



**THE WORKSHOPS
RAIL MUSEUM**

IPSWICH

EDUCATION

THE SCIENCE OF RAIL TRAIL

Years 6 to 8



theworkshops.qm.qld.gov.au

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open daily 9:30am-5:00pm

(except Good Friday, ANZAC Day & Christmas Day)

This program has been produced and published by The Workshops Rail Museum, North Street, North Ipswich, Qld, Australia 4305.

The Museum's Vision Statement is:

to be recognised as a creative, innovative and exciting journey of discovery into Australia's rail story.

The Mission Statement is:

