



How does lead affect the human body?

S3 - Module 1

Program delivery

The LeadSmart modules are designed to allow flexibility for teachers and schools to tailor the delivery of the program in a way that best suits their needs. Each set of modules are designed in a way that they can be delivered in sequential order, as individual lessons, or in an arrangement of the school's choosing.

Module overview

In this module students will understand that once lead is in our lungs or stomach, it is absorbed into the bloodstream and then distributed to our organs, bones and teeth. Lead can be stored in our bodies and released many years after the initial exposure.

Students will have the opportunity to engage in a digital interactive activity where they will investigate how lead travels around the body to identify which parts of the body are most at risk from lead harm.

Assessment

There are a number of informal assessment opportunities throughout this module including:

- Brainstorm to assess prior knowledge and experiences
- Class discussion
- Student questioning
- Student workbooks
- Observation

Learning intentions

Students will:

- Understand that lead can enter our bodies and build up over time affecting our health
- Explore where lead goes once it enters our body
- Identify some strategies we can use to reduce lead exposure for our own bodies

Resources

- Health hub space in your school (we encourage you to book an appropriate area in school for the duration of this module, enabling access to the technology and space required to complete the unit)
- Interactive Whiteboard (IWB)
- How did lead get into and affect Jack's body? - Interactive resource
- Butcher's paper
- Permanent makers
- Human body outline - Activity sheet
- Supplementary Teacher resources

Differentiation

As with all of the LeadSmart Education modules, we encourage you to differentiate the following activities by making any necessary modifications in order to cater for diverse student learning needs.

Note: The suggested duration of the activities found within this module may require adjustment to cater for the needs of your students.

Curriculum links

Stage 3

PDHPE

- **COS3.3** Communicates confidently in a variety of situations
- **SLS3.13** Describes safe practices that are appropriate to a range of situations and environments
- **PHS3.12** Explains the consequences of personal lifestyle choices.

Geography

- **GE3-1** Describes the diverse features and characteristics of places and environments
- **GE3-2** Explains interactions and connections between people, places and environments

English

- **EN3-1A** Communicates effectively for a variety of audiences and purposes using increasingly challenging topics, ideas, issues and language forms and features

Cross curriculum priorities

- Sustainability

General capabilities

- Critical and creative thinking
- Ethical understanding
- Literacy

Introduction activity: What do we already know?

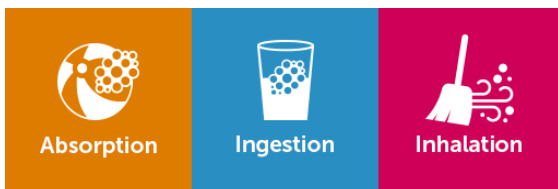
10 minutes

1. Sit students in front of the IWB.
2. Explain that lead occurs naturally in the ground throughout Broken Hill, that's why it's been mined here for over 130 years. Lead gets into the air as dust from past and present mining activities. Because of the dry climate and wind, lead dust has been spreading and building up in dust, dirt and soil in and around homes and public spaces such as parks, playgrounds, schools and ovals in Broken Hill. Lead is also found in old paint which was widely used in and around homes until the 1970s, so it's safe to assume that many homes and buildings in Broken Hill may contain lead dust and lead paint. This means lead can be disturbed and spread around when we build, renovate and complete other manual work around Broken Hill.
3. Ask students to identify the different ways that lead can enter our bodies (ingestion – in our mouths, inhalation – when we breathe, and absorption – through our skin). Explain that ingestion is the main way that lead gets into our bodies in Broken Hill. Inhalation and absorption are less likely as the lead particles are usually too big – lead particles must be very fine or in the form of fumes to get into our body in these ways.
4. Display the slide "How can we reduce lead exposure to our bodies?" on the IWB.
5. Discuss what students already know about how to keep their bodies safe from the effects of lead. Record key words and ideas on the IWB.
6. Reinforce that lead does not belong in the human body. When it gets into our body, it builds up and makes us sick. Having too much lead in the human body can be dangerous and cause health issues such as high blood pressure and kidney problems. Lead can also harm brain development in children which can result in learning and behavioural issues.



1. Introduce students to the How did lead get into and affect Jack's body? Interactive resource on the IWB.
2. Select 'start investigation'.
3. Complete the first interactive activity. Select student volunteers to identify and correctly label the three main exposure pathways demonstrating how lead initially enters our bodies (ingestion, inhalation and absorption). As each exposure pathway is identified, read the information about Jack, discuss other examples of how lead can get inside the body below.
 - **Ingestion** – Dirty hands, rainwater from tanks, unwashed food, unwashed toys, household dust, dirt, dust, soil, old flaking or chipping paint, old lead paint dust.
 - **Inhalation** – Household dust, dirt, soil, dust, old lead paint fumes, old lead paint dust.
 - **Absorption** – Dirty hands, skin and hair.

