

Assessment Schedule – 2012

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

Evidence Statement

ONE	N0	N1	N2	A3	A4	M5	M6	E7	E8
	No response/ no relevant evidence.	ONE idea given.	TWO ideas given.	THREE ideas given.	FOUR ideas given.	Explains ONE idea.	Explains TWO ideas.	Discusses how structure and function are related to either feeding OR reproduction in the growth of bacteria and fungi on an agar plate.	Discusses how structure and function are related to feeding OR reproduction in the growth of bacteria and fungi on an agar plate. AND The absence of viral growth compared with the presence of bacteria and fungi on the agar plate.
	<ul style="list-style-type: none"> • Describes conditions for growth of fungi/ bacteria – food / nutrients, moisture / water, warmth / correct temperature. – TWO out of three conditions required. • Recognises viruses need living cells/ host (to replicate). • Describes viral replication. • Describes one similarity or difference between the fungal and bacterial colonies. • Bacteria and fungal spores arrive on the plate from the air/ direct contamination. • Fungi produce spores/ hyphae/ mycelium. • Bacteria reproduce through binary fission/ split in two. • Bacteria have a capsule. • Bacteria and fungi use extra cellular digestion. 					<ul style="list-style-type: none"> • Bacteria/ Fungi need food/ nutrients/ moisture for growth which the agar plate provides. Viruses need living cells to reproduce/ replicate them, and so cannot grow on an agar plate. • Fungus is furry as they have sporangia (which grow upwards into the air) / hyphae (which grow on the surface of the agar) • Bacteria colonies are shiny because they have no sporangia/ have slime / shiny capsules. 		<p>(Both arrive by air, the fungus as spores and the bacteria as single bacterial cells. This was possible because the plate was left open on a bench.) Once on the agar, the conditions were ideal for the bacteria and fungi to grow. Both the bacteria and fungi were able to use extracellular digestion to digest food by secreting enzymes from their cell walls. This gave them the energy needed to reproduce.</p> <p>Fungi look fuzzy as they have sporangia / hyphae above the agar and bacteria look smooth as they have a</p>	

								<p>slime capsule. Fungi are able to release spores from these sporangia to reproduce. Because the plate was incubated at 25°C, the conditions for reproduction were ideal, and they were able to reproduce fast. Bacteria reproduce by binary fission by duplicating their DNA and pinching their cell wall to form two cells and as they had both nutrients and a warm environment they were able to reproduce to visible levels. Because viruses need living cells to reproduce/ replicate them, they cannot grow on an agar plate.</p>	
TWO	N0	N1	N2	A3	A4	M5	M6	E7	E8
	No responses/ no relevant evidence.	ONE idea given.	TWO ideas given.	THREE ideas given.	FOUR ideas given.	ONE idea explained.	TWO ideas explained.	Discusses how ONE step affects a life process to alter storage/ safety.	Discusses how TWO steps affect life process(es) to alter storage/ safety.
	<ul style="list-style-type: none"> High food temperatures kill bacteria. Heating the can sterilises it/ removes bacteria / enzymes in bacteria denatured/ destroyed. Sterilising kills bacteria/ prevents introduction of MOs. No air so no bacterial growth. Sealing the can prevents MOs entering. Removal of air removes oxygen or source of bacteria. Refrigerating food affects a named MO life process/ slows micro-organisms growth/ respiration/ reproduction. OR Leaving food on bench means it is warm enough for bacteria to reproduce. Opening the can allows MOs to enter. 					<ul style="list-style-type: none"> High food temperatures kill MOs; this means the food will not spoil unless opened. Sterile can means MOs have been killed so can't reproduce. Removal of air bubbles limits oxygen and prevents aerobic respiration by MOs. Sealed sterile lid means that more MOs are not introduced, so cannot reproduce / spoil the food. Fridge has cool or cold temps (not freezes) and therefore slows (NOT kills or stops) MO reproduction/ respiration. 		<ul style="list-style-type: none"> Sterile lid means MOs aren't introduced, as they have been killed, so can't reproduce and therefore spoil the food. High food temperatures kill MOs so they cannot respire or reproduce, which means the food will not spoil unless opened/ will be safe for consumption. 	

THREE	N0	N1	N2	A3	A4	M5	M6	E7	E8
	No response/ no relevant evidence.	ONE idea given.	TWO ideas given.	THREE ideas given.	FOUR ideas given.	Explains ONE aspect.	Explains TWO aspects.	Discusses the role of bacteria AND EITHER links this to the oxygen levels in the tank OR the type of respiration and products produced..	Discusses the role of bacteria, linking this to the oxygen levels in the tank AND the type of respiration and products produced.
	<ul style="list-style-type: none"> • Sewage treatment reduces the spread of disease/ prevents destruction of waterways by raw sewage/ reduces the smell of raw sewage / sewage contains lots of bacteria. • sewage treatment is important as it helps to recycle nutrients / water • An aeration tank contains high level of oxygen (DO NOT accept air). • Aerobic bacteria survive/ reproduce/ feed in the aeration tanks. • The sewage that enters the aeration tank contains organic waste/ faeces etc. • The products of the treatment are carbon dioxide and water. (Some sludge is also produced for further processing.) • Air is needed to oxygenate the tank / bacteria need the oxygen to survive / respire. • The bacteria carry out aerobic respiration as they feed on the contents. • Bacteria breakdown / decompose the solid / organic waste. 					<ul style="list-style-type: none"> • Human faeces contain large quantities of bacteria. Preventing these from entering drinking water and food reduces the risk of infection spreading/ as naturally occurring bacteria break down waste in waterways, they use large amounts of dissolved oxygen, making the water anaerobic/ killing the fish/ plants • As the bacteria feed on the organic material in the tank, they carry out <u>aerobic respiration</u>. This produces carbon dioxide and water as waste products. • The air entering the tank helps maintain a high level of oxygen. If the oxygen levels fell, the bacteria would not be able to use aerobic respiration/ respiration would become anaerobic. 		<ul style="list-style-type: none"> • As the bacteria feed on the organic material in the tank, they carry out aerobic respiration. This produces carbon dioxide and water as waste products. Without air / oxygen being pumped into the tank, the bacteria are unable to carry out aerobic respiration, and instead their respiration becomes anaerobic. For this reason the aeration tank has air pumped in to it. • If conditions in the tanks remain highly oxygenated, the aerobic bacteria are in the best conditions for them to feed and reproduce. This means that the tank will continue to function as it should and the bacteria will continue to convert the organic waste to carbon dioxide and water. If the conditions change, and the tank loses its oxygen supply, anaerobic bacteria/ respiration will take over as the aerobic bacteria will not be able to survive. This will result in the tank becoming smelly, and the production of methane. 	

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 7	8 – 12	13 – 18	19 – 24