

Assessment Schedule – 2014

Biology: Demonstrate understanding of biological ideas relating to micro-organisms (90927)

Evidence Statement

	Evidence	Achievement	Merit	Excellence
ONE (a)	<ul style="list-style-type: none"> • Bacteria – single-celled organisms that have varied shape (cocci, bacillus, vibrio, spirillum). Genetic material (DNA / RNA) / no nucleus, surrounded by a cell wall. • Fungi – are multicellular organisms, many different shapes, with thin thread-like hyphae, sporangium, and spores. • A virus is not a cell / not living. It has a protein coat / capsid, genetic material / DNA or RNA. 	<p>Description of all three.</p> <ul style="list-style-type: none"> • Bacteria are living organisms / made of cells. <p>OR</p> <p>Bacteria perform MRSGREEN / specific process of MRSGREEN.</p> <p>AND</p> <p>Another point.</p> <p>Eg: they feed by extracellular digestion.</p> <ul style="list-style-type: none"> • Fungi are made of living cells. <p>OR</p> <p>Fungi are made of cells / perform MRSGREEN.</p> <p>AND</p> <p>Another point.</p> <p>Eg: Fungi are saprophytic / consume dead material.</p> <ul style="list-style-type: none"> • Viruses are non-living / not made of cells / only perform reproduction and not the other MRSGREEN processes. <p>AND</p> <p>Another point.</p> <p>Eg: viruses are pathogens.</p>		

<p>(b)</p>	<p>The three micro-organisms have different methods of reproduction, however they all have the same purpose and that is to create new individuals of the same species.</p> <p>Fungi produce many spores in the sporangium either asexually or sexually, and then release them into the air to be transported. When the spore lands on a suitable surface to gain nutrition it will begin to grow into a new fungus.</p> <p>Bacteria divide asexually to produce two identical cells through binary fission, compared to viruses, which reproduce using replication and a host cell to assemble all the viral components and make hundreds of new identical copies.</p>	<p>Description of their method of reproduction.</p> <p>Eg: Can name or describe.</p> <ul style="list-style-type: none"> • Viruses reproduce by using the DNA of a host cell to make new viruses. • Bacteria – binary fission/ mitosis/ conjugation / Bacteria cell divides producing two cells from one. • Fungi – asexual/ mitosis. <p>Fungi produce spores that can grow into a new fungus</p>	<p>Explanation of their method of reproduction</p> <p>Eg:</p> <ul style="list-style-type: none"> • Fungi produce many spores in the sporangium either asexually or sexually, releasing them into the air. If the spores land in a suitable environment they will grow into a new fungus. • Bacteria divide asexually to produce two identical cells through binary fission. Once a bacterium reaches a critical size, it replicates its nuclear material then divides to produce two identical cells. • Viruses reproduce by replication. Viruses inject their nuclear material into a host cell. The host cell's DNA is used as a raw material to replicate the viral DNA. Replicated DNA forms a protein coat (sheath). The host cell ruptures releasing the viruses within it to move on to invade other host cells. The replication process repeats. 	
