

New Zealand Blood Service Teaching Units

Level 7: Science

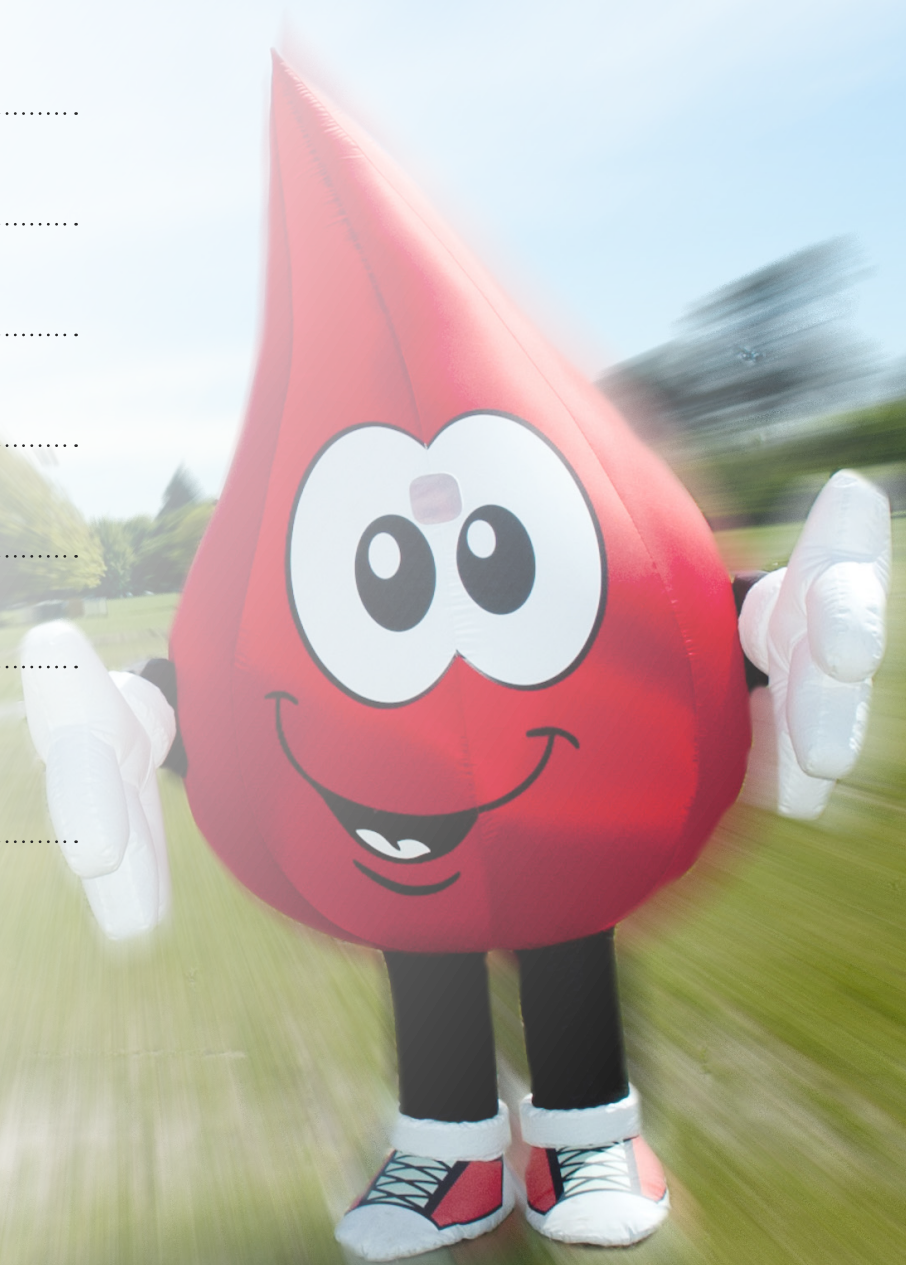


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NZBLOOD
Te Rauanga Toto O Aotearoa