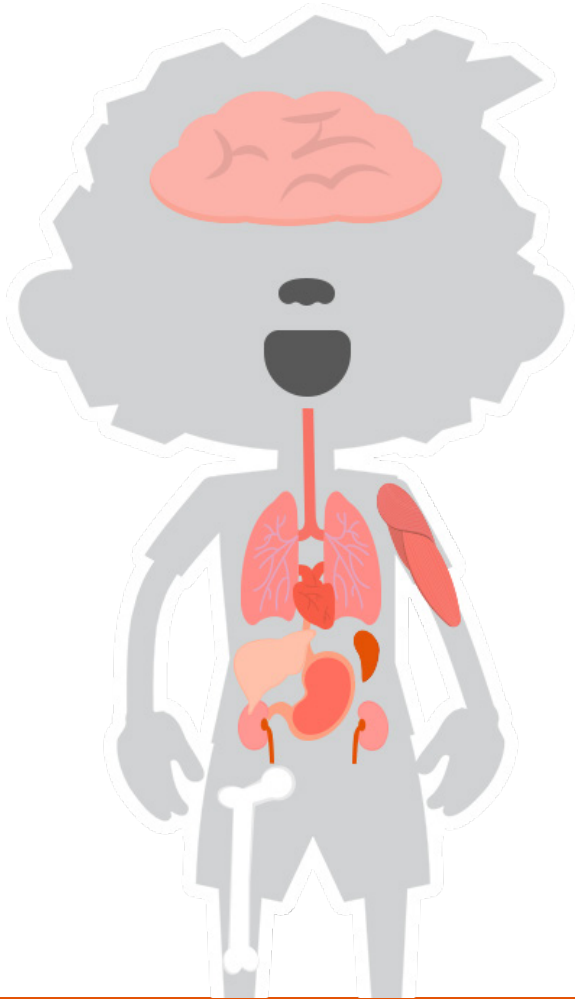
Explain that ingestion (in our mouths) is the main way that lead gets into our bodies in Broken Hill. Inhalation (through our nose) is less likely as the lead particles are usually too big – lead particles must be very fine or in the form of fumes to get into our body this way. Absorption (through our skin) is most likely for people who work with lead.



4. Revisit the students' ideas at the beginning of the lesson for how we can reduce lead exposure to our bodies. Look at each of the ways they have suggested and decide as a class whether the strategy is guarding against Absorption, Ingestion or Inhalation.
5. Complete the second interactive activity. Explain that once lead has entered our bodies it gets into our lungs or stomach. Lead is then absorbed into the blood stream where it travels around and is distributed to different parts of the body.
6. Complete the third activity. View the icons at the bottom of the screen, ask students to see if they can identify which body parts they are (liver, kidneys, brain, spleen, muscles, heart, bones and teeth). Select student volunteers to drag and drop each body part into the correct position. Identify each body part and discuss with students its purpose using the information provided below.
7. Explain that when lead gets into our bodies it can cause a range of long term health issues. Lead is distributed around the body via the bloodstream to the heart, muscles, brain, lungs, kidneys and spleen and can stop them working effectively. Lead can also be stored in the teeth and bones and released into the bloodstream later. Health effects depend on a number of factors, such as age, job and the presence of other health conditions, an adult and a child can react differently, even though they might have the same amount of lead in their blood.
8. Read Jack's diagnosis on the final page of the interactive.
9. Explain to students that they are going to create life-sized body diagrams to illustrate how lead enters and travels around the human body. Encourage students to clearly label the diagrams and record any appropriate information they think important.

Teacher background information:

- **Brain** – Located within the skull, it is the control centre of the nervous system. It controls muscles, coordination, sensory, speech, memory, thoughts and emotions.
- **Heart** – A muscular organ that pumps blood throughout the body.
- **Liver** – Located on the right side of the abdominal cavity. It processes the contents of the blood e.g. breaks down fats, produces urea, filters harmful substances and maintains glucose levels in blood.
- **Kidneys** – Two bean-shaped organs located at the back of the abdominal cavity, on each side of the spinal column. They maintain the body's chemical balance by excreting waste products and excess fluid (urine).
- **Spleen** – Located in the upper far left part of the abdomen. It acts as a filter for blood as part of the immune system.
- **Muscles** – Found throughout the body. They provide strength, balance, posture, movement and heat.
- **Bones** – Found throughout the body (skeleton). Provides a framework for the body consisting of many individual bones and cartilages.
- **Teeth** – Found in the jaws (mouth). They are used to break down food and in speech.



10. Divide students into groups of three.
11. Hand out large sheets of butcher's paper and permanent markers to each group. Instruct one group member to lay down on the butcher's paper so another student can carefully trace around them to create a human body outline. Alternatively, teachers can print out the human body outline activity sheet and photocopy for each group.
12. Once the outline has been completed, instruct students to start filling in and labelling their diagrams starting with the three exposure pathways. Leave the completed interactive resource displayed on the IWB so students can use it as a reference when drawing and labelling each body part.
13. To complete the activity each diagram should illustrate the following:
 - The three exposure pathways (absorption, inhalation and ingestion). Students should draw and label the mouth, nose, lungs, throat and stomach and highlight the hands.
 - The blood stream to show how lead is transported around the body. Students should draw and label the heart, brain and approximate placement of circulatory system.
 - The main organs. Students should draw and label the liver, kidneys, spleen, muscles, bones and teeth.

