New Zealand Blood Service Teaching Units

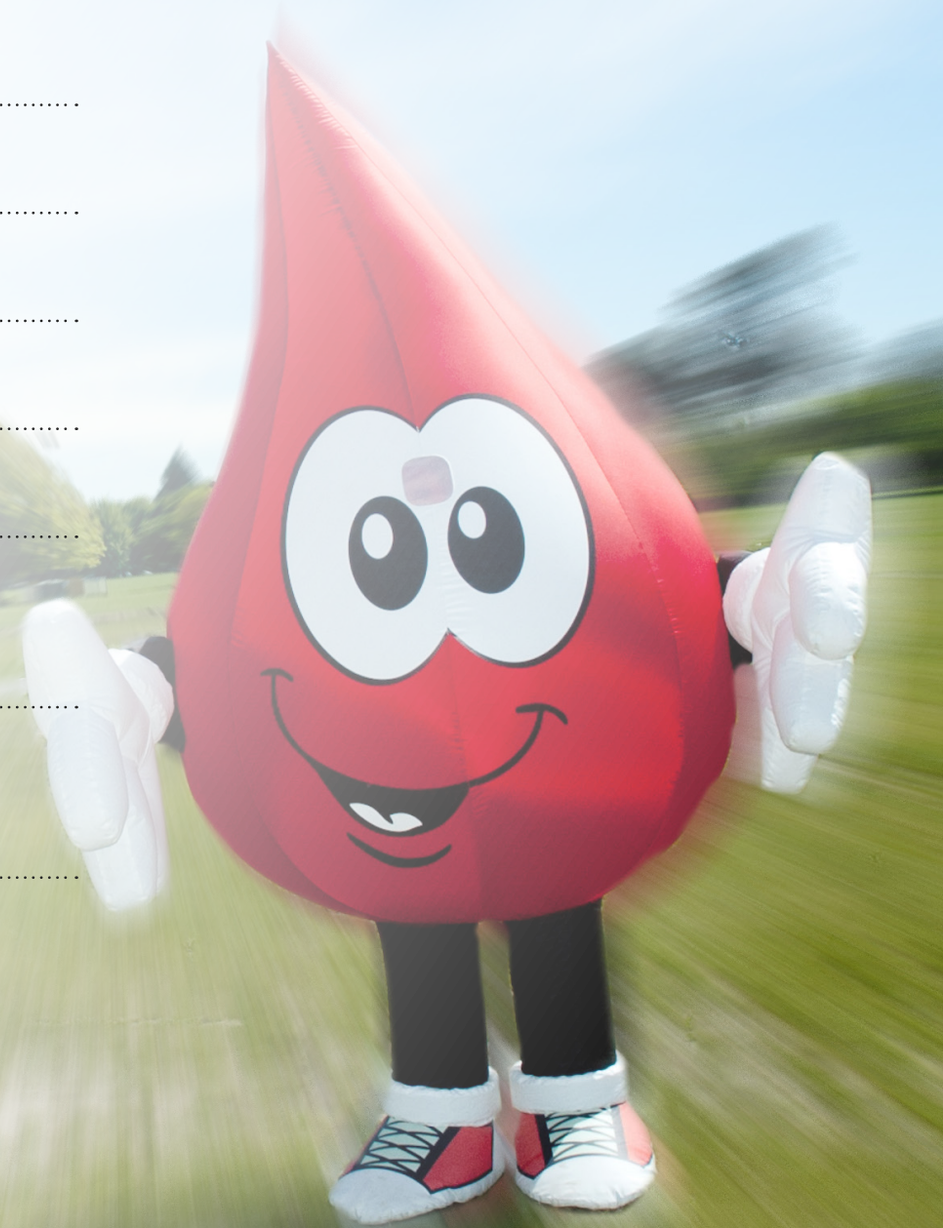
Level 5: Science, Social Studies and English

nzblood.co.nz

NZBLOOD
Te Ratonga Toto O Aotearoa

107I04203

Contents



107I04203

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 encompasses the science, social sciences and English learning areas at Level 5 of the New Zealand Curriculum. The suggested teaching and learning sequence is based around the importance of blood donation to social sustainability. This is considered through the wider contexts of:

- the circulatory system
- the history of the blood donation process
- how blood donation can be viewed with regard to the concepts of responsible and participatory citizenship.

The suggested learning experiences focus on the circulatory system, the blood donation process in relation to this, and the different perspectives that people have about blood donation.