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<p>(c)</p>	<p>Fungi and bacteria can both reproduce asexually, making new organisms that are identical copies to the parent; compared to virus, which requires a host cell to replicate and thus cannot reproduce without one. However, unlike viruses, bacteria and fungi require warm, moist conditions with a suitable food source to provide the conditions for successful reproduction. In addition, bacteria and fungi are both considered to be living organisms as they carry out all of the life processes, however viruses are considered non-living as they only reproduce, and require a host cell in order to do this.</p> <p>The reproductive similarities between these micro-organisms include that they all contain genetic material which must be duplicated in some way to produce a new organism; and they all need to reproduce successfully in order for the species to survive.</p>			<p>Description of the similarities OR differences between the reproductive methods</p> <p>Eg:</p> <ul style="list-style-type: none"> • Viruses require a host cell, bacteria and fungi do not. • Bacteria and fungi require warm and moist conditions and a nutrient substrate to grow on. • Bacteria make only two new individuals each reproductive cycle, fungi and viruses make many new individuals. • Viruses and bacteria make identical copies of themselves • All three microbes must copy their genetic material in order to reproduce. 	<p>Explanation of the similarities OR differences between the reproductive methods</p> <p>Eg:</p> <ul style="list-style-type: none"> • Fungi and bacteria can both reproduce asexually, making identical copies of the parent. This allows rapid reproduction. • The virus requires a host cell to reproduce as they require a hosts DNA to make new viral DNA, whereas bacteria and fungi require warm, moist conditions with a suitable food source and space to grow. • Because viruses are not living they cannot take advantage of nutrients and other resources in their environment to increase their rate of reproduction. • Making identical copies of nuclear material allows identical offspring to be produced that can take advantage of the same environmental conditions as the parent generation. 	<p>Compares and contrasts how viruses, bacteria, and fungi reproduce</p> <p>Eg:</p> <ul style="list-style-type: none"> • Fungi and bacteria can both reproduce asexually, making identical copies of the parent, compared to a virus, which requires a host cell to replicate and thus reproduce. However, unlike viruses, bacteria and fungi require warm, moist conditions with a suitable food source to successfully reproduce. In addition, bacteria and fungi are both considered to be living organisms as they carry out all of the life processes, compared to viruses, which are considered non-living as they only reproduce, and require a host cell in order to do this. • Their similarities include that they all contain genetic material which must be duplicated in some way to produce a new organism; and they all need to reproduce in order to survive .Identical offspring can thrive in the same environment as the parent generation. If the environment changes, all individuals will be equally vulnerable to death. 			
<p>Not Achieved</p>				<p>Achievement</p>		<p>Merit</p>		<p>Excellence</p>	
<p>NØ = no response or no relevant evidence</p>	<p>N1 = 1 idea from Achievement</p>	<p>N2 = 2 ideas from Achievement</p>	<p>A3 = 3 ideas from Achievement</p>	<p>A4 = 4 ideas from Achievement</p>	<p>M5 = 2 explanations from Merit</p>	<p>M6 =3 explanations from Merit</p>	<p>E7 = comparison of at least 2 features for TWO microbes</p>	<p>E8 = comparison of at least 3 features for THREE of the microbes</p>	