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Introduction

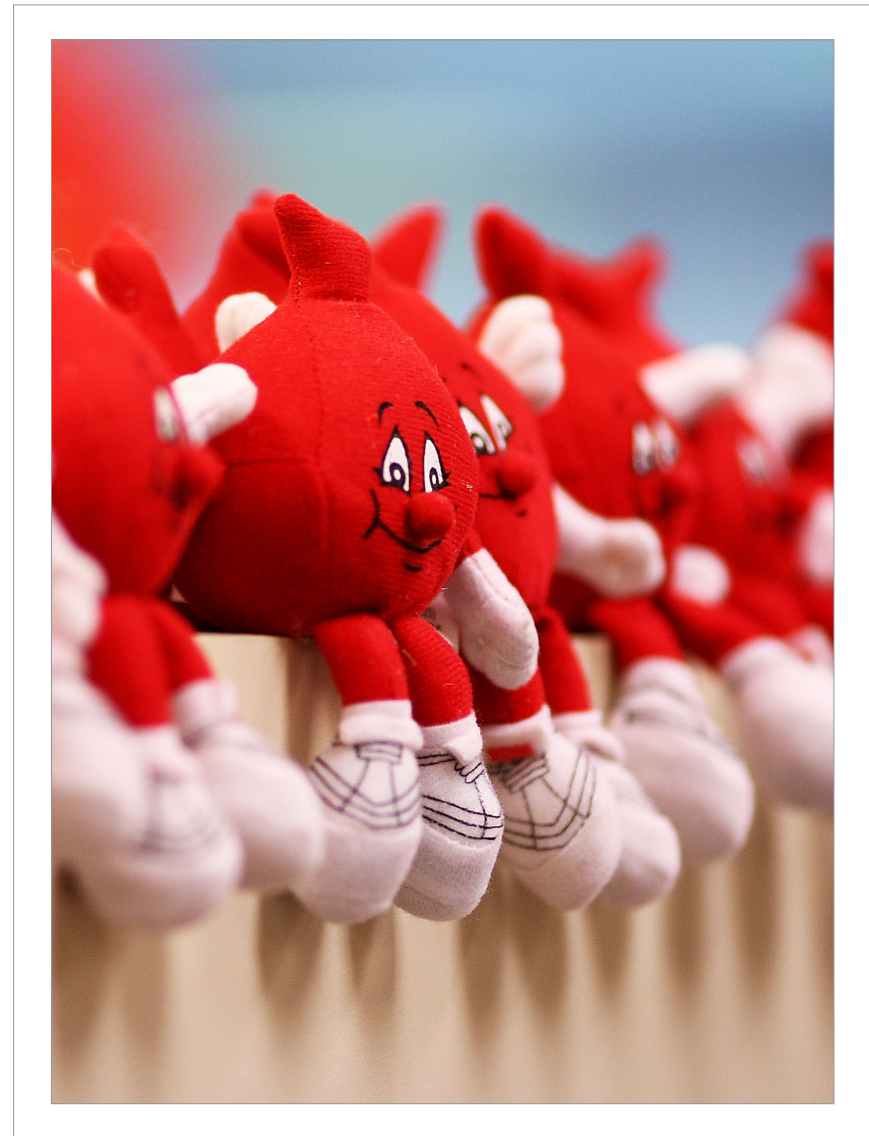
New Zealand Blood Service (NZBS) has developed a range of education resources linked to the New Zealand Curriculum. These resources provide engaging learning experiences on NZBS topics for teachers to use in the classroom.

The resources support teachers to develop their students' knowledge and understanding of blood and blood donation. They provide students with opportunities for personal development and social interaction, and to contribute to their community as an active member of society.

This unit is for teachers and students of Year 12 biology and science and is set at Level 7 of the New Zealand Curriculum. It corresponds with the Achievement Standard AS91154 – **Analyse the biological validity of information presented to the public.**

The unit aims to provide experiences for students to learn about blood and NZBS in the context of analysing information for biological validity. The unit encourages students to think about the scientific validity of sources of information.

The curriculum focuses of the unit are Living World: Life processes and the Nature of Science strands: Participating and contributing and Communicating in science.



CURRICULUM ALIGNMENT – LEVEL 7 OF THE NEW ZEALAND CURRICULUM

Context for learning	The importance of blood donation
Concept	Social responsibility
Vision	<p>This resource focuses on students being:</p> <ul style="list-style-type: none"> • actively involved • connected.
Principles	<p>This resource supports the principles of:</p> <ul style="list-style-type: none"> • community engagement • inclusion.
Values	<p>This resource models and explores the values of:</p> <ul style="list-style-type: none"> • innovation, inquiry and curiosity • community and participation. <p>Through their learning experiences, students will learn about and develop their ability to:</p> <ul style="list-style-type: none"> • explore, with empathy, the values of others • critically analyse values and actions based on them • make ethical decisions and act on them.
Key Competency	<p>This resource fosters in students the key competency of:</p> <ul style="list-style-type: none"> • participating and contributing.

ACHIEVEMENT OBJECTIVES

The following are achievement objectives, relating to this unit, from the Science and English learning areas of the curriculum.

	Level 7
English	<p>Listening, Reading, and Viewing: Ideas Students will:</p> <ul style="list-style-type: none"> • Show a discriminating understanding of ideas within, across, and beyond texts. <p>Speaking, Writing, and Presenting: Ideas Students will:</p> <ul style="list-style-type: none"> • Select, develop, and communicate sustained ideas on a range of topics.
Science	<p>Nature of Science: Participating and contributing Students will:</p> <ul style="list-style-type: none"> • Use relevant information to develop a coherent understanding of socio-scientific issues that concern them, to identify possible responses at both personal and societal levels. <p>Nature of Science: Communicating in science Students will:</p> <ul style="list-style-type: none"> • Use accepted science knowledge, vocabulary, symbols, and conventions when evaluating accounts of the natural world and consider the wider implications of the methods of communication and/or representation employed. <p>Living world: Life processes Students will:</p> <ul style="list-style-type: none"> • Explore the diverse ways in which animals and plants carry out the life processes.