For more information on the approach to citizenship taken in this unit, see Kahne, J., & Westheimer, J. (2006). The limits of efficacy: educating citizens for a democratic society. *PS: Political Science and Politics.* April. *39*(2), 289–296; or see **www.democraticdialogue.com/DDpdfs/WestheimerKahnePS.pdf**

107I04203

CURRICULUM ALIGNMENT – LEVEL 5 OF THE NEW ZEALAND CURRICULUM

Context for learning	The importance of blood donation
Concepts	Circulatory system (blood components, oxygenation, antibodies, clotting, cellular activity, blood types, blood volume), interacting systems, scientific investigation, social sustainability, responsible citizenship, participatory citizenship, resource management, decision-making
Vision	This resource focuses on students being connected and actively involved.
Principle	This resource supports the principle of community engagement.
Values	This resource models and explores the values of community and participation for the common good. Through their learning experiences, students will learn about their own values and those of others and will develop their ability to express their own values.
Key Competency	This resource fosters in students the key competency of participating and contributing.

107I04203

ACHIEVEMENT OBJECTIVES

The following are achievement objectives, relating to these units, from the English, Social Studies, and Science learning areas of the curriculum.

	Level 5
English	**Listening, Reading, and Viewing: Ideas** Students will: • Show an understanding of ideas within, across, and beyond texts. **Speaking, Writing, and Presenting: Ideas** Students will: • Select, develop, and communicate purposeful ideas on a range of topics.
Social Studies	**Continuity and Change** Students will gain knowledge, skills, and experience to: • Understand how the ideas and actions of people in the past have had a significant impact on people's lives. **Identity, Culture, and Organisation/The Economic World** Students will gain knowledge, skills, and experience to: • Understand how people's management of resources impacts on environmental and social sustainability.
Science	**Living World: Life processes** Students will: • Identify the key structural features and functions involved in the life processes of plants and animals. **Nature of Science: Understanding about science** Students will: • Understand that scientists' investigations are informed by current scientific theories and aim to collect evidence that will be interpreted through processes of logical argument.

107I04203

PEDAGOGICAL APPROACH

The pedagogical approach used in these units is teaching for conceptual understanding through the explicit teaching of key concepts and the use of social inquiry. Teaching for conceptual understanding is based on identifying concepts that are complex enough to sustain ongoing exploration by students. It is most widely used in the teaching of social sciences and science, but it can be used across all learning areas.

Key concepts

- circulatory system
- interacting systems
- scientific investigation
- social sustainability
- responsible citizenship
- participatory citizenship
- resource management
- decision-making

Throughout the unit, students need to progressively develop their understanding of the key concepts, because these are central to the achievement objectives. The use of the graphic organiser B: First and second definitions will help them track their understanding of new sub-concepts. These definitions can be displayed on the classroom wall during the unit. You can also add other new vocabulary to the list as students' understanding develops during discussions.

Conceptual understandings

The conceptual understandings this unit focuses on are:

- Damage to the human circulatory system may require blood transfusion.
- Blood donation can be seen as part of social sustainability.

Inquiry learning

Inquiry learning can support the development of students' conceptual understandings of blood donation. There are several approaches to inquiry and these vary across subject areas.

This unit draws on the social-inquiry approach. Using this approach, students:

- ask questions, gather information and background ideas, and examine relevant current issues
- explore and analyse people's values and perspectives
- consider the ways in which people make decisions and participate in social action
- reflect on and evaluate the understanding they have developed and the responses that may be required.

107I04203

The inquiry focuses for this unit are on **examining relevant current issues**, **exploring and analysing people's values and perspectives**, **considering the ways people participate in social action**, and **reflecting and evaluating**. In the learning experiences table on pages 9–41, there are question prompts under "Conceptual understanding focus, assessment opportunities and social inquiry links". These prompts can be used to focus students' attention on these aspects of social inquiry.

Ongoing reflection occurs in this unit by relating new content to students' initial understanding of the circulatory system (as recorded in activities 1 and 2), as well as by asking students to complete entries in graphic organiser E: Learning log. The learning log encourages students to think independently about *what* they have learned as well as *how* they have learned from the activities.

ASSESSMENT

Diagnostic, formative and summative assessment opportunities are indicated in the learning experiences table under "Conceptual understanding focus, assessment opportunities and social inquiry links". The reflections that students record in graphic organiser E: Learning log provide valuable formative and summative assessment information.

Vocabulary

Key words are introduced in activity 2 by way of a first and second definitions list. Graphic organiser C: First and second definitions answers serves as a completed glossary of these words.

107I04203

Unit 1: The circulatory system and the function of blood in the human body

Learning outcomes

Science

Students will:

- identify some features and functions of the human circulatory system (blood components, oxygenation, antibodies, clotting, cellular activity, blood types, blood volume) and of interacting systems
- understand that scientists' investigations of the human circulatory system are informed by current scientific theories, and scientists aim to collect evidence that will be interpreted through processes of logical argument.