Reflection activity: What did we discover?

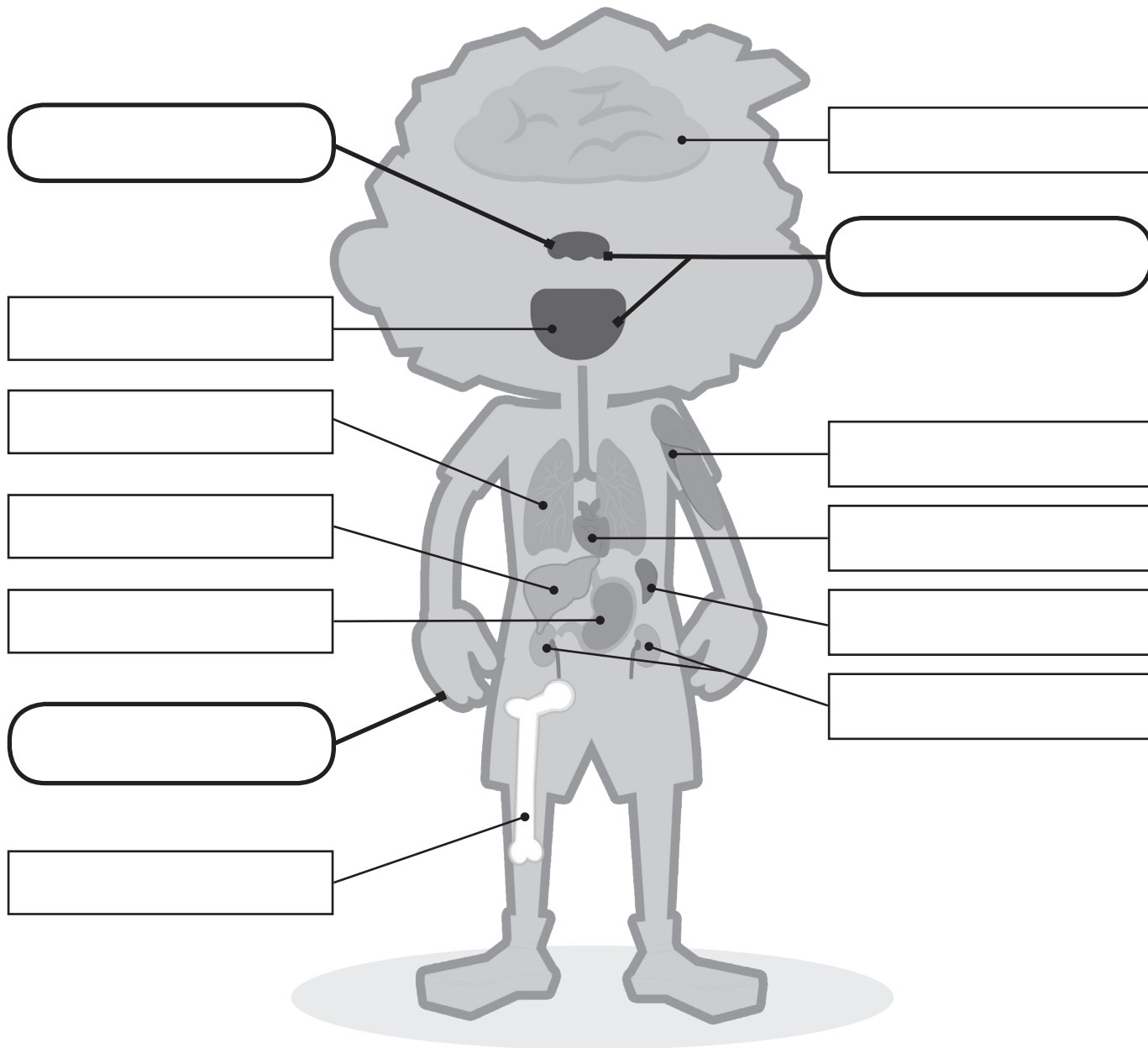
10 minutes

1. Give each group an opportunity to present their diagram and explain the process of lead entering and travelling around the human body.
2. Allow students time to ask questions or comment on new or surprising information.
3. To consolidate learning, display the question 'What happens when lead enters our body?' on the IWB. Collect students' ideas and record key words on the IWB.
4. Display diagrams in the classroom or around the school.



How does lead enter and travel around the body?

Label the diagram below to illustrate how lead enters and travels around the body.



Inhalation	Absorption	Ingestion	
Lungs	Heart	Spleen	
Stomach	Liver	Muscles	
Brain	Kidneys	Bones	Teeth