**Part 1: Learning outcomes plan**

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| **Main idea:**   * Understanding infection and how we can reduce or stop diseases from spreading. | **Science strand:**   * Living World: Life processes common to all living things, and these occur in different ways. | | **Level:** 3 4  **Year:** 5–6  **Teacher:** Barbara Ryan |
| **Overarching learning outcomes:**  In building understandings about reducing infection, students will integrate:   * understandings about how infection spreads and that our bodies work to fight infection (scientific knowledge) * an investigation into how we can help to fight and reduce specific diseases (scientific practice) * understanding that scientific knowledge can be used to help people (nature of science). | | | |
| **Conceptual learning outcomes** | **Procedural learning outcomes** | **Nature of science outcomes** | **Technical learning outcomes** |
| Students will understand that:   * infection is the invasion of pathogens into the body * the body has defence systems to protect the body from infection * bacteria, viruses and parasites are examples of microorganisms, and although most are harmless, some are pathogenic (disease causing) * people transmit infection by spreading microorganisms from one person to another * pathogenic microorganisms can be contained by simple practices such as hand washing, not sharing drinks and so on * vaccinations are the administration of vaccines to produce an immunity to a disease * vaccines use the body’s natural defence to build resistance to specific infections * vaccines have been developed to try to eliminate harmful and life-threatening diseases. | Students will be able to:   * develop questions while investigating ‘snot’ * research for information on infection and vaccination from the Fighting infection resources on the Science Learning Hub * identify and classify microorganisms * carry out an experiment relating to the spreading of disease and develop simple explanations for this * explore and discuss current medical research and Māori therapies * work through the process of an ethical issue culminating in a debate. | Students will understand and appreciate that:   * scientists are continually exploring and investigating new ways to fight infectious diseases * scientific research can help people in the future (such as research into infectious diseases) * scientists face ethics issues (such as those related to vaccination) * ethics issues in science are continually developing - early scientists did not consider some of the ethics issues we need to consider today (such as Edward Jenner’s exploration of smallpox). | Students will be able to:   * follow conventions for conducting an experiment * use the Science Learning Hub for research (computer skills). |
| **Management/materials:**   * Resources: [www.sciencelearn.org.nz/resources/165-fighting-infection-introduction](http://www.sciencelearn.org.nz/resources/165-fighting-infection-introduction) * Equipment for the student activity [Making snot](https://www.sciencelearn.org.nz/resources/196-making-snot) * Equipment for the student activity [Spreading diseases](https://www.sciencelearn.org.nz/resources/192-spreading-diseases) | | | |
| **Assessment:**   * Transactional writing - see student activity [Ethical dilemmas in fighting infection](https://www.sciencelearn.org.nz/resources/195-ethical-dilemmas-in-fighting-infection) | | | |

**Part 2: Lesson plan**

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| **Main idea:** Understanding infection and how we can reduce or stop diseases from spreading. | | | | |
| **Subtasks** | | **Resources/focal artefacts** | **Planned interactions** | **Key student outcomes** |
| **Meso tasks** | **Micro tasks** |
| **Day 1**  Introduce the concept of infection. | 1.1 [What is ‘snot’?](https://www.sciencelearn.org.nz/videos/57-what-is-snot) | * Student activity > [Making snot](https://www.sciencelearn.org.nz/resources/196-making-snot) * Fake snot | * Begin with some previously made fake ‘snot’. Ask what is this? Brainstorm ideas as instructed in the student activity Making snot and continue to work through it. | * Students will think about why the body might make mucus (snot), particularly in the nose. |
| 1.2 Read and discuss the science ideas and concepts article [Infection](http://www.sciencelearn.org.nz/resources/179-infection). | * Article > [Infection](http://www.sciencelearn.org.nz/resources/179-infection) | * In small groups or as a class read the article Infection. Discuss terms such as ‘microorganisms’, ‘pathogenic’, ‘vaccination’. This could be done as a class using an IWB – scientific words could be highlighted and discussed. | * Students will know that infection is the invasion of pathogens into the body. |
| 1.3 Read and discuss the science ideas and concepts article [The body’s first line of defence](https://www.sciencelearn.org.nz/resources/177-the-body-s-first-line-of-defence). | * Article > [The body’s first line of defence](https://www.sciencelearn.org.nz/resources/177-the-body-s-first-line-of-defence) | * In groups or as a class read the article The body’s first line of defence. Discuss the parts of our outside defence system and how they stop pathogens from entering the body. * Ask the students what they know about another system of defence inside the body that deals with pathogens that get past the first line of defence ([second line of defence](https://www.sciencelearn.org.nz/resources/178-the-body-s-second-line-of-defence)). | * Students will know that the body has defence systems to protect itself against pathogens. |
| 1.4 Students make snot. | * Student activity > [Making snot](https://www.sciencelearn.org.nz/resources/196-making-snot) * Ingredients for fake snot as per recipe | * In small groups, students make fake snot. Discuss texture and possible reasons for this texture (catching germs and microorganisms). | * Students will understand that the body forms snot to protect itself against invading particles and ‘germs’ that may cause an infection. |

