Assessment Schedule – 2022

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

Evidence Statement

Q	Possible Evidence	Achievement	Merit	Excellence
ONE	Bacteria need ideal / correct water, food source, warmth, space and pH to carry out life processes such as nutrition and respiration. Bacteria feed through the process of extracellular digestion. This means that digestion of the food material occurs outside the bacterial cell. In order to digest food outside their cell, bacteria secrete enzymes through their cell membrane. The enzymes break down the food material into small molecules because they need to be small enough to diffuse back into the bacterial cell through the membrane. Increased temperature can increase the rate of bacterial feeding. The warmer temperatures allow the enzymes to work more quickly which can increase the rate of extracellular digestion. Colder temperatures will decrease the enzyme activity and therefore the rate. The enzymes involved in extracellular digestion operate best at an optimum pH. If the pH is at the optimal point, then feeding through extracellular digestion is working at the highest rate. If the pH is altered to be higher or lower, then the enzyme's active site denatures so the enzyme will no longer function as it should. These means that the feeding process rate will slow down. Bacteria require oxygen for aerobic respiration. Aerobic respiration is Glucose + Oxygen → ATP / Energy + water + carbon dioxide. Energy from respiration is used for other processes like growth / feeding / reproduction. If more oxygen is available, then more aerobic respiration can happen and more ATP energy is produced. With more ATP energy produced, the bacteria has more energy available for growth, movement of required materials, feeding and reproducing. Compost Heap A would break down dead plant material more quickly and efficiently. This is because there is more oxygen available to the bacteria to use in aerobic respiration because of the layers of sticks allowing air to circulate in the compost heap. Because more bacteria are able to respire aerobically, the rate of activity / energy production is higher and therefore the rate of feeding increases and therefore decomposition of the dead plant material is faster.	**Describes** (single, simple ideas): • Describes the process of bacteria feeding. • Describes the process of respiration • States which compost heap would be better to decompose dead plant material. • Describes an effect of an environmental factor on bacteria feeding. • Describes an effect of an environmental factor on bacteria respiration.	**Explains** (gives reasons how or why something occurs / provides examples): • Explains how bacteria feed. • Explains how respiration occurs in bacteria. • Explains why the decomposition process is faster in Compost Heap A. • Explains how a change in an environment factor affects a life process. • Explains how the process of bacteria feeding / respiration is linked to the breakdown of dead plant material.	**Discusses** (makes multiple links between ideas: • Discusses how changing a named environmental factor (temperature / oxygen availability / pH / other) can impact on the life processes of feeding and respiration in bacteria. AND The impact on the rate of the breakdown of the dead plant material in the compost heap. • Discusses how changing another named environmental factor (temperature / oxygen availability / pH / other) can impact on the life processes of feeding and respiration in bacteria AND The impact on the rate of the breakdown of the dead plant material in the compost heap.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains ONE relevant idea.	Explains TWO relevant ideas.	Provides ONE relevant example of discussing (making multiple links).	Provides TWO relevant examples of discussing (making multiple links).