	Evidence	Achievement	Merit	Excellence
TWO (a)	Viruses are not living as they have no cells, and do not undergo all of the life processes of movement, respiration, sensitivity, growth, excretion and nutrition. They do reproduce.	<ul style="list-style-type: none"> • Viruses do not have cells OR • Viruses only reproduce, they do not perform other MRSNGREN functions. OR • Viruses only contain genetic material / DNA / RNA. 		
(b)	Viruses are difficult to grow in the laboratory because they need a living host to reproduce. This is because they use all of the host cell's DNA replication mechanisms to replicate, or make copies of their own RNA / DNA, to make many new identical viruses. This is why we cannot grow them in the lab. They do not grow on agar plates.	<ul style="list-style-type: none"> • Describes why viruses are difficult to culture. Eg: • Viruses need a living cell / host cell to reproduce. OR Viruses need to use a host cell's DNA to make their own DNA. OR Viruses do not grow on agar plates. 	<ul style="list-style-type: none"> • Explains why viruses are difficult to culture. Eg: Because viruses require a living host cell that contains DNA they can use for the replication of their own DNA / RNA they are difficult to grow in a / xlaboratory. 	

<p>(c)</p>	<p>The common cold is easily transferred in the air so sneezing, coughing etc can spread the virus to others very quickly. This is difficult to control and thus large numbers of people can be quickly infected with the virus.</p> <p>Viruses like the common cold can mutate and change their protein coats and / or DNA frequently, resulting in different strains of the virus emerging over time. This prevents the organism's immune system from recognising the virus, making it difficult for the immune system to work effectively at making antibodies against the common cold virus, like it does with the chicken pox virus. This is why a person can catch viral diseases like the common cold and the flu more than once, because each infection is by a slightly different virus.</p> <p>Viruses are also difficult to treat using antibiotics as they are ineffective on viruses, and can be used to treat only bacteria infections as they target and work on destroying the bacteria's cell wall. Because viruses do not have a cell wall and are not living cells, this method of treatment is not successful.</p> <p>Pathogens are organisms that always cause damage or disease in another organism, and viruses usually do this as a consequence of their method of reproduction. Replication destroys every host cell. Viruses cannot survive and reproduce without a host cell, however the host cell bursts once the cell has assembled and replicated hundreds of identical copies of the virus. Thus, the cell is destroyed once it has finished replicating new viruses, and therefore viral infections always result in damage or disease to the host.</p>	<ul style="list-style-type: none"> • Viruses are easily transmitted from person to person by coughing / sneezing / body fluids. • Viruses can mutate / change to a different strain / type. • People become immune to a virus so cannot get the same one twice. • Antibiotics do not work on viruses / are used for bacteria / are used for living microorganisms. • viruses are always pathogens / kill their host. 	<ul style="list-style-type: none"> • Explains why people can catch a cold more than once. Eg, some viruses mutate and change their protein coats frequently. This prevents the organism's immune system from recognising them, resulting in different strains of the virus. • Explains why antibiotics are not used to treat viruses. Eg, antibiotics are ineffective on viruses. Some attack the cell wall, and viruses do not have a cell wall. • Explains why viruses are always pathogens. Eg, viruses need a host cell to reproduce as it provides the material to assemble new viruses. However the host cell is usually destroyed as part of viral reproduction: the host cell bursts to release the new identical viruses. 	<ul style="list-style-type: none"> • Discuss why the 'common cold' is so common and why a person can catch it more than once. The common cold is easily transferred from one person to another by sneezing / coughing etc. Eg, there are many different strains of the common cold virus. Viruses like the common cold can mutate and change their protein coats and / or DNA frequently, resulting in different strains of the virus emerging over time. This prevents the organism's immune system from recognising the virus, making it difficult for the body's immune system to work effectively at making antibodies against the common cold virus, like it does with the chicken pox virus. This is why a person can catch viral diseases like the common cold and the flu more than once, because each infection is by a slightly different virus. <p>Antibiotics are ineffective on viruses, and are used to treat only bacteria infections as they target and work on destroying the bacteria's cell wall, and viruses don't have a cell wall.</p> <ul style="list-style-type: none"> • Justifies why viruses are always pathogens. Eg, pathogens are organisms that always cause damage or disease in another organism and viruses always do this as a consequence of their method of reproduction, replication. Viruses cannot survive and reproduce without a host cell, however the host cell bursts once it has assembled and replicated hundreds of identical copies
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								of the virus. Thus, the cell is destroyed once it has finished replicating new viruses, and therefore viral infections always result in damage or disease to the host.	
	Not Achieved			Achievement		Merit		Excellence	
	NØ = no response or no relevant evidence	N1 = 1 idea from Achievement	N2 = 2 ideas from Achievement	A3 = 3 ideas from Achievement	A4 = 4 ideas from Achievement	M5 = 1 explanation from Merit	M6 = 2 explanations from Merit	E7 = Discusses why common cold so common OR Justifies why viruses are always pathogens	E8 = Discusses why common cold so common AND Justifies why viruses are always pathogens