ACHIEVEMENT STANDARD

Science – NCEA Level 2 Achievement Standard (Year 12)

Subject Reference		Number: AS91154 Version: 1			
		Subject reference: Biology 2.2			
Title		Analyse the biological validity of information presented to the public.			
		Subfield: Science			
		Domain: Biology			
Level	2	Credits	3	Assessment	Internal

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Analyse the biological validity of information presented to the public.	Analyse in-depth the biological validity of information presented to the public.	Comprehensively analyse the biological validity of information presented to the public.

PEDAGOGICAL APPROACH

The pedagogical approach used in this unit is science as inquiry. Students are encouraged to reflect on their learning and how they learn. They are encouraged to assess the biological validity of the various sources of information presented to them.

Students will be encouraged to:

- explore how the natural physical world and science work so that they can participate as critical, informed and responsible citizens
- call on a range of sources for information, and evaluate and use the information as a basis for action
- create texts to record and communicate ideas, using language and symbols appropriate to science and to the target audience
- become reflective learners.

Students will assimilate the new learning, which will be assessed formatively throughout the unit. They will relate it to what they already know and adapt it for their own purposes with the aim of translating the thought into action – understanding the importance of donating and becoming a donor, and encouraging others to. Students are encouraged to analyse the information they are gathering for scientific validity and bias. Students are supported to recognise what they are learning as relevant. This will help them to take greater ownership of their learning and actions.

ASSESSMENT

This unit does not include an assessment task, but it offers a possible approach to gaining credits for the internal assessment of Biology Achievement Standard AS91154 – **Analyse the biological validity of information presented to the public.**

Possible assessment tasks could include:

- writing a report comparing the development of scientific ideas over time
- creating a PowerPoint presentation, using the information they have gathered, to inform fellow students (or another audience) about the NZBS and discussing the biological validity of various sources of information.

Vocabulary

A useful glossary of terms for this unit is available on the NZBS website at <https://www.nzblood.co.nz/knowledge-hub/glossary/>

At the start of the unit, give students a copy of graphic organiser A: Glossary. Explain that they will add definitions and other vocabulary to the glossary list at the end of each activity throughout the unit.

Discuss the words that already have definitions. This vocabulary is needed to complete the summary presentation.

Unit: Analysing information for biological validity

Investigating blood

Suggested learning experiences

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcomes</p> <p>Students will:</p> <ul style="list-style-type: none">• develop an understanding of the amount of blood in a human body and the consequences of blood loss• investigate the history of our understanding of blood and blood donations• distinguish between scientific and social information.		
<p>Activity 1: What do we know?</p>		
<ul style="list-style-type: none">• Do a class brainstorm to determine prior knowledge about blood. Record the students' ideas on a mind-map chart.• To demonstrate to the students how much blood is in the human body and how much we can lose before there are serious implications, take the students outside for the following practical investigation.		

Teaching and learning activities	Assessment opportunities	What you need
<p>Scenario: A car accident patient is bleeding on the road. How much blood do they have and how much can a person lose without it being fatal? What would these amounts look like?</p> <ul style="list-style-type: none"> • Half fill a 10L bucket with 5L of “blood” (water and red food colouring). • Assemble the class outside in a concrete area that will show the liquid clearly. Ask a student to use the measuring cylinder to spill 750mL (15% of the average human’s blood volume) of “blood” onto the ground. Explain: “This is a class I haemorrhage, which will cause no major issues”. • Have the student spill another 750mL (30%). Explain: “This is a class II haemorrhage. This would lead to shock: rapid heart rate and vasoconstriction (pale skin). The patient won’t need a blood transfusion but will need saline solution”. • Have the student spill another 500mL (40%). Explain: “This is a class III haemorrhage. This would cause major shock, in which the patient’s heart rate increases, blood-pressure drops and peripheral capillary delivery worsens. The patient’s blood volume would need to be replaced urgently to avoid serious damage to organs that require a lot of oxygen such as the kidney, liver, brain and heart. Blood volume is usually replaced with saline initially. If blood loss continued, the patient would need a transfusion of red blood cells and possibly plasma and platelets”. 		<ul style="list-style-type: none"> • Equipment for the practical investigation <ul style="list-style-type: none"> – a 10L bucket – 5L of “blood” (water and red food colouring) – a 1L measuring cylinder