English

Students will:

- show an understanding of ideas within written, visual and oral texts about the circulatory system.

107I04203

Suggested learning experiences

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 1: Drawing what we already know		
• Have students accompany you to an area where you can wash away water (such as a paved play area). Spill 5L of red water onto the ground. Ask them to guess what it represents (the approximate amount of blood in an average-sized human body). • Back in the classroom, have the whole class brainstorm all the words they thought of when they saw the fake blood. Prompt them by asking, "What other words do you know that are to do with the human circulatory system?" • Give each student a copy of graphic organiser A: Body outline. Ask students to start by drawing a heart and then drawing what they know about how the blood circulates through the body, with notes to explain any symbols. (Keep this diagram for adding to later.)	**Assessment opportunity:** What are students' initial assumptions about blood and the circulatory system?	• 5L of "blood" (water and red food colouring) • Graphic organiser A: Body outline

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 2: Vocabulary and new concepts		
• Give students graphic organiser B: First and second definitions. Have them work independently to fill in the "First definition" column. • Collect the completed definitions and read them to gain an idea about the students' existing knowledge of the topic. • Alternatively, give students graphic organiser C: First and second definitions – mixed answers, and have them try to work out which definitions match which terms. • Return graphic organiser B to the students. Explain: "As you come across the terms during this unit, complete the "Second definition" column, which you can use as a glossary. You can also add new vocabulary to the list as you come across it during discussions or while reading".	**Assessment opportunity:** What are students' initial assumptions about blood and the circulatory system?	• Graphic organiser B: First and second definitions • Graphic organiser C: First and second definitions – mixed answers

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 3: An introduction to the circulatory system		
• Have students watch the following one-minute video at least twice, to introduce circulation and allow students to reflect on what information is new and what questions arise: **www.sciencekids.co.nz/videos/humanbody/circulatorysystem.html** • Have students add to or modify their graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification. • Have students complete their first entry in graphic organiser E: Learning log. Students could answer these questions by blogging, using Google Docs or recording a video diary. Ask students to keep their learning log for completing later in the unit.	**Conceptual understanding:** The circulatory system **Assessment opportunity:** What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system? What level of conceptual understanding is revealed by students' learning log reflections?	• Video: Introduction to the circulatory system, available at **www.sciencekids.co.nz/videos/humanbody/circulatorysystem.html** • Graphic organiser A: Body outline • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 4: Blood as a transport medium		
• Have students sit in pairs facing each other across a desk. Cut down the middle copies of graphic organiser F: Blood – A transport medium. Give one student in each pair the left-hand side (marked "A") and the other the right-hand side (marked "B"). (The complete text is available for the teacher in graphic organiser G: Blood – A transport medium, factsheet.) Explain: "You're going to help each other fill in the gaps on your pages, without showing your copies to each other and without telling your partner directly what the word is. You should try to explain what you think the word means until your partner guesses it correctly". • Ask students to brainstorm appropriate search terms to find a diagram on the Internet that best shows the information described in this activity. • Have students use these terms to search on Google Images for a diagram or diagrams showing this information. • Have students show their selected diagrams to each other. Ask each pair to discuss and complete the questions in graphic organiser H: Representing the human circulatory system with diagrams. Ask for some students to share their ideas with the class. Emphasise that diagrams are used to graphically convey a process in an easy-to-understand format, but they can also oversimplify complex system information. For example, the circulatory system is not a stand-alone system but part of a complex network of systems.	**Conceptual understanding:** The circulatory system **Assessment opportunity:** Do students understand why scientists use diagrams and what the limitations of these might be? What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system?	• Graphic organiser F: Blood – A transport medium • Graphic organiser G: Blood – A transport medium, factsheet • Internet access • Graphic organiser H: Representing the human circulatory system with diagrams

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
• Provide students with the definitions for arteries, capillaries, veins and oxygenation from graphic organiser D: First and second definitions answers, in a random order. Ask students to write these into the correct boxes in the "Second definition" column of graphic organiser B: First and second definitions. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification. • Have students complete the second reflection on graphic organiser E: Learning log.	What level of conceptual understanding is revealed by students' learning log reflections?	• Graphic organiser D: First and second definitions answers • Graphic organiser B: First and second definitions • Graphic organiser A: Body outline • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 5: Predicting and researching how scientists found out about the human circulatory system		
• Have students work in pairs to complete questions 1 to 3 of graphic organiser I: Theorising about the human circulatory system. • Allow time for students to research independently or in small groups (using the Internet or library) early scientific theories about the human circulatory system. Ask them to complete questions 4 and 5 of graphic organiser I: Theorising about the human circulatory system. • Discuss the students' findings as a class.	**Conceptual Understandings:** The circulatory system, scientific investigation **Assessment opportunity:** Can students postulate about how evidence could have been collected and how it could have been interpreted prior to our current scientific theories?	• Graphic organiser I: Theorising about the human circulatory system • Library and/or Internet access

