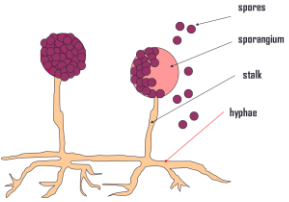
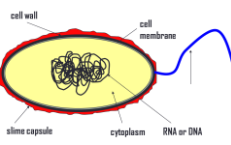
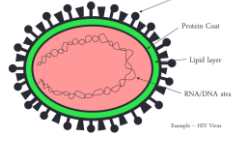
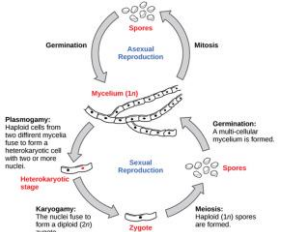
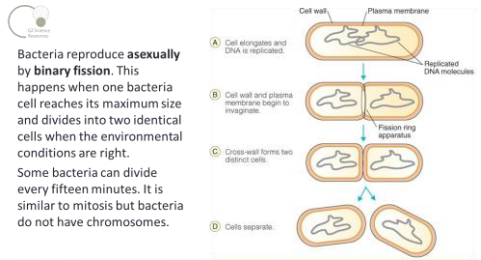
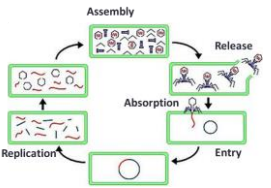
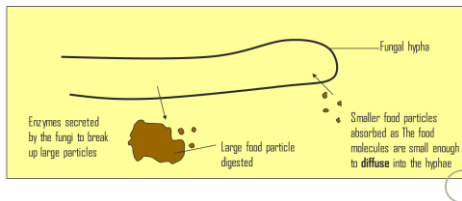

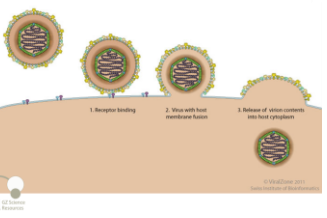


Name	Fungi		Bacteria	Viruses
Structure	<p>Fungal pathogens are multi and single-celled eukaryotes made of tangled threads called hyphae that are spread by spores.</p> <p>>Spores, haploid (only half the chromosomes) used for reproduction – both asexual (growing into an exact copy) or sexual (when combining with a spore from another fungus)</p> <p>>Sporangium or fruiting body. The visible part of the fungi that produces and distributes the spores.</p> <p>> Hyphae, the feeding threads. A mat of hyphae is called a mycelium. The hyphae can also be involved in sexual reproduction when they come in contact with hyphae from another fungus.</p> 		<p>Bacterial pathogens are microscopic single-celled prokaryote organisms</p> <p>Bacterial cells have no mitochondria and the cell membrane is the site of energy release instead.</p> <p>The DNA / RNA is in a single loop rather than chromosomes. Outside the cell membrane is a cell wall and often bacteria have a slime capsule for protection. There may be a flagellum to help the bacterium move, and smaller cilia/pili.</p> <p>Bacterial cells are much smaller than plant or animal cells (usually).</p> 	<p>Viral pathogens are non-living and take over living cells in order to carry out viral reproduction.</p> <p>All viruses contain:</p> <ul style="list-style-type: none"> □ Nucleic acid, either DNA or RNA (but not both), □ A protein coat (capsid), which encases the nucleic acid. □ Some viruses are also enclosed by an envelope of fat and protein molecules. <p>Nucleic Acid - Just as in cells, the genetic material (DNA or RNA) of each virus encodes the genetic information for the synthesis (creation) of all proteins. While the double-stranded DNA is responsible for this in prokaryotic and eukaryotic cells, only a few groups of viruses use DNA. Most viruses have single-stranded RNA. The genetic material can only make protein when it is slotted into the DNA of a host cell as it has no ribosomes</p>  <p>Capsid - The capsid is the protein shell that encloses the nucleic acid. The capsid has three functions:</p> <ol style="list-style-type: none"> 1) it protects the genetic material from digestion by enzymes. 2) contains special sites on its surface that allow the virus to attach to a host cell. 3) It may contain spike proteins that enable the virus to penetrate the host cell membrane and, in some cases, to inject the viral nucleic acid into the cell's cytoplasm.