Teaching and learning activities	Assessment opportunities	What you need
<ul style="list-style-type: none"> • Say: “If a physically fit person lost more than 50% of their blood, they would not be able to compensate. They would die if not resuscitated with replacement of blood volume with saline and blood transfusion”. (The term blood transfusion refers to use of any of the blood components: red blood cells, platelets and plasma. Blood is stored in blood banks as separate components, because each component needs to be kept at a different temperature for best preservation.) • Have the student spill the remaining “blood” to show the average human’s blood volume. • With the class, discuss the medical and first-aid implications of this demonstration. Ask students questions to prompt the discussion, for example, how would they deal with the accident, how could they get an idea of the amount of blood lost, how might they minimise further blood loss and how might they treat shock? 		
Activity 2: The history of our understanding of blood		
<ul style="list-style-type: none"> • Have students read and gather information about the development of people’s knowledge about blood and how it could be used to treat disorders. • Have students use graphic organiser B: Timeline information to record major dates and advances for a timeline. Have students construct this timeline on a large sheet of paper. Ask students to decide if each advance is scientific or social and to use different colours to show scientific and social advances or milestones. Be sure students include recent blood group discoveries. 		<ul style="list-style-type: none"> • Possible source of information: <ul style="list-style-type: none"> – https://www.redcrossblood.org/donate-blood/blood-donation-process/what-happens-to-donated-blood/blood-transfusions/history-blood-transfusion

Teaching and learning activities	Assessment opportunities	What you need
<ul style="list-style-type: none"> Facilitate a discussion about the timing of major advances, asking: <ol style="list-style-type: none"> How do advances cluster together? What is the relevance of war? Ensure students have the key dates on their timelines. Keep the timelines as a useful resource for the students when they are completing the final activity. Have students add any new words and their meanings to graphic organiser A: Glossary. 	<p>The completed timeline can be used as a formative assessment to show the students' level of understanding.</p>	<ul style="list-style-type: none"> http://health.govt.nz/nbts/Pages/About-Blood/History-of-Blood.aspx Graphic organiser B: Timeline information Graphic organiser A: Glossary
Activity 3: How does my blood flow?		
<ul style="list-style-type: none"> Do the following activities to have students look at their own blood vessels and vital signs. <p>1. Blood vessels</p> <p>Explain that arteries are deep, so they are hard to locate by sight, but you can feel them in places where they are close to the skin and run across bone or hard tissue. Have students locate a partner's carotid artery pulse on their throat/neck. Make sure students use two fingers, not thumbs (which have their own pulses). Next, have students feel for their partner's radial artery in their wrist and their popliteal artery behind their knee.</p> <p>Ask:</p> <ul style="list-style-type: none"> Which artery was the easiest to find? In an accident, which artery may be the most important and why? (Answer: The artery in the upper arm – to monitor blood pressure) 		

Teaching and learning activities	Assessment opportunities	What you need
<p>2. Pulse</p> <p>Have students feel the artery that is easiest to find and count how many beats happen in a minute (pulse rate). Remind them to use their fingers, not thumbs.</p> <p>Ask:</p> <ul style="list-style-type: none"> – What causes your pulse? – Is the heart the only organ that is pumping your blood around? – Does the blood stop flowing between pulses? – What is a “normal” pulse rate? What are normal rates for athletes, babies and elderly people? – What are the medical terms for a very fast pulse, a very slow pulse and a weak pulse? <p>3. Veins</p> <p>Explain that some veins are nearer to the skin’s surface than arteries, so they can be seen, for example, on the back of your hand or under your forearm. Have students locate veins on their partner’s hand. If they have trouble finding them, two ways to improve visibility are: squeeze the partner’s arm firmly, just above the wrist, and ask the partner to make a tight fist (the muscle contraction will squeeze blood out of muscles into the veins under the skin). If neither of these work, have the partner immerse their hand and wrist in a basin of hot water until the skin is glowing pink. Higher skin temperature will cause the small arteries that supply the skin to dilate allowing a much faster blood flow and delivering more blood to the skin. Ask: “Do the veins inflate more and become easier to see?”</p>		

Teaching and learning activities	Assessment opportunities	What you need
<p>4. Emptying their vein</p> <p>Have students squeeze the blood out of the vein on the back of their partner's hand. Say: "To do this, press your first finger at the end of the vein nearest your partner's fingers, and stroke the vein firmly up their hand towards the wrist with your second finger. If you stop stroking you may see that their vein stays empty! Release the first finger and it will refill". (Students may need to try this several times to see the effect).</p> <p>Ask:</p> <ul style="list-style-type: none"> – Do you think the blood in veins is under higher or lower pressure than in arteries? Why might this be? – What prevented the blood in your partner's hand from flowing back into their vein when the second finger was lifted? – Why does the vein fill again when the first finger is lifted? <p>5. Blood pressure:</p> <p>To do this activity, you will need a blood pressure monitor or access to a school nurse.</p> <p>Ask for a volunteer to have their blood pressure taken. As the pressure in the arm cuff declines, have students observe the mercury column begin to "jump" and then become smoother. The points at which the reading starts to jump and later cease to jump are the systolic and diastolic blood pressures. Try taking (or having students take) a number of students' blood pressures and calculate averages for the individual pressures and the class systolic and diastolic pressures.</p>		<ul style="list-style-type: none"> • Blood pressure monitor