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 6: Observing the effect of exercise on the circulatory system		
• Have students take their own pulse, timing them for 15 seconds (make sure they use their fingers not their thumbs). Ask them to perform some exercise (for example, a brisk walk around the school or star jumps for one minute) and then to take their pulse again. Have them compare what their pulse rates were before and after exercise. Ask students: 1. What have you observed? 2. What does your observation suggest about the blood's role during exercise? • Have students complete graphic organiser J: Effects of exercise – Word cloze. • Have students complete the third reflection on graphic organiser E: Learning log.	**Conceptual Understandings:** The circulatory system, oxygenation **Assessment opportunity:** Can students extrapolate on the effects of exercise on the circulatory system?	• A stopwatch or timer that has seconds. • Graphic organiser J: Effects of exercise – Word cloze • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 7: The components of blood		
• Explain to the students that different parts of the blood perform different functions, such as the functions needed when people exercise. Ask students to read the text at the top of graphic organiser K: 5Ws and an H factsheet and then to draft questions as instructed. Students will need time to find answers to their four most interesting questions (this may be an appropriate activity for homework). • Provide students with the definitions for plasma, red blood cells, white blood cells and platelets from graphic organiser D: First and second definitions answers, in a random order. Have students write these into the correct boxes in the "Second definition" column of graphic organiser B: First and second definitions. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification.	**Conceptual understanding**: Blood components **Assessment opportunity:** Can students think logically about how their own pulse rate changes fit in with the whole circulatory system? What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system?	• Graphic organiser K: 5Ws and an H factsheet • Access to research materials: library books, the Internet or an "expert". • Graphic organiser D: First and second definitions answers • Graphic organiser B: First and second definitions • Graphic organiser A: Body outline

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 8: Picture dictation of red blood cells		
• Have students write the heading "How red blood cells oxygenate the body" on a sheet of A4 paper and rule the page into six large squares, numbering each square in the corner. • Write the word "haemoglobin" on the board, and tell students they may need to use this word as a label in their drawings. • Read each of the statements below slowly three or four times, as the students illustrate the corresponding box to represent the statement. Alternatively, provide students with clay or a similar substance and have them sculpt each statement as you read it (number 5 may need to be discussed rather than sculpted). 1. Most of the cells in the blood are red blood cells, which look like flattened basketballs. 2. Red blood cells carry around an iron-rich protein called haemoglobin. 3. Blood gets its bright red colour when the haemoglobin in red blood cells picks up oxygen from the lungs. 4. As the blood travels through the body, the haemoglobin releases oxygen to the tissues. 5. Each red blood cell has a life span of about four months. 6. Each day, the body produces new red blood cells to replace those that die or are lost from the body.	**Conceptual understanding:** oxygenation	• The statements for dictation were adapted from **https://kidshealth.org/en/kids/blood.html** and **https://kidshealth.org/en/teens/blood.html**