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| **Meso tasks** | **Micro tasks** |
| **Day 2**  Exploring germs and how they spread | 2.1 What are microorganisms? | * Article > [Microorganisms – friend or foe?](https://www.sciencelearn.org.nz/resources/176-microorganisms-friend-or-foe) | * In small groups or as a class read the article Microorganisms – friend or foe? * Discuss any new terms, particularly ‘pathogen’. Is a pathogen friend or foe? * With an IWB or data projector (or individual computers) explore the scale interactive under Useful links to appreciate the size of microorganisms (<http://learn.genetics.utah.edu/content/cells/scale/>). | * Students will understand that bacteria, viruses and parasites are examples of microorganisms, and although most are harmless, some can be disease-causing (pathogens). |
| 2.2 Participate in an experiment that shows how disease spreads among a group of people. | * Student activity > [Spreading disease](https://www.sciencelearn.org.nz/resources/192-spreading-diseases) * Equipment for experiment | * Revisit the Infection article as a class. * On an IWB/data projector (or using paper copies), go through the instructions for Pass it on with the class, making sure they are clear about what they need to do. * At the end of the activity, test for the ‘virus’. Discuss how we spread viruses (sharing drinks etc.) and how can we reduce the spread of viruses (don’t share drinks, wash hands etc). | * Students will explain that viruses are spread by people and will be aware of how they can reduce the spread of viruses. |

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| **Day 3–4**  Exploring ways to stop diseases spreading. | 3–4.1 What is vaccination? | * Image > [Getting immunised](https://www.sciencelearn.org.nz/images/180-getting-immunised) | * Who has had been immunised? * Explore students’ knowledge on vaccination. What was it for? What is in the injection? How does it work? Do you think it is a good thing? Why? Why not? Why do you think/say that? (Others may have expressed an opinion to students). | * Students will begin to think about vaccination – what it is (the administration of a vaccine given to produce an immunity to a disease), benefits and possible controversies surrounding it. |
| 3–4.2 Exploring vaccines and therapies | * Article > [Vaccines and therapies](https://www.sciencelearn.org.nz/resources/180-vaccines-and-therapies) | * As a class read the article Vaccines and therapies. Discuss new terms. Note that immunisation is the process of being vaccinated and becoming immune. To be immune is to be protected against specific diseases. | * Students will understand that vaccines use the body’s natural defence to build resistance to specific infections and that they have been developed to try to eliminate harmful diseases from our communities. * Students will understand that therapies are a range of measures that can be used to help the body’s natural defences fight off infectious diseases and that scientists are continually looking for new ways to fight infectious diseases. |
| 3–4.3 Exploring current medical research | * Student activity > [Exploring medical research](https://www.sciencelearn.org.nz/resources/193-exploring-medical-research) | * Follow the instructions in the student activity using the topics TB, rotavirus, RSV or hookworm and allergies. | * Students will be aware of current New Zealand research and that scientific research helps people in the future. |
| 3–4.4 Exploring Māori therapies. | * Student activity > [Using rongoa Māori](https://www.sciencelearn.org.nz/resources/197-using-rongoa-maori) | * Follow the instructions in the student activity to play the silent card game while learning about medicines (therapies). | * Students will be aware of the traditional Māori approach to infection. |

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| **Day 5–8**  Exploring the ethics of vaccination. | 5–8.1 Begin to explore an ethics issue. | * Student activity > [Ethical dilemmas in fighting infection](https://www.sciencelearn.org.nz/resources/195-ethical-dilemmas-in-fighting-infection) * Article > [History of vaccination](https://www.sciencelearn.org.nz/resources/181-the-history-of-vaccination) * Science ideas and concepts article > [Infection](http://www.sciencelearn.org.nz/resources/179-infection) * Science ideas and concepts article > [Vaccines and therapies](https://www.sciencelearn.org.nz/resources/180-vaccines-and-therapies) * Article > [Immunisation in New Zealand](https://www.sciencelearn.org.nz/resources/182-immunisation-in-new-zealand) | * Follow the instructions in student activity using the ethics questions: ‘Should Edward Jenner have experimented on the young boy?’ and ‘Should people be vaccinated against infectious diseases?’ * The class could be divided into small groups of 2–3 students. Half could focus on one issue and the other half on the other. * Groups read appropriate articles and discuss them. | * Students begin the process of exploring ethics in science. They have an ethics question, identify what they need to know and begin to research the science involved. |
| 5–8.2 Make an initial decision. | * String * 2 cards - Strongly agree, Strongly disagree. | * Students stand on the continuum line. * Discuss decisions made. | * Students make a decision based on previous knowledge and initial reading. |
| 5–8.3 Investigate the issue. | * Edward Jenner animated video <https://www.youtube.com/watch?v=jJwGNPRmyTI> | * Note questions relating to Edward Jenner and vaccination students should ask to understand the science/issue. | * Students will develop an understanding of the issue and the science involved. |
| 5–8.4 Using an ethical approach to explore the ethics. | * Student activity > [Ethical dilemmas in fighting infection](https://www.sciencelearn.org.nz/resources/195-ethical-dilemmas-in-fighting-infection) | * Use a consequentialist approach and noisy round robin activity to explore the ethics. * All the groups doing the same ethics question could combine to work through the noisy round robin activity. PMI worksheets need to be prepared for each ethics question. Divide each half of the class into 6 groups. Call the same word (say ‘vaccine’) to move both sets of 6 groups to the next PMI at the same time. | * Students will generate a number of ideas about how groups affected by the issues would benefit or be harmed by them. |
| 5–8.5 Debate. | * Student activity > [Ethical dilemmas in fighting infection](https://www.sciencelearn.org.nz/resources/195-ethical-dilemmas-in-fighting-infection) | * Class debate – groups of 3 prepare and debate the issues so that the whole class hears arguments for both issues. A whole class summing up discussion could take place if deemed appropriate at the end. | * All students will be exposed to and have to consider both ethical issues – vaccination and Edward Jenner. |
| 5–8.6 Final continuum. | * Student activity > [Ethical dilemmas in fighting infection](https://www.sciencelearn.org.nz/resources/195-ethical-dilemmas-in-fighting-infection) | * Students defend their decision in a final continuum. In pairs, consider, discuss and answer the questions in the activity. There could also be a class discussion using these questions. | * Students make an ethical decision with justification. |