Teaching and learning activities	Assessment opportunities	What you need
<p>Ask:</p> <ul style="list-style-type: none"> - What might cause the spike (jump) in the blood pressure reading? (Think back to your investigation of pulse rates.) - Does the blood pressure ever drop to zero? - Use the Internet to find the meanings of systolic and diastolic. - What are the average adult values? - What might cause very high blood pressure and what is this condition called (in medical terms)? - Do people ever have very low blood pressure? 		

Teaching and learning activities	Assessment opportunities	What you need
Activity 4: What is in blood?		
<ul style="list-style-type: none"> • Have students look at prepared slides of blood under a microscope (if your school has them). • Provide students with sources of information about the composition of blood (such as the websites in the “What you need” column). Have students use graphic organiser C: Composition of blood to make notes from the sources of information. 		<ul style="list-style-type: none"> • Prepared slides of blood • A microscope • If you do not have access to these resources, some images are available at http://imagebank.hematology.org/ • Possible sources of information: <ul style="list-style-type: none"> – https://www.bbc.co.uk/bitesize/guides/z9n6sg8/revision/2 – https://www.oneblood.org/about-donating/blood-donor-basics/what-is-blood/ • Graphic organiser C: Composition of blood

Teaching and learning activities	Assessment opportunities	What you need
Activity 5: What does blood look like?		
<ul style="list-style-type: none"> • Have the students use coloured paper or other resources to make a model or diagram of the various components of blood, such as red blood cells, white blood cells, plasma and platelets. Explain that their representations should show the structure of each component and include notes about their functions. • Display the representations in the classroom throughout the unit as a resource to refer to. • Alternatively, students could create a PowerPoint presentation about the composition of blood, including a graphic representation of the structure and function of each component. • Have students add any new words and their meanings to graphic organiser A: Glossary. • Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activities 4 and 5. Keep the graphic organisers so that they can be referred to in the final assessment of the unit. 	<p>The models and diagrams are a formative assessment of the understanding of the composition of blood.</p> <p>The website reliability checklist is a useful resource to look at the biological validity of the sites.</p> <p>This information will be a useful resource for the students when they are writing their final report.</p>	<ul style="list-style-type: none"> • Resources for making models and diagrams, such as coloured paper, felt pens, scissors and glue sticks • Graphic organiser A: Glossary • Graphic organiser D: Website reliability checklist

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcome</p> <p>Students will:</p> <ul style="list-style-type: none"> learn about the ABO blood typing system and its importance in transfusions. 		
<p>Activity 6: The ABO System</p>		
<ul style="list-style-type: none"> Have students play the Nobel Prize blood typing game. Make sure they note down their score from the game and keep it until the end of activity 9. Divide the class into small groups to research and report back on information about Karl Landsteiner. A good starting point would be: https://www.nobelprize.org/prizes/medicine/1930/landsteiner/biographical/ Have students summarise the information on graphic organiser E: Retrieval chart – Karl Landsteiner. 	<p>The group research activity will indicate understanding of what is and what is not scientific information.</p>	<ul style="list-style-type: none"> The blood typing game: https://educationalgames.nobelprize.org/educational/medicine/bloodtypinggame/ Graphic organiser E: Retrieval chart – Karl Landsteiner

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcomes</p> <p>Students will:</p> <ul style="list-style-type: none"> • explain the genetic basis of blood types • discuss the implications of blood types in transfusions/forensics/paternity. 		
<p>Activity 7: Inheritance of blood types</p>		
<ul style="list-style-type: none"> • Have students use graphic organiser F: Inheritance of blood types to record information from the websites listed in the “What you need” column. • Have students use the information to write a paragraph explaining the importance of inheritance of blood types in forensics and in paternity issues. • As a class, look at the charts on: <ul style="list-style-type: none"> – www.bloodbook.com/world-abo.html • Facilitate a discussion about what is likely to happen as people travel more and interracial relationships become more common. 	<p>The written conclusion and discussion will indicate the students’ understanding of blood typing.</p>	<ul style="list-style-type: none"> • Graphic organiser F: Inheritance of blood types • Websites: <ul style="list-style-type: none"> – https://www.nzblood.co.nz/about-blood/ – https://www.transfusion.com.au/blood_basics/blood_groups/inheritance_patterns – www.bloodbook.com/world-abo.html