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
• When students have finished drawing, have them share the meaning of each drawing with a partner. • Have students ask their partners two questions about the information represented in their pictures. • Have students discuss with their partners: 1. What were they doing four months ago when some of their old red blood cells would have been starting their life span? 2. What other comparisons can they think of for the red blood cells, aside from flattened basketballs? 3. How might scientists have come to understand the role of red blood cells? • Provide students with the definition for haemoglobin from graphic organiser D: First and second definitions answers. Have students write this into the correct box in the "Second definition" column of graphic organiser B: First and second definitions. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification. Suggest that students might want to draw additional magnified diagrams to show details. • Have students complete the fourth reflection on graphic organiser E: Learning log.	**Assessment opportunity:** Are students able to explain their diagrammatic representations of red blood cells to another person in a way that shows an understanding of oxygenation? What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system? What level of conceptual understanding is revealed by the students' learning log reflections?	• Graphic organiser D: First and second definitions answers • Graphic organiser B: First and second definitions • Graphic organiser A: Body outline • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 9: Investigating the function of white blood cells		
• Have students read graphic organiser L: White blood cells factsheet and answer the questions. • Provide students with the definitions for antibodies and antigen from graphic organiser D: First and second definitions answers, in a random order. Have students write these into the correct boxes in the "Second definition" column of graphic organiser B: First and second definitions. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification. Suggest that students might want to draw additional magnified diagrams to show details. • Have students complete the fifth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** antibodies **Assessment opportunity:** Are students able to correctly identify the role of white blood cells? What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system? What level of conceptual understanding is revealed by the students' learning log reflections?	• Graphic organiser L: White blood cells factsheet • Graphic organiser B: First and second definitions • Graphic organiser D: First and second definitions answers • Graphic organiser A: Body outline • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 10: Platelet paragloss		
• Have students listen while you read graphic organiser M: Platelet paragloss factsheet. • Read the factsheet a second time. Before you read, explain that this time, students should write down what they think the key words or concepts are. Make sure students leave several lines between each key word or concept they record. • Read the factsheet again. Before you read, explain that this time, students should use a different coloured pen to add any key words or concepts that they may have missed the previous time. • If necessary, read the factsheet a final time for students to add more key words. • Ask students to work in pairs to write the paragraph as closely to what was read out as possible, using their lists of key words and concepts. • Ask students how they would go about building a model to reflect how platelets clump, especially considering common household objects they could use to build it. If appropriate, students can proceed to build the model for display in the classroom. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification. Suggest that students might want to draw additional magnified diagrams to show details. • Have students complete the sixth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** clotting **Assessment opportunity:** Are students able to design a model which effectively represents the clotting process? What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system? What level of conceptual understanding is revealed by the students' learning log reflections?	• Graphic organiser M: Platelet paragloss factsheet • Graphic organiser A: Body outline • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 11: Cells, plasma and bone marrow business cards		
• Have students read graphic organiser N: Cells, bone marrow and plasma factsheet. • Have students make a business card for each of these three things. Have them put the name of each thing in the middle of its card and include information such as what jobs it does/what it specialises in and where it can be found. Students can also think up a snappy catchphrase to include. • Provide students with the definitions for cell, organelle, cytoplasm, nucleus, bone marrow and stem cells from graphic organiser D: First and second definitions answers, in a random order. Have students write these into the correct boxes in the "Second definition" column of graphic organiser B: First and second definitions. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification. Suggest that students might want to draw additional magnified diagrams to show details. • Have students complete the seventh reflection on graphic organiser E: Learning log.	**Conceptual understanding:** cellular activity **Assessment opportunity:** Are students able to identify the most important functions of a cell? What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system? What level of conceptual understanding is revealed by the students' learning log reflections?	• Graphic organiser N: Cells, bone marrow and plasma factsheet • Paper or card to be cut into business card-sized pieces • Graphic organiser D: First and second definitions answers sheet • Graphic organiser B: First and second definitions • Graphic organiser A: Body outline • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 12: Blood types – A three-level guide		
• Have students read graphic organiser O: Blood types factsheet. • Give each student a copy of graphic organiser P: Blood types – A three-level guide. Have students work independently to assess whether they agree with the statements on the guide. Divide the students into groups of three or four to discuss their answers. • Have students complete the eighth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** blood types (also known as blood groups) **Assessment opportunity:** Are students able to justify or make concessions about the accuracy of blood typing descriptions? What level of conceptual understanding is revealed by the students' learning log reflections?	• Graphic organiser O: Blood types factsheet • Graphic organiser P: Blood types – A three-level guide • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 13: The Blood Typing Game		
• Have students play The Blood Typing Game, available online at **https://educationalgames.nobelprize.org/educational/medicine/bloodtypinggame/** • Have students complete the ninth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** blood types **Assessment opportunity:** What level of conceptual understanding is revealed by students' learning log reflections?	• The Blood Typing Game: **https://educationalgames.nobelprize.org/educational/medicine/bloodtypinggame/** • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 14: Calculating blood volume		
• Ask for volunteers to read out their first definition of "blood volume" from their copy of graphic organiser B: First and second definitions. • Explain to students that blood volume is "The total amount of blood in the body". Get them to write this in the "Second definition" column of their definitions list, if what they wrote in the "First definition" column has a different meaning. • Ask students to consider whether all humans have the same blood volume or not. • Explain that females generally have less blood volume on average (4.6L blood volume) than males (5.3L blood volume). Have students imagine this in terms of 2L plastic milk bottles' worth. Ask them to discuss why males generally have a higher blood volume than females. • Say: "Blood volume depends on many factors (such as proportions of body fat and muscle), but estimates can be made based on body height, weight and gender" (quoted from **www.nytimes.com/2010/11/16/science/16qna.html**).	**Conceptual understanding:** blood volume **Assessment opportunity:** What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system?	

