

A microscopic view of numerous red blood cells, appearing as bright red, biconcave discs against a dark red background. The cells are scattered across the frame, with some in sharp focus and others blurred in the background.

New Zealand Blood Service Teaching Resource

Levels 3 and 4:
Let's Learn About Blood

nzblood.co.nz

NZBLOOD
Te Raukanga Tota O Aotearoa

Let's Learn About Blood

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. This resource focuses on developing students' understanding of the cardiovascular/circulatory system – one of the body's most important systems – and how blood “keeps our body going”.

Curriculum links

The following tables include suggested curriculum links and achievement objectives. You are encouraged to adapt these to meet the needs of your students, the context for learning, and your school curriculum.

<p>Vision</p> <ul style="list-style-type: none"> connected and actively involved 	<p>Principles</p> <ul style="list-style-type: none"> community engagement future focus, particularly the future-focus issues of sustainability and citizenship
<p>Values</p> <ul style="list-style-type: none"> community and participation for the common good 	<p>Key Competencies</p> <ul style="list-style-type: none"> thinking – to make sense of information, experiences, and ideas participating and contributing – being actively involved in communities

Achievement objectives

<p>SCIENCE Nature of Science: <i>Understanding about science</i> Levels 3 and 4</p> <p>Students will appreciate that science is a way of explaining the world and that science knowledge changes over time.</p>	<p>SCIENCE Living World: <i>Life processes</i> Levels 3 and 4</p> <p>Students will recognise that there are life processes common to all living things and that these occur in different ways.</p>
<p>HEALTH AND PHYSICAL EDUCATION Personal Health and Physical Development: <i>Personal growth and development</i> Level 3</p> <p>Students will identify factors that affect personal, physical, social, and emotional growth and develop skills to manage changes.</p>	<p>HEALTH AND PHYSICAL EDUCATION Healthy Communities and Environments: <i>Community resources</i> Level 4</p> <p>Students will investigate and/or access a range of community resources that support well-being and evaluate the contribution made by each to the well-being of community members.</p>

Assessment for learning

This resource supports formative assessment. It does not include assessment tasks but offers opportunities for students to reflect on their learning and understanding of the concepts and information presented in the activities.

Science and Health classroom activities

The following classroom activities may be taught sequentially. However, you are encouraged to select and adapt the activities to meet the learning context, and the specific needs, interests, and experiences of your students – including the students' physical needs, and their cultural backgrounds and beliefs.

What do we know?

Create a “blood fact” graffiti wall (a large body or blood drop outline on the classroom wall) where students can post all the facts they know about blood. Add to the graffiti wall as students learn more.

The circulatory system

Ask: “What is the circulatory system?” Select one of the following animations for your students to watch.

- <http://www.neok12.com/video/Circulatory-System/zX5d7d0e41705968036a4351.htm>
- http://kidshealth.org/kid/closet/movies/CSmovie.html?tracking=59983_C#cat20396
- http://www.bbc.co.uk/schools/gcsebitesize/pe/appliedanatomy/0_anatomy_circulatorysys_rev1.shtml

As they watch an animation, have students take notes on a “Body outline” graphic organiser. Prompt students to note what blood delivers (to where) and what blood picks up (from where) for the body to get rid of. Have students use the information to draw a flow diagram of the circulatory system. They can add to this diagram and the graphic organiser as they learn more.

To demonstrate how the blood moves around the body, use red and blue counters and have students role play the circulatory system – delivering the red oxygenated “blood” and picking up the blue “waste” counters.

What are heartbeats?

Your heart pumps blood around your body (approximately 70 or so times a minute). To illustrate the pump-action of the heart, have students make a fist and open and close their fist quickly for one minute. Ask: “Why are the lungs near the heart and why are both protected by the breastbone and ribs?”

Check your pulse

Explain that you can count how fast your heart is beating if you feel your pulse point (the easiest places are the neck or wrist) gently with your fingertips. Or, if you have one available, use a stethoscope. Show students how to locate their pulse. Have students take their pulse (resting) before exercise and record this. Then have them do a reasonably intense physical exercise (such as skip or run for 3 minutes) before taking their pulse again, immediately after the exercise. Record this and discuss the difference. Ask: “Why is it different?”

What is blood?

Ask: “What is our blood made up of?” Divide the students into groups of four. Have each student in each group use a section of the “Let’s learn about blood and stopping bleeding” factsheet to investigate one of the following: red blood cells, white blood cells, platelets, or plasma. Have the “expert” students report back to their group. Add this information to the wall chart or their graphic organiser.

How much blood have I got?

Explain that the volume of blood in your body depends on your weight (approximately 65–70 mL per kg of body weight) and gender. The average adult male weighing 78kg has 5.3 L of blood, and the average adult female weighing 70kg has 4.6 L. Fill a bucket with coloured water (food colouring not dye) to demonstrate what 5.3 L looks like. Have students work out their own approximate blood volume by entering their information at <http://easycalculation.com/medical/blood-volume.php>. Students can then measure out their own approximate blood volume, using coloured water, into a transparent container.