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcome</p> <p>Students will:</p> <ul style="list-style-type: none"> carry out a practical investigation to identify unknown blood samples. 		
<p>Activity 8: Blood typing experiment</p>		
<ul style="list-style-type: none"> As a class, do the practical blood typing experiment (as detailed on the teacher factsheet) to deduce the type of each unknown blood sample, using the two antisera to observe clotting. <p>Ask students to write a conclusion in which they:</p> <ul style="list-style-type: none"> explain why type O is the universal donor construct a table showing blood type compatibility and incompatibility define antibodies and antigens discuss the importance of compatibility and what would happen if incompatible blood was transfused. 		<ul style="list-style-type: none"> Teacher factsheet: Blood typing experiment Graphic organiser G: Blood typing experiment results Websites with information about ABO incompatibility: <ul style="list-style-type: none"> www.nlm.nih.gov/medlineplus/ency/article/001306.htm www.nlm.nih.gov/medlineplus/ency/article/001303.htm

Teaching and learning activities	Assessment opportunities	What you need
Activity 9: Scenario – 1850		
<ul style="list-style-type: none"> Have students discuss this scenario with a partner. Explain: “It is the year 1850. You are a country doctor treating a woman who has lost a lot of blood during childbirth. You know that many patients die from blood transfusions. How would you treat her?” Facilitate a whole-group discussion about how her treatment would differ today. Ask: “What medical advances have influenced how we treat blood loss?” <p>Conclusion</p> <ul style="list-style-type: none"> After activities 6, 7, 8 and 9, have students play the blood typing game again. Compare their scores with their scores from before these activities. Have students add any new words and their meanings to graphic organiser A: Glossary. Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activities 6, 7, 8 and 9. Keep the graphic organisers so that they can be referred to in the final assessment of the unit. 	<p>The scenario activity will show the students’ understanding of scientific advances.</p> <p>Activities 6, 7, 8 and 9 will provide useful information for when the students are writing their final reports.</p> <p>Before and after scores on the blood typing game can be used to assess how much the students have learned.</p>	<ul style="list-style-type: none"> The blood typing game: https://educationalgames.nobelprize.org/educational/medicine/bloodtypinggame/ Graphic organiser A: Glossary Graphic organiser D: Website reliability checklist

Blood Transfusions

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcomes</p> <p>Students will:</p> <ul style="list-style-type: none"> • discuss why people give blood and identify the scientific validity of the reasons • compare and contrast the different types of blood donations. 		
<p>Activity 10: Why do people give blood?</p>		
<ul style="list-style-type: none"> • Divide the class into small groups to each read two or three stories on the NZ, UK and other blood service websites about blood transfusions saving lives and why people donate blood. • Then, working as a class, pool their information on a spider diagram that shows as many reasons as you can find for why people give blood. 	<p>This activity will show students' understanding of the difference between scientific reasons or otherwise.</p>	<ul style="list-style-type: none"> • Websites: <ul style="list-style-type: none"> – https://www.nzblood.co.nz/get-involved/amazing-stories/ – https://www.blood.co.uk/why-give-blood/who-you-could-help/ • Spider diagram templates: <ul style="list-style-type: none"> – http://creately.com/diagram/example/fuqwo5qk1/Spider+Diagram+Template+2

Teaching and learning activities	Assessment opportunities	What you need
<ul style="list-style-type: none"> Differentiate the scientific reasons from other reasons with colour-coding or another way. (You may choose to divide “other” into more categories, for example, has needed blood transfusion in the past/it is easy/it has become a habit/a family member needs blood regularly/to feel good/has blood type that is in high demand/to contribute to society/personal experience/religious/family reason...) 	<p>This activity will provide useful information when the students are writing their final reports.</p>	<ul style="list-style-type: none"> http://creately.com/diagram/example/fuo0d13c1/Spider+Diagram+Template+1
Activity 11: Who is suitable to donate blood?		
<ul style="list-style-type: none"> Have students take the New Zealand Blood Service eligibility quiz to check their suitability for blood donation. Have students research the four different ways of donating blood on the NZBS’s website. Ask them to use graphic organiser H: Four ways to donate blood to capture the advantages and disadvantages of each type of donation. Have students add any new words and their meanings to graphic organiser A: Glossary. Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activities 10 and 11. Keep the graphic organisers so that they can be referred to in the final assessment of the unit. 	<p>The website reliability checklist will help you assess the students’ understanding of the biological validity of websites.</p>	<ul style="list-style-type: none"> Eligibility quiz: https://www.nzblood.co.nz/become-a-donor/am-i-eligible/eligibility-quiz/ Different ways to give blood: https://www.nzblood.co.nz/become-a-donor/ways-to-donate/ Graphic organiser H: Four ways to donate blood Graphic organiser A: Glossary Graphic organiser D: Website reliability checklist

