Rail Safe

Years 7–8

Focus area 1

This section of the Rail Safe programme contains one of the following focus areas for students at years 7–8 (ages 11–13):

- 1. About trains
- 2. About tracks
- 3. About us

An effective programme should include learning experiences from each of the focus areas.

Focus area 1: About trains

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Focus area 1: About trains

Focus question

How do most people look out for trains and take care around them?

Explanation

The following key messages will become part of students' thinking as a result of this lesson.

- Trains are heavy and can't swerve or stop quickly.
- You can't always hear a train coming.
- Trains travel faster than they look.
- Always take care around trains.

Notes for the teacher

Different types of trains

Trains provide transport for people and freight across New Zealand. They operate on rail networks and use a locomotive to pull along carriages or freight wagons.

1) Long distance passenger trains

These run between cities and towns stopping at stations to pick up people along the way. A passenger train has a locomotive, a number of passenger carriages and a luggage van.

2) Commuter trains

Commuter trains operate in both Auckland and Wellington metropolitan areas and take people from the suburbs to the city. Most commuter trains are electric multiple unit sets of up to eight carriages which can be driven from either end, so they don't need to be turned around. These trains are powered by electricity from overhead electric wires. All other commuter trains are pulled by locomotives.

3) Freight trains

A freight train is used to move containers and other freight from one destination to another. A freight train is led by one or more locomotives and can have up to 60 wagons following behind.

Length of trains

A train can be up to a kilometre in length, which is equal to the length of 10 rugby fields.

Weight of Trains

An average train weighs 1,500 tonnes, which is equal to 1,000 cars. A locomotive engine without wagons or carriages weighs 100 tonnes.

Years 7-8

Curriculum links

Key Competencies: Thinking (thinking about actions when near trains and tracks); Managing self (taking responsibility for keeping safe when near trains and tracks)

Learning areas: Levels 3 Health and physical education: Strand A – Safety management; Strand D – Rights, responsibilities and laws

Level 3 Science: Physical world. Understanding about science; Participating and contributing.

Resources

DVD: Tracks are for Trains (accessible from your School Community Officer)

6 golf balls

6 ping pong balls

6 sheets of A4 paper

6 ramps – could be cardboard, a large book

6 rulers

Any materials students may need for their demonstrations

Success criteria

At the end of this focus area students will be able to:

- identify characteristics of trains and explain how they differ from motor vehicles
- explain why you need to take care near trains.

Learning experience 1: Trains versus motor vehicles

Learning intentions

By the end of this learning experience students will be able to identify characteristics of trains and explain how they differ from motor vehicles

Activities

1. Characteristics of trains and motor vehicles

Divide the class in half. Explain that one half of the class will be thinking about characteristics of trains, and the other half will be thinking about characteristics of motor vehicles. Now divide each half into groups of about 4-5. Each group comes up with as many characteristics of their form of transport as they can. Divide the board in half and head one side 'Trains' and the other side 'Motor Vehicles'. Each group writes their characteristics on the appropriate side of the board, making sure not to repeat ideas that are already written there.



Explain that they are going to watch some videos about trains. Ask them to look out for characteristics of trains to add to the list on the board. Show the video or slideshare *Tracks are for Trains*, or other videos such as https://www.youtube.com/watch?v=W3fiCS2zTFc (freight trains and how they operate) or https://www.youtube.com/watch?v=W3fiCS2zTFc (freight trains and how they operate) or https://www.youtube.com/watch?v=CORPm2QFdQ4 (long-distance passenger trains).

After the videos, ask the following questions.

Ask: Was there anything that surprised you on the videos? What was one bit of information that you didn't know? Is all the information we wrote up about trains correct?

What new characteristics can we add?

Work with the class to group all the characteristics of trains and motor vehicles under appropriate headings. Either let the class choose suitable headings, or give them headings such as those below.

Size, fuel, safety features, capacity, driver, weight, substance made from, speed, what they travel on

Each student uses the information on the board to make a statement summarising the similarities and differences between trains and motor vehicles.

Learning experience 2: Finding out more

Learning intention

At the end of this lesson students will be able to explain why you have to take care around trains.

Explanation

- 1. The class may need to spend additional time preparing their demonstration and so the activity may go over two lessons.
- 2. Notes on hazards:

Back draft

If a train is driving right through a station it will be going quite fast. As it passes it creates a suction of wind, called a back draft. If people are standing too close to the edge of the platform they could be blown over, or even sucked under the train. People should stand at least 1.5 metres back from the edge of the platform.