Q	Possible Evidence	Achievement	Merit	Excellence
TWO	Fungi need ideal / correct water, food source, warmth, space and pH to carry out life processes such as growth and reproduction. Fungi feed through the process of extracellular digestion. No nutrients (food) means the fungi cannot make energy. This is when the hyphae, which grow and extend through the substrate they are living in / on, secrete digestive enzymes outside the hyphae and into the substrate. This is required because the substrate or food needs to be broken down into smaller food molecules, so that they are easily reabsorbed back into the hyphae. Water is required for extracellular digestion. In order to carry out the feeding process, there needs to be an optimum amount of water available to the fungus so that it is able to produce the digestive enzymes that are in liquid, so that they are able to be secreted through the wall of the hyphae and into the substrate. When there is insufficient water available cellular processes cannot occur at an optimal rate so growing and reproduction slows down. Methods such as freeze drying, pickling and salting can remove water from cells which limits growth and reproduction of fungi enabling the food to stay edible for longer. Fungi grow using energy from the food they eat. They grow in the form of branching threads or hyphae. Collectively hyphae are called mycelium. The process of fungal growth requires an optimal temperature in order for the enzymes that control growth to be able to work. At warmer temperatures fungi can grow and reproduce at a faster rate as enzymes are working at a faster rate. At cooler temperatures enzymes activity slows meaning the fungi grow and reproduce at a slower rate. Therefore, when food is stored in a cold place like the fridge or freezer, fungal growth is slowed, and food is preserved or does not go off. Boiling temperatures can cause enzymes to denature and the cell processes slows / stops. Canning and bottling are some ways that food can be stored using increased temperature to enable the food to stay edible for longer. Fungi require oxygen to carry out cell respiration. Glucose + Oxygen → ATP / Energy + water + carbon dioxide. Energy is used for growth / feeding / reproduction. If there is not enough oxygen present, the fungi will not be able to carry out enough respiration and create enough net energy to be used for other life processes. Fungi also reproduce by asexual reproduction / binary fission / making two daughter cells. Fungi reproduce by growing a sporangium, which makes spores that can be carried on the wind. The sporangium ruptures and spores are released into the wind. These spores can then land and grow into a food source using hyphae. Therefore methods to store food can include sealed/air tight containers, vacuum sealing, etc in order to enable food to stay edible for longer.	**Describes** (single, simple ideas): • Describes fungal reproduction • Describes a way fungi can spread • Describes how fungi feed • Describes how fungi grow • Describes one named environmental factor that fungi need to live • Describes how food can be stored to prevent fungal growth.	**Explains** (gives reasons how or why something occurs / provides examples) aspects of fungal growth, reproduction, and interaction with environmental factors: • Explains how fungal reproduction. • Explains ways fungi are spread. • Explains how fungi feed through extracellular digestion. • Explains how fungi grow. • Explains how a **named** environmental factor can affect a life process of a fungus. • Explains how food storage techniques can prevent fungal growth/life processes.	**Discusses** the interaction between ONE environmental factor and ONE life process (growth, reproduction, and feeding) of fungi in the process of decay. • Discusses how changing **temperature / other** can affect at least one of fungal reproduction / growth / feeding linked to one method that food can be stored. • Discusses how **oxygen / other** can affect at least one of fungal reproduction / growth / feeding linked to one method that food can be stored. • Discusses how **water / other** can affect at least one of fungal reproduction / growth / feeding linked to one method that food can be stored.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains ONE relevant idea.	Explains TWO relevant ideas.	Discussing (making multiple links) TWO relevant ideas	Discussing (making multiple links) THREE relevant ideas.

Q	Possible Evidence	Achievement	Merit	Excellence
THREE	Viruses are microscopic biological agents that invade living host cells and infect their bodies by reproducing within their cell tissue. Infection by a virus causes the host cell to break down. This is because viruses reproduce by attaching to the host cell and injecting their DNA, or combining their DNA with the host's DNA so that the viral DNA can use the host's metabolic processes to reproduce. Viruses can spread when viral particles are passed onto new hosts through direct contact between organisms, on surfaces and equipment used by workers, in the air and through spray droplets. Antibiotics are chemicals that are useful in reducing the number of bacterial cells in a living thing. Some antibiotics kill the bacteria by interfering with the formation of the bacterial cell wall or contents, while others stop the bacteria from reproducing. On the other hand, viruses are not living cells and therefore antibiotics are ineffective against them. The only effective means of controlling the spread of plant diseases caused by viruses is by removing and burning affected plant material, and good hygiene. Virus movement can also be controlled by sterilising equipment before beginning new work. Viruses cannot be controlled though antibiotic sprays. Longer term, breeding plant varieties that are resistant to virus infection may be needed.	**Describes** (single, simple ideas): • Describes how viruses reproduce. • Describes how viruses are spread. • Describes how the spread of a virus can be controlled. • Describes how bacterial diseases can be controlled. • Antibiotic sprays can slow / stop the growth of bacteria.	**Explains** (gives reasons how or why something occurs/provides examples): • Explains how viruses reproduce. • Explains how viruses are spread. • Explains how viruses can be controlled. • Explains why antibiotics can be used to control bacteria.	**Discusses** (makes multiple links between ideas): • Discusses why antibiotic chemical sprays can control plant diseases caused by bacteria but other methods are required to control diseases caused by viruses.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains ONE relevant idea.	Explains at least TWO relevant ideas.	Discussing (making multiple links) involving ONE idea.	Discussing (making multiple links) involving TWO ideas.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 13	14 – 19	20– 24