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcomes</p> <p>Students will:</p> <ul style="list-style-type: none"> • learn why people need blood transfusions • discuss how blood transfusions help with various diseases and situations. 		
<p>Activity 12: Why do people need blood?</p>		
<ul style="list-style-type: none"> • Divide the class into six groups. Have each group research one of the following reasons blood is needed, using the NZBS's website: <ul style="list-style-type: none"> – for cancer patients – for those undergoing surgery – to treat accident and burns victims – to treat shock – to provide clotting factors for people with bleeding disorders, including haemophilia – to provide antibody treatment for people with disorders of the immune system. • Have the groups use the website to find out: <ul style="list-style-type: none"> – how the blood helps this problem/disorder – other treatments that are available for this problem/disorder – how much blood is needed – what percentage of blood collected in NZ is used to treat this problem/disorder. 		<ul style="list-style-type: none"> • Access to the NZBS's website: https://www.nzblood.co.nz/about-blood/what-blood-is-used-for/

Teaching and learning activities	Assessment opportunities	What you need
<ul style="list-style-type: none"> • Have the groups use graphic organiser I: Why people need blood to summarise their findings. Ask each group to share their findings with the class. • Have students add any new words and their meanings to graphic organiser A: Glossary. • Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activity 12. Keep the graphic organisers so that they can be referred to in the final assessment of the unit. 	<p>You can assess each group's level of understanding using their summaries and presentations of information to the class.</p> <p>This activity will provide useful information when the students are writing their final reports.</p> <p>The website reliability checklist will help you assess the students' understanding of the biological validity of websites.</p>	<ul style="list-style-type: none"> • Graphic organiser I: Why people need blood • Graphic organiser A: Glossary • Graphic organiser D: Website reliability checklist

Ideas about transfusions and scientific validity for these ideas

Note: This unit is not attempting to change the beliefs of any student or groups of people. The aim of this unit is to identify the biological validity of information and sources of information.

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcome</p> <p>Students will:</p> <ul style="list-style-type: none"> investigate beliefs surrounding the donation of blood and other tissues and look at the biological validity of these beliefs. 		
<p>Activity 13: Beliefs</p>		
<ul style="list-style-type: none"> In this section, students will look at some belief systems that discourage donating and transfusing blood (and other body tissues). Students will look at the reasons for these beliefs and assess whether the reasons are scientifically or biologically valid. As a class, discuss students' prior knowledge of religious and cultural beliefs around blood transfusions. For example, Māori people consider blood to be tapu. Ask: <ul style="list-style-type: none"> What is tapu? What are justifications/reasons for tapu? Why is blood tapu? Does this mean it should not be transfused? 		

Teaching and learning activities	Assessment opportunities	What you need
<ul style="list-style-type: none"> • Have students use a variety of resources (such as the Internet, library books, personal interviews) to help them answer the above questions. • Jehovah’s Witnesses and some other conservative Christian groups have beliefs about transfusion. Have students research the reasons that some groups of people choose not to donate blood and other body tissue. Ask: “Do the reasons have biological validity?” Have the students make up their own graphic organiser to summarise their information. 		<ul style="list-style-type: none"> • Resources about tapu and transfusions: <ul style="list-style-type: none"> – books.google.co.nz/books?isbn=1877283886 – https://www.mcnz.org.nz/assets/MediaReleases/a4c0bf345a/2.-MCNZ-Achieving-Best-Health-Outcomes-for-Maori-a-Resource-consultation-May-2019.pdf
Activity 14: Reasons for not giving blood		
<ul style="list-style-type: none"> • The resources available at https://www.nzblood.co.nz/knowledge-hub/external-resources/ give some common reasons for not giving blood. Print the second part of “Let’s learn about blood” and have the students discuss the reasons for not giving blood and the scientific validity of these reasons. • Ask students to create a spiritual belief, cultural tradition, scientific knowledge table to present the information from activities 13 and 14. • Have students add any new words and their meanings to graphic organiser A: Glossary. • Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activities 13 and 14. Keep the graphic organisers so that they can be referred to in the final assessment of the unit. 	<p>This information will be a useful resource for the students when they are writing their final report.</p> <p>The website reliability checklist will help you assess the students’ understanding of the biological validity of websites.</p>	<ul style="list-style-type: none"> • Graphic organiser A: Glossary • Graphic organiser D: Website reliability checklist

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcome</p> <p>Students will:</p> <ul style="list-style-type: none"> • discuss reasons people cannot give blood and compare these with excuses or reasons for not giving blood. 		
<p>Activity 15: Who can't give blood?</p>		
<ul style="list-style-type: none"> • There are valid reasons that people cannot give blood. Ask students to use the Internet to investigate why some people cannot or are advised not to give blood. Have them summarise their findings on graphic organiser J: Reasons people cannot give blood. Some helpful websites are suggested in the “What you need” column. • Have students add any new words and their meanings to graphic organiser A: Glossary. • Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activity 15. Keep the graphic organisers so that they can be referred to in the final assessment of the unit. 	<p>The website reliability checklist will help you assess the students’ understanding of the biological validity of websites.</p>	<ul style="list-style-type: none"> • Graphic organiser J: Reasons people cannot give blood • Websites: <ul style="list-style-type: none"> – https://www.nzblood.co.nz/become-a-donor/am-i-eligible/detailed-eligibility-criteria/ – https://www.blood.co.uk/who-can-give-blood/ – https://my.blood.co.uk/knowledgebase/ – https://www.nzblood.co.nz/clinical-information/transfusion-medicine/information-for-recipients/ • Graphic organiser A: Glossary • Graphic organiser D: Website reliability checklist