	Evidence	Achievement	Merit	Excellence
THREE (a)	Fungi require warm, moist conditions for optimum growth.	<p>Describes the conditions for fungi to grow.</p> <ul style="list-style-type: none"> Fungi require any two of warmth, moisture and a source of nutrients to grow. 		
(b)	The percentage cover of mould in Sample A is greater than Samples B and C because the temperature provides optimum growing conditions for the fungi. In Sample C the temperature is too cold for any growth, and in Sample B the temperature is colder than the fungi's optimum temperature so the growth rate is slower.	<p>Describes results, and % cover of Mould is so much more for Sample A, than Samples B and C.</p> <ul style="list-style-type: none"> A has a suitable temperature for a fungus to grow. <p>OR</p> <p>B has a lower than optimal temperature for fungal growth and C has a temperature below that needed for fungal growth.</p>	<p>EITHER</p> <ul style="list-style-type: none"> Explains why the % cover of mould is so much more for Sample A, than Samples B and C. <p>Eg: Fungi feed by extracellular digestion in order to grow. Extracellular digestion relies on enzymes that only function well over a narrow range of temperatures. If the temperature is too low the rate of enzyme activity is slow or stops altogether.</p> <p>OR</p> <p>Refers to AND analyses with a reason an aspect of the resource material for the question.</p> <p>Eg: Due to the lower temperature, Sample B shows no growth of fungus until Day 4</p> <p>OR</p> <p>After 10 days Sample A at 20°C has about 76% cover of mould while Sample B at 4°C has about 25% cover as the temperature is lower than that required for maximum growth.</p>	

<p>(c)</p>	<p>Fungi receive their required nutrients to carry out their life process through extra-cellular digestion because they are unable to make their own food. They do this by excreting digestive enzymes from their hyphae into the food source. The digestive enzymes break the large food molecules up into smaller food molecules and then absorb the nutrients through their hyphae. so they can be used by the fungi to carry out their life processes.</p> <p>Different types of fungi live on different food and so they produce different enzymes and waste products. This gives food different flavours and textures that can be used to create a variety of products such as cheeses, bread and alcoholic drinks like beer and wine.</p> <p>Yeast is a fungus that is used to produce different wines, beer and breads. Different species of yeast are used, as their enzymes and waste products from extra-cellular digestion give the food different flavours.</p>			<ul style="list-style-type: none"> • Describes how fungi retrieve nutrients from the food source using extra-cellular digestion. Eg, enzymes break it down into smaller molecules. • Gives examples of fungi that are used in food production. Eg, yeast for bread, beer, wine / Cheese and yoghurt are made using micro-organisms to ferment milk. 		<ul style="list-style-type: none"> • Explains how fungi retrieve nutrients from the food source using extra-cellular digestion. Eg, extra-cellular digestion is where the fungi secrete digestive enzymes from their hyphae into the food source. The digestive enzymes break the large food molecules up into smaller food molecules and then absorb the nutrients through their hyphae, so they can be used by the fungi. • Explains why the processes of extra-cellular digestion and respiration are important to food production. Eg, because both modify food by either excreting waste products into it, eg CO₂ or alcohol, or excreting digestive enzymes. 		<ul style="list-style-type: none"> • Discuss how people use fungi in food production. Eg, respiration is the process fungi use to release energy from nutrients such as glucose. When yeast respire they excrete CO₂/ alcohol which provides beer, wine etc with the fizz, flavour and alcoholic content Different types of yeast can be used to make different types of bread. They all produce CO₂ through respiration, and the different flavours are created because of the different enzymes and waste products. • Links a feature (eg flavour or texture) of the food example to the fungi life process of extra-cellular digestion or respiration. Eg, fungi receive their required nutrients to carry out their life process through extra-cellular digestion because they are unable to make their own food. Yeast is a fungus that is used to produce different wines, beer and breads. Different fungi species are used, as their enzymes and waste products from extra-cellular digestion give the food different flavours and textures. 	
<p>Not Achieved</p>			<p>Achievement</p>		<p>Merit</p>		<p>Excellence</p>		
<p>N0 = no response or no relevant evidence</p>	<p>N1 = 1 idea from Achievement</p>	<p>N2 = 2 ideas from Achievement</p>	<p>A3 = 3 ideas from Achievement</p>	<p>A4 = 4 ideas from Achievement</p>	<p>M5 = 1 explanation from Merit</p>	<p>M6 = 2 explanations from Merit</p>	<p>E7 = Discusses an example OR Links a feature of food to Life Process</p>	<p>E8 = Discusses an example AND Links a feature of food to Life Process</p>	

Cut Scores

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 7	8 – 13	14 – 18	19 – 24