

**Assessment Schedule – 2018**

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

**Evidence Statement**

Q	Achievement	Merit	Excellence
<p><b>ONE</b> Using microbes to clean up an oil spill</p>	<p><b>Examples</b> of possible ideas include:</p> <ul style="list-style-type: none"> <li>• Describes bacterial life processes                             <ul style="list-style-type: none"> <li>- growth</li> <li>- feeding</li> <li>- reproduction</li> <li>- respiration</li> </ul> </li> <li>• Describes impact on bacterial life processes of environmental factors:                             <ul style="list-style-type: none"> <li>- Oxygen availability</li> <li>- Water availability</li> <li>- Temperature</li> <li>- Food source</li> <li>- Competition</li> </ul> </li> <li>• Describes requirements for life processes</li> <li>• Describes ideal conditions for bacterial life processes.</li> </ul>	<p><b>Examples</b> of possible explanations include:</p> <ul style="list-style-type: none"> <li>• Explains bacterial                             <ul style="list-style-type: none"> <li>- growth</li> <li>- feeding</li> <li>- reproduction</li> <li>- respiration.</li> </ul> </li> <li>• Explains impact on bacterial life processes of environmental factors                             <ul style="list-style-type: none"> <li>- oxygen availability</li> <li>- water availability</li> <li>- temperature</li> <li>- food source</li> <li>- competition.</li> </ul> </li> <li>• Explains difference between aerobic and anaerobic respiration.</li> </ul>	<p><b>Examples</b> of possible responses include:</p> <p>The temperature of the surrounding water will impact on how effective the bacteria will be in cleaning up the oil spill. This is because temperature affects the rate at which bacteria can feed via extra-cellular digestion because it relies on the action of enzymes.</p> <p>To feed via extra-cellular digestion, bacteria secrete digestive enzymes outside their cell onto the food source (in this case the oil). The enzymes break up the oil molecules which are too big to be absorbed through the membrane into smaller soluble molecules which can be dissolved and then reabsorbed.</p> <p>This process also requires water or moisture to dissolve the products of digestion so that they can be reabsorbed into the bacterial cell. Bacteria cannot absorb dry material.</p>

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	FOUR relevant ideas given.	FIVE relevant ideas given.	Explains TWO relevant ideas.	Explains THREE relevant ideas.	Discusses THREE ideas	Discusses FOUR ideas

Q	Achievement	Merit	Excellence
<p>TWO Sore Throat</p>	<ul style="list-style-type: none"> <li>• Describes bacterial life processes: (up to 2 ideas for each)                             <ul style="list-style-type: none"> <li>- growth</li> <li>- feeding</li> <li>- reproduction</li> <li>- respiration</li> <li>- excretion.</li> </ul> </li> <li>• Describes virus reproduction.</li> <li>• Describes virus as non-living.</li> <li>• Describes the process of microbes being passed from person to person.</li> <li>• Describes virus as requiring a living host cell.</li> <li>• Defines pathogen.</li> <li>• Describes all viruses as being pathogenic.</li> </ul>	<ul style="list-style-type: none"> <li>• Explains bacterial life processes:                             <ul style="list-style-type: none"> <li>- growth</li> <li>- feeding</li> <li>- reproduction</li> <li>- respiration</li> <li>- excretion.</li> </ul> </li> <li>• Explains virus reproduction.</li> <li>• Explains the process of microbes being passed from person to person.</li> <li>• Explains why a virus requires a living host cell.</li> <li>• Explains why bacteria can be treated with antibiotics but viruses cannot.</li> <li>• Explains how the symptoms of sore throats are caused.</li> </ul>	<p>Bacteria can cause an infection such as a sore throat. They do this by growing and reproducing using throat cells as food for energy. The bacteria feed via extracellular digestion whereby they secrete digestive enzymes onto your throat cells that digest your cell materials so that the molecules are soluble and small enough to be reabsorbed back into the bacterial cell. On the other hand, viruses do not feed, respire or excrete toxic waste. They cause sore throats due to their process of replication or reproduction, for which they require a living host cell (your throat cell). Once in your throat via droplets in a sneeze or cough or through using a drink bottle from an infected person, the virus will attach itself to your throat cell and inject its DNA. This will then programme the host cell's DNA to produce replicas of the viral DNA effectively making many more viruses. When the host cell is full, it will burst releasing many more viruses, which can then go on to infect many more throat cells.</p>

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	FOUR relevant ideas given.	FIVE relevant ideas given.	Explains TWO relevant ideas.	Explains THREE relevant ideas.	Compares and contrasts ONE life process of bacteria / viruses.	Compares and contrasts TWO life processes of bacteria / viruses.

Q	Achievement	Merit	Excellence
THREE	<p><b>Examples</b> of possible ideas include:</p> <ul style="list-style-type: none"> <li>• Describes fungal life processes:                             <ul style="list-style-type: none"> <li>- growth</li> <li>- feeding</li> <li>- reproduction</li> </ul> </li> <li>• Describes the requirements for fungal growth</li> <li>• Describes impact on fungi life processes of environmental factors:                             <ul style="list-style-type: none"> <li>- water availability</li> <li>- temperature.</li> </ul> </li> <li>• Describes NZ bush as having environmental factors required for growth of myrtle rust.</li> <li>• Describes what happens if someone disturbs the plants that have myrtle rust.</li> </ul>	<p><b>Examples</b> of possible explanations include:</p> <ul style="list-style-type: none"> <li>• Explains fungal life processes:                             <ul style="list-style-type: none"> <li>- growth</li> <li>- feeding</li> <li>- reproduction.</li> </ul> </li> <li>• Explains impact on fungi life processes of environmental factors:                             <ul style="list-style-type: none"> <li>- water availability</li> <li>- temperature.</li> </ul> </li> <li>• Explains how / why NZ bush has environmental factors required for growth of myrtle rust.</li> <li>• Explains why people are advised not to touch plants with myrtle rust.</li> <li>• Explains impact of myrtle rust infection on ability of plant to carry out photosynthesis.</li> </ul>	<p>Moisture (water availability) and temperature are two environmental factors that are important for the growth of a fungus like myrtle rust. Water is required for successful feeding of fungi because fungi feed via extra-cellular digestion. This involves the hyphae secreting digestive enzymes outside of the fungal structure and into the substrate (in this case the leaves of native plants). The enzymes then break down the food molecules so they are small enough to be soluble in water and then reabsorbed. Without water, this process would not be able to be carried out because the fungus could not re-absorb dry material. Once re-absorbed the food molecules are then used in respiration to release the energy which is then used for other life processes such as growth and reproduction.</p> <p>Temperature is also important in the process of extra-cellular digestion because it affects the efficiency of the enzymes in the digestive process. Too warm and the enzymes will change shape or denature and become ineffective and too cold and they work very slowly, slowing down the process of digestion. In optimal (warm) temperatures the enzymes will work most efficiently allowing life processes, such as extra-cellular digestion, to proceed.</p> <p>The public are warned not to touch infected plants because this will disturb the reproductive spores. The spores are plentiful, very light and therefore easy to spread around. If someone touches them, they could become airborne and be carried in the wind to infect other plants. Also, they could become attached to the person who then goes to another area where they are then spread more widely. This could lead to increased infection both close by, due to wind picking up the disturbed spores, or more widely, with the person dispersing them without realising.</p>

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	FOUR relevant ideas given.	FIVE relevant ideas given.	Explains TWO relevant ideas.	Explains at least THREE relevant ideas.	Discusses THREE ideas.	Discusses FOUR ideas.

### Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 14	15 – 19	20 – 24