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcome</p> <p>Students will:</p> <ul style="list-style-type: none"> find out what happens to blood when it has been donated. 		
<p>Activity 16: Where does blood go?</p>		
<ul style="list-style-type: none"> In this lesson, students will investigate what happens to blood after it has been donated. Have students look at the NZBS website: https://www.nzblood.co.nz/about-blood/what-blood-is-used-for/ Explain: “You’re going to create a flow diagram to summarise what happens to blood after it has been donated. Start from this page and look for information about the storage conditions and life of different blood products. Find scientific and biological facts regarding the storage procedures of the different blood products. You may already have some of this information from earlier lessons”. Have students add any new words and their meanings to graphic organiser A: Glossary. Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activity 16. Keep the checklists so that they can be referred to in the final assessment of the unit. 	<p>The flow diagram will provide a chance for you to assess the students’ understanding of this area.</p> <p>This activity will provide useful information when the students are writing their final reports.</p> <p>The website reliability checklist will help you assess the students’ understanding of the biological validity of websites.</p>	<ul style="list-style-type: none"> The NZBS website: https://www.nzblood.co.nz/about-blood/what-blood-is-used-for/ Graphic organiser A: Glossary Graphic organiser D: Website reliability checklist

Teaching and learning activities	Assessment opportunities	What you need
<p>Learning outcomes</p> <p>Students will:</p> <ul style="list-style-type: none"> • discuss haemovigilance and advances in transfusion technology • discuss possible adverse effects of blood transfusion and what is done about them. 		
<p>Activity 17: Haemovigilance and advances</p>		
<ul style="list-style-type: none"> • Students will investigate haemovigilance and advances in blood transfusions using the Internet. • Write the word “haemovigilance” on the board. Ask students to discuss, in groups of three, a possible definition of the word before they use the Internet to find the definition. • Discuss the importance of haemovigilance to blood transfusion • Give each student a copy of graphic organiser K: Adverse effects of transfusion. Have students find five (or more) possible adverse effects of transfusion. For each effect, have them note on the graphic organiser: <ul style="list-style-type: none"> – frequency – symptoms – treatment – if applicable – what NZBS does to avoid this complication – whether risking this effect is justified (students may want to specify any special circumstances that would justify the risk). 	<p>The graphic organiser will help you assess the students’ understanding of haemovigilance.</p> <p>This activity will provide useful information when the students are writing their final reports.</p> <p>The website reliability checklist will help you assess the students’ understanding of the biological validity of websites.</p>	<ul style="list-style-type: none"> • Students may find useful information in the Transfusion Medicine Handbook, available from http://www.nzblood.co.nz/clinical-information/transfusion-medicine/transfusion-medicine-handbook/ • Graphic organiser K: Adverse effects of transfusion

Teaching and learning activities	Assessment opportunities	What you need
<ul style="list-style-type: none"> • Have students add any new words and their meanings to graphic organiser A: Glossary. • Have students use graphic organiser D: Website reliability checklist to assess at least two of the websites they used in activity 17. Keep the graphic organisers so that they can be referred to in the final assessment of the unit. 		<ul style="list-style-type: none"> • Graphic organiser A: Glossary • Graphic organiser D: Website reliability checklist
<p>Learning outcome</p> <p>Students will:</p> <ul style="list-style-type: none"> • investigate ways to encourage new donors. 		
<p>Activity 18: Encouraging participation and contribution (Nature of Science)</p>		
<ul style="list-style-type: none"> • Say: “Imagine you are the manager of a blood service. Demand for blood is high. How would you encourage new donors to donate blood? Your task is to produce a pamphlet to inform the public about blood donation. Use the information you have gathered in the unit to help you do this”. 	<p>This activity could be adapted to be an assessment task for the Achievement Standard AS91154.</p>	

Teaching and learning activities	Assessment opportunities	What you need
Activity 19: Summary presentation		
<ul style="list-style-type: none"> • Have students use all of the knowledge and information they have gathered during the unit to write a report or create a PowerPoint presentation to inform fellow students (or another audience) about NZBS. Encourage them to include a discussion of the biological validity of various sources of information and to compare the development of scientific ideas over time. • Remind the students to use correctly as many of their glossary words as possible. 	<p>This activity may be used as an assessment task for the Achievement Standard AS91154.</p>	<ul style="list-style-type: none"> • Graphic organiser A: Glossary