What happens when I bleed?

Ask: “What happens when you cut yourself or graze your knee? How does the bleeding stop? What do you do to help control the bleeding? What does the circulatory system do?” Have students use the information on the factsheet to draw a diagram to explain the “stop-bleeding” process. Discuss the steps you should take to stop the spread of infection (cover open wounds) and aid healing. See www.stjohn.org.nz/First-Aid/First-Aid-Library/Bleeding/#Abrasion for how to clean an abrasion.

Possible assessment activity

Have students create a poster or digital presentation to explain their understanding of the circulatory system and how it works.

Factsheet: Let's learn about blood and stopping bleeding

Red blood cells (erythrocytes)	White blood cells (leukocytes)	Plasma	Platelets (thrombocytes)
<p>Functions:</p> <ul style="list-style-type: none"> ■ transport oxygen from the lungs around the body ■ carry back waste gases (carbon dioxide) to the lungs to be exhaled. <p>Features:</p> <ul style="list-style-type: none"> ■ contain haemoglobin – a red protein that contains iron and enables the red blood cells to transport the oxygen and carbon dioxide ■ made in the bone marrow (If the bone marrow is healthy, new cells are continuously made and old cells are broken down.) ■ live for about 120 days in the circulatory system ■ make the blood look red ■ make up about 45% of blood. <p>Interesting:</p> <ul style="list-style-type: none"> ■ there are about one billion red blood cells in 2 to 3 drops of blood ■ for every 600 red blood cells, there are about 40 platelets and one white cell. 	<p>Functions:</p> <ul style="list-style-type: none"> ■ some travel around the body and destroy bacteria (help your body fight infection and heal wounds) ■ some produce antibodies – proteins that fight disease ■ they are an important part of the immune system. <p>Features:</p> <ul style="list-style-type: none"> ■ there are several different types of white blood cells ■ made in the bone marrow ■ nearly colourless ■ make up less than 1% of blood. <p>Interesting:</p> <ul style="list-style-type: none"> ■ in the bone marrow they outnumber red blood cells by 2 to 1 ■ in the blood stream, there are about 600 red blood cells for every white blood cell ■ the number of white cells in blood increases when you're sick because your body's defence system is responding to fight the infection. 	<p>Functions:</p> <ul style="list-style-type: none"> ■ transports nutrients, hormones, and proteins around the body ■ also helps carry carbon dioxide ■ carries waste products to the kidneys or liver, to be excreted (expelled) from the body ■ helps you maintain a healthy blood pressure and volume ■ supplies necessary proteins needed for blood clotting (stopping bleeding) and immunity. <p>Features:</p> <ul style="list-style-type: none"> ■ makes up about 55% (men) – 60% (women) of your blood ■ liquid part of the blood – 92% water; 7% vital proteins; 1% mineral salts, sugars, fats, hormones, and vitamins ■ clear, pale yellow. <p>Interesting:</p> <ul style="list-style-type: none"> ■ plasma donations are needed for the treatment of many serious health problems. 	<p>Functions:</p> <ul style="list-style-type: none"> ■ tiny particles in blood that help stop bleeding and start healing ■ quickly stick to the edges of a cut or graze and make a soft plug that slows and stops bleeding ■ help strong blood clots form so that bleeding does not start again ■ help the body repair itself after a cut or graze. <p>Features:</p> <ul style="list-style-type: none"> ■ makes up less than 1% of your blood ■ colourless ■ made in the bone marrow and live in the circulatory system. <p>Interesting:</p> <ul style="list-style-type: none"> ■ platelet plugs stop you bleeding but they are not very strong.

Resource links

<https://www.nzblood.co.nz/about-blood/>

<https://www.redcrossblood.org/donate-blood/how-to-donate/types-of-blood-donations/blood-components.html>

<http://www.cyh.com/HealthTopics/HealthTopicDetailsKids.aspx?p=335&np=152&id=2250#1>

For Amazing You pdf: <https://anzsbt.org.au/wp-content/uploads/2018/06/AmazingYou.pdf>

Stopping bleeding

When a blood vessel is injured, you bleed. There are three processes in the body that work together to stop bleeding.

1. **Constriction of blood vessels:** Small muscles in the blood vessel walls cause the vessels to narrow (constrict). When this happens, blood flow stops or slows down.
2. **Platelet plug:** Platelets form a soft plug to seal holes in injured blood vessels.
3. **Blood clotting:** A strong meshwork of protein fibres strengthens the platelet plug by acting as a web that binds the torn parts of the blood vessels. This is the slowest of the three processes and prevents bleeding from starting again. Sometimes blood clots appear on the outside of the body as scabs.

Graphic organiser: Body outline