Trains take a long time to stop

A child might think that if a train is in the distance there is plenty of time for them to cross the tracks safely. However, trains go fast and because they are heavy they wouldn't be able to stop in time if there was a person on the line. Trains have also been proven to travel faster than they appear.

Double tracks

Two railway tracks running side by side are called double tracks. There is usually a space of three metres between double tracks. Trains could come from either direction at the same time. Children may not realise this. If one train has passed they may think it is safe to cross and be hit by a second train. They need to wait until they can see that each track is clear in both directions.

A train is wider than the tracks

Train tracks are about one metre wide. A train can be 2.5 - 2.8 metres wide (this includes the width of wagons and containers). A child may not realise this and stand too close to the tracks while waiting to cross. The area of land on either side from the middle of the track is called the rail corridor. Tracks and the rail corridor are for trains only.

Tunnels

A tunnel is 3 metres wide. A train is 2.5 - 2.8 metres wide. So when a train travels through a tunnel there is very little space between the train and the wall of the tunnel. A person may think that if they were in a rail tunnel they could outrun the train, but this is impossible. The average speed of a moving train is around 80k/hr. As you can never be sure when a train is coming, a person should never go into a rail tunnel.

Bridges

Train bridges are only 2.1 metres wide, while a train is 2.5 - 2.8 metres wide. This means that the train will overhang the sides of the bridge. So, there is no place for people to go if a train

comes, except off the side of the bridge. As you can never be sure when a train is coming, a person should never go on a rail bridge.

Trains are unpredictable

There can be changes of timetables which people may not be aware of. A person may be expecting a train to come from one direction and forget that one may come from the opposite direction before this. Trains can also be unpredictable on sidings or shunting yards. This is why those areas are strictly out of bounds.

Activities

1. Inertia

Pose the following problem to the class.

If a ping pong ball and a golf ball were released down a slope at the same time, which ball would travel the furthest?

Get each student to write down their hypothesis.

Put the class into 6 groups. Give each group a ping pong ball, a golf ball, a sheet of A4 paper, and something to make a ramp. If you are setting up the experiment on carpet, the balls will need something smooth to run on, such as thick paper or card. Give each group instructions to set up the experiment, as per the diagram below. The folded A4 paper is introduced at stage 2 of the experiment.



Each group now carries out the experiment as follows:

a) The two balls are released from the top of the ramp at the same time, with no force being applied.

- b) The distance that each ball travels from the bottom of the ramp is measured.
- c) Repeat this part of the process two or three times, to get an average measurement.
- d) The piece of folded A4 paper is introduced one metre from the end of the ramp. See diagram.
- e) Release the balls one at a time from the top of the ramp and observe what happens when each reaches the A4 folded paper.
- Ask: Which ball travelled the furthest? Why do you think this was?

Was your hypothesis correct? What happened when the ping pong ball reached the folded paper? What happened when the golf ball reached the folded paper? How does what you have found out relate to trains? (Trains are heavy and so take a long time to stop.) How will this information help to keep you safe?

Introduce the term 'inertia' to the class. This means that when something very heavy starts moving it takes a long time to stop because its own weight keeps it going. This applies to railway wagons in shunting yards, which will just keep moving if they are shunted. Once an engine starts moving it is very difficult to stop, as its weight keeps it in motion. Recent University of Waikato research showed that found that people typically misjudge the speed of an approaching train by up to 20kms an hour.

2. Hazards

Divide the class into groups and allocate each group one of the potential hazards listed below. Ensure that the group understands what the hazard is (see Teachers' Notes).

Explain that each group needs to decide how to demonstrate their potential hazard to the rest of the class. For example they could do a role play, use equipment or models to demonstrate, develop a set of diagrams, and prepare an oral explanation. Encourage groups to be as creative as possible.

Potential Hazards

A train going through a station creates a back draft.

Sometimes there are double tracks running side by side.

A train is wider than the tracks.

There is a very small distance between the train and the sides of a tunnel.

Trains overhang a rail bridge.

Trains are unpredictable and can come from any direction at any time.

Each group demonstrates their hazard in turn. The rest of the class guesses what the hazard is and it is listed on the board.

After all demonstrations have been given:

Ask: Which of these hazards were you already aware of?

Which of these hazards had you not thought about before?

Do you think most people know about these hazards? Why or why not?

How will knowing about the hazards help to keep you safe around trains?