Reproduction	<p>Reproduces asexually with spores (and sexually when hyphae meet)</p> <p>Asexual reproduction Special spore capsules or cases called sporangia develop and produce the spores. These spores are haploid – they have only half the number of chromosomes. They can be either + or – strains. (rather than male or female).</p> <p>Millions of spores are released to float in the air</p> <p>When spores land on tissue they germinate, sending out hyphae that rapidly branch and invade the new host.</p> 		<p>Reproduces asexually by binary fission</p>  <p>Bacteria reproduce asexually by binary fission. This happens when one bacteria cell reaches its maximum size and divides into two identical cells when the environmental conditions are right.</p> <p>Some bacteria can divide every fifteen minutes. It is similar to mitosis but bacteria do not have chromosomes.</p> <p>This type of reproduction means that bacteria can quickly make use of an available food source.</p> <p>Bacteria can also remain dormant until the conditions are right.</p>	<p>Reproduces by invading living cells</p> <p>Absorption Viruses can enter an organism through any cavity or broken surface of an organism. Once inside, they find a host cell to infect.</p> <p>Entry The Virus attaches to a specific cell type and 'injects' its genetic material.</p> <p>Replication The viruses genetic material joins into the cell DNA and viral protein is made.</p> <p>Assembly Various pieces of viral protein are constructed into individual viral particles (or virions).</p> <p>Release The newly created virions break through the cell wall (killing it) and proceed to infect other cells.</p> 
Nutrition	<p>Feeds by extra-cellular digestion</p> <p>Multicellular fungi are made up of a mass of very fine threads called hyphae, which invade the tissue of the host organism or dead matter.</p> <p>Fungi feed like bacteria by releasing digestive enzymes onto food, then reabsorbing the nutrients. This is called extra-cellular digestion.</p> 		<p>Feeds by extra-cellular digestion</p> <p>Bacteria may be parasitic (feeding off other living organisms) or saprophytic (feeding off dead or decaying organisms). Bacteria feed by extra-cellular digestion, because the digestion (where larger pieces of food break into smaller pieces) takes place outside the cell. They secrete enzymes outside of their cell membrane and cell wall. The enzymes digest the food into small particles that can be absorbed through the cell membrane. This is similar to fungi feeding.</p> 	<p>The virus attaches to the target cell, usually through specific protein-protein interactions between capsid and cell surface receptors.</p> <p>Only then can the genetic material be taken into the host cell.</p>  <p>There are three requirements that must be met to ensure successful infection of a virus:</p> <ol style="list-style-type: none"> 1. sufficient virus must be present 2. the cells must be susceptible and permissive (matching) to the virus, 3. and local defences (immune system) must be absent.
Growth (conditions needed)	<p>Fungi will grow well if the environmental conditions are suitable. Fungi need food available, warmth and moisture.</p> <p>Fungi often grow best in the dark (they do not need light as they do not photosynthesis like plants do)</p> <p>Carbon dioxide and alcohol (ethanol) are waste products of yeasts. Other fungi may produce different waste products including toxins.</p> <p>Toxins excreted by fungi that kill or stop the growth of bacteria are known as antibiotics.</p> <p>Humans have made use of the antibiotics produced by fungi to fight harmful bacteria in their bodies. The most commonly used antibiotic is produced by the penicillin sp. of fungi.</p>		<p>Bacteria need the following conditions for growth:</p> <p>Energy – in the form of food (in humans this is their cells or food they have eaten)</p> <p>Moisture – enough water for their metabolism</p> <p>Warmth – cooling bacteria reduces their growth rate, but does not usually kill them. Refrigerators and freezers preserve food by slowing down the growth of bacteria.</p> <p>Oxygen – For aerobic bacteria only. Oxygen may kill anaerobic bacteria.</p> <p>pH – bacteria grow better under the right conditions of pH (acidity or alkalinity). Bacteria grow well on the human skin, as it is slightly acidic.</p>	