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
• Have students work out their own approximate blood volume by entering information at **http://easycalculation.com/medical/blood-volume.php** • Have students measure out their own approximate blood volume in water. Work out a class average, and display this amount of water, mixed with red food colouring, in transparent vessels for the duration of the unit. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification.		• Websites: – **http://easycalculation.com/medical/blood-volume.php** • Transport vessels and "blood" (water and red food colouring) • Graphic organiser A: Body outline

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 15: The circulatory system as part of a complex system		
• Have a class brainstorm of other systems of the body (such as cardiovascular, respiratory, digestive, immune, skeletal, muscular, nervous, reproductive, excretory). • Think-Pair-Share: Have the students take a few minutes to think about the question: "What would happen to these other systems if the circulatory system stopped working?" Then ask students to share their thoughts with a partner and to work together to create an answer they agree on. Record some of these answers on the board. • Have students work in small groups to investigate one other system and its relationship with the circulatory system. Have them present their answers by way of an oral report, PowerPoint presentation, Prezi, story board, role play or rap. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification.	**Conceptual understanding:** interacting systems **Assessment opportunity:** Do students understand that the circulatory system is not a stand-alone system but is part of a complex network of systems? What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system?	• Access to research materials: library books, the Internet or an "expert". • Computer access/ large paper (depending on method of presenting their answers) • Graphic organiser A: Body outline

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 16: Answering learning log questions		
• Have students look at the questions they generated as part of graphic organiser E: Learning log. Have them consider: 1. Which questions have been answered? 2. How can I find answers to those that haven't been answered? 3. What topics did I want to know more about? • Allow students time in the library or on the Internet to search for answers to their queries or to email experts for answers. • Have students add to or modify their copy of graphic organiser A: Body outline to reflect any new understandings, putting the date beside each addition or modification. These completed diagrams could be displayed on the classroom wall to show how the students have progressed in their learning.	**Conceptual understanding:** circulatory system **Assessment opportunity:** What additions or modifications have students made to graphic organiser A? Do these show a developing understanding of the circulatory system?	• Graphic organiser E: Learning log • Access to research materials: library books, the Internet or an "expert". • Graphic organiser A: Body outline

107I04203

Teaching and learning activities	Conceptual understanding focus and assessment opportunities	What you need
Activity 17: A-B-C summarise		
• Assign each student in the class a different letter of the alphabet. Have them select a word starting with that letter that is related to the circulatory system. • Give students time to write a short explanation of the word. They may find their copies of graphic organiser B: First and second definitions helpful. • Go through the alphabet and write each student's word on the board. As you write their word up, have the student explain how the word is related to the circulatory system.	**Conceptual understanding:** circulatory system and interacting systems	• Graphic organiser B: First and second definitions

107I04203

Unit 2: The history of blood in health care and the blood donation process

Learning outcomes

Science

Students will:

- understand that scientists' investigations are informed by current scientific theories and scientists aim to collect evidence that will be interpreted through the processes of observation, measurement, and logical argument.

Social Studies

Students will:

- understand how blood transfusion research has had a significant impact on people's lives
- understand how people's management of blood resources impacts on social sustainability.

English

Students will:

- show an understanding of ideas within, across and beyond texts about scientific investigation, social sustainability, responsible citizenship, participatory citizenship, resource management and decision-making
- select, form and communicate purposeful ideas on scientific investigation, social sustainability, responsible citizenship, participatory citizenship, resource management and decision-making.

107I04203

Suggested learning experiences

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 1: Definitions of social sustainability		
• Have students work independently on the Unit 2 section of graphic organiser B: First and second definitions. Have them fill in the "First definition" column. • Collect the completed definitions and read them to gain an idea about the students' existing knowledge about the topic. • Return the definitions. (As with Unit 1, students will complete the "Second definition" column throughout the unit to serve as a glossary.)	**Conceptual understanding:** social sustainability **Assessment opportunity:** What are the students' initial assumptions about social sustainability in relation to blood donation?	• Graphic organiser B: First and second definitions

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 2: Researching the history of blood transfusion		
• Have students research the history of biomedical research and transfusion medicine in order to find answers to the questions in graphic organiser Q: The history of blood transfusion. For every website they use, have students complete the checklist on graphic organiser T: Website reliability checklist. • Allow the students a few minutes to think about the question: "How and why is the work of these early researchers still impacting on us today?" Ask the students to share their thoughts with a partner and to work together to come up with an answer they agree on. Record these answers on the board. • Have students complete the tenth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** scientific investigation **Finding out information:** What historical knowledge is relevant? Which issues are still relevant? **Assessment opportunities:** Are students able to think critically about the reliability of the websites they visit? Do students connect ideas of the past with those of the present? What level of conceptual understanding is revealed by students' learning log reflections?	• Graphic organiser Q: The history of blood transfusion • Graphic organiser T: Website reliability checklist • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 3: What is social sustainability?		
• Have students work independently to write a definition of "social sustainability". Have students share their thoughts in groups of three or four and identify the answers they agree are the best. Record their answers on the board. • Give students the following definition: "Social sustainability is "a process for creating sustainable successful places that promote wellbeing, by understanding what people need from the places they live and work. Social sustainability combines design of the physical realm with design of the social world – infrastructure to support social and cultural life, social amenities, systems for citizen engagement, and space for people and places to evolve". (Social Life, a UK based social enterprise specializing in place based innovation). See also: **https://seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability** • Have students complete the eleventh reflection on graphic organiser E: Learning log.	**Conceptual understanding:** social sustainability **Finding out information:** What are students' initial assumptions about social sustainability? **Assessment opportunity:** What level of conceptual understanding is revealed by students' learning log reflections?	• Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 4: Bone marrow donation – Taking notes		
• Talk to students about how to paraphrase by rewriting the most important pieces of information into shorter phrases. Have students take notes from **bonemarrow.org.nz** for graphic organiser R: Bone marrow donation – Taking notes. • Have students complete the twelfth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** social sustainability **Finding out information:** What is the most important information to know about bone marrow donation? **Assessment opportunity:** Are students able to identify the most important information about bone marrow donation? What level of conceptual understanding is revealed by students' learning log reflections?	• Access to the NZ Bone Marrow Registry website: **bonemarrow.org.nz** • Graphic organiser R: Bone marrow donation – Taking notes • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 5: Blood donation and paragraph writing		
• Have students explore the page: **https://www.nzblood.co.nz/about-blood/** • Have students work either individually or in groups to complete brainstorms for the following topics: 1. reasons people need donated blood 2. reasons people donate blood • Have students work individually to write formal paragraphs addressing the question: "How is blood and bone marrow donation relevant to the concept of social sustainability?" Students should incorporate their brainstormed ideas and consider how this question connects with the definition of social sustainability given in activity 3. The following writing frame may help some students: "Blood and bone marrow donation contributes towards social sustainability. Many people need donated blood or bone marrow because... Some people choose to donate their tissue because... If people did not donate their tissue... This relates to social sustainability because social sustainability means... Social sustainability is therefore relevant to donation because... "	**Conceptual understanding:** social sustainability **Finding out information:** What is relevant to social sustainability? **Assessment opportunity:** How do students understand the concept of social sustainability in relation to blood donation?	• **https://www.nzblood.co.nz/about-blood/**

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 6: Responsible and participatory citizenship		
• Have students work independently to complete graphic organiser S: Responsible and participatory citizens. • Share the following definition of a responsible citizen: "Someone who votes; pays taxes; obeys the law; and is polite, kind, considerate and peaceful" (adapted from **www.democraticdialogue.com/DDpdfs/WestheimerKahnePS.pdf**). Have the students add this definition to graphic organiser B: First and second definitions. • Have students take a few moments to think about the question: "How does this definition relate to social sustainability?" Ask students to share their thoughts with a partner and to work together to come up with an answer they agree on. Record some of these answers on the board. • Have students work independently to describe what a "participatory citizen" is, and how this might differ from a "responsible citizen". Have students share their thoughts in groups of three or four and identify the answers they agree are the best. Record these answers on the board. • Share the following definition of a participatory citizen: "Someone who is responsible and who also aims to solve social problems by involving themselves in the life of the community at local, regional, or national levels" (adapted from **www.democraticdialogue.com/DDpdfs/WestheimerKahnePS.pdf**). Have the students add this definition to graphic organiser B: First and second definitions.	**Conceptual understanding:** social sustainability, responsible citizenship, participatory citizenship **Assessment opportunity:** Are students able to distinguish between responsible and participatory citizenship as these relate to blood donation? What level of conceptual understanding is revealed by students' learning log reflections? **Considering responses and decisions:** What actions do individuals or groups make in relation to blood donation?	• Graphic organiser S: Responsible and participatory citizens • Graphic organiser B: First and second definitions

