside body cells).
<b>Antibiotic resistance</b>	Bacteria <b>mutate</b> and become <b>resistant</b> to antibiotic -> <b>cannot be killed</b> -> risk of <b>super bugs</b> e.g. MRSA.
6 - Developing Drugs	
<b>Drugs from plants</b>	<b>Painkiller aspirin</b> from <b>willow</b> . <b>Heart drug digitalis</b> from <b>foxgloves</b> .
<b>Drugs from micro-organisms</b>	<b>Antibiotic penicillin</b> discovered by <b>Alexander Fleming</b> from the <b>Penicillium</b> mould.
<b>Drug testing</b>	Drugs tested for <b>efficacy</b> (does it work), <b>toxicity</b> (is it harmful), and <b>optimum dose</b> (most effective but few side effects).
<b>Preclinical trials</b>	1. Test drugs on <b>human cells</b> and <b>tissues</b> in the <b>lab</b> . 2. Test drugs on <b>live animals</b> .
<b>Clinical trials</b>	1. Test on <b>healthy volunteers</b> (low dose gradually increased) 2. Test on <b>patients</b> with the <b>disease</b> (use double-blind trial).
<b>Placebo</b>	<b>Inactive substance</b> made to <b>resemble a drug</b> . E.g. a sugar pill.
<b>Double-blind trial</b>	Split patients into <b>2 groups</b> . <b>Neither patient nor doctor</b> knows who has the <b>real drug</b> and who has the <b>placebo</b> . Reduces <b>bias</b> .

## GCSE Science

### Biology B3 – Infection & Response