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
• Have the students take a few moments to think about the question: "How does this relate to social sustainability?" Ask students to share their thoughts with a partner and to work together to come up with an answer they agree on. Record some of these answers on the board. • To further explore the difference between responsible citizens and participatory citizens, direct students to TV1 news' "Good Sorts" slot on Sunday night (video clips are available at **https://www.tvnz.co.nz/content/tvnz/onenews/good-sorts.html**). Have students discuss whether they have watched examples of responsible citizens or participatory citizens. • Ask students to think about examples of both responsible and participatory citizenship as they are relevant to blood donation, and write these up as a whole-class brainstorm. • Have students complete the thirteenth reflection on graphic organiser E: Learning log.		• Access to TVNZ website: **https://www.tvnz.co.nz/content/tvnz/onenews/good-sorts.html** • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 7: The role of a blood service		
• Have students imagine that they are the managers of their local blood service and get them to record their planning for this in graphic organiser U: Providing a blood service. • Have students complete the fourteenth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** resource management **Considering responses and decisions:** What responses could be made? **Assessment opportunity:** Are students able to plan logically for the management of blood resources? What level of conceptual understanding is revealed by students' learning log reflections?	• Graphic organiser U: Providing a blood service • Graphic organiser E: Learning log
Activity 8: The role of NZBS		
• Have students explore the role of NZBS by looking at **https://www.nzblood.co.nz/about-blood/** • Have students work in groups to answer the question: "What barriers to social sustainability might NZBS face?" • Have students take turns to share one or two of their ideas to the class.	**Conceptual understanding:** social sustainability **Considering responses and decisions:** What decisions does NZBS make to be socially sustainable?	• Access to the NZBS website: – **nzblood.co.nz** – **https://www.nzblood.co.nz/about-blood/**

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
• Have students consider the impact of blood donation as shown in the stories at **www.scotblood.co.uk/amazing-stories/**. Ask: "How are these stories relevant to the concept of social sustainability?"	**Assessment opportunity:** How do the students understand the concept of social sustainability in relation to blood donation?	• Website: **www.scotblood.co.uk/amazing-stories/**

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 9: Different values regarding blood donation		
• Have students look at **https://www.nzblood.co.nz/become-a-donor/whakaorangia-tangata/**. Ask students: "What are some values that are addressed by NZBS?" • Have students research how other societal groups view blood donation. Allow students time in the library or on the Internet to search for answers to their queries, or to email experts for answers. • Have students work individually to either write formal paragraphs or to draw a cartoon (using characters and speech bubbles) to address the question: "What values do different groups and individuals hold about blood donation, and how do their actions reflect these values?" • Have students complete the fifteenth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** decision-making **Exploring values and perspectives:** What has shaped people's values and how do these values influence their responses? **Assessment opportunity:** Are students able to identify different values held by people in relation to blood donation and connect these to people's actions? What level of conceptual understanding is revealed by students' learning log reflections?	• Access to the NZBS website: **https://www.nzblood.co.nz/become-a-donor/whakaorangia-tangata/** • Access to research materials: library books, the Internet or an "expert". • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 10: Consequence wheel		
• Have students review their learning from activities 7 and 8 and consider what would happen if NZBS did not have enough blood. Have students use graphic organiser V: Consequence wheel to record their thinking. • Have students complete the sixteenth reflection on graphic organiser E: Learning log.	**Conceptual understanding:** resource management **Considering responses and decisions:** What are the consequences of a lack of resources? **Assessment opportunity:** Are students able to think logically about the consequences of a lack of blood resources? What level of conceptual understanding is revealed by students' learning log reflections?	• Graphic organiser V: Consequence wheel • Graphic organiser E: Learning log

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 11: What could/should I/we do in response to this?		
• Have students work individually to answer the following questions: 1. What are my values in relation to blood donation? 2. Have these changed over the course of this unit? • Have students work in groups to consider the question: "What responses (decisions or actions) could we make to contribute towards a socially sustainable future in relation to blood donation?" • Have each group give feedback to the class. Categorise the ideas into things that could be done now, things that could be done in the near future and things that could be done in the distant future. • If appropriate, students could explore some of these options as a social action to be undertaken, reported on and evaluated. For example, in order to share their ideas with their peers, whānau and community, students could make a promotional video clip about the different things people can do in relation to blood donation.	**Conceptual understanding:** decision-making **So what/Now what?** What might be done about it? **Assessment opportunity:** Are students able to express their own values in relation to blood donation? Are students able to identify possible actions that support their values?	• If necessary, resources for implementing the planned social action, for example, a video camera.

107I04203

Teaching and learning activities	Conceptual understanding focus, assessment opportunities and social inquiry links	Resources for the teachers and students
Activity 12: Future careers in health care		
• Have students complete graphic organiser W: Careers in the health sector. Have them choose three health services jobs and three health technologies jobs from **www.careers.govt.nz/jobs-database** and complete the table for each job. • Have students look at the quick links at **https://careers.nzblood.co.nz/home** • Conduct a whole-group discussion about what type of citizenship is illustrated by some of these career options.	**So what/Now what?** What might be done to achieve a socially sustainable future in relation to blood donation? **Assessment opportunity:** Are students able to distinguish between responsible and participatory citizenship in relation to health care careers?	• Graphic organiser W: Careers in the health sector • Internet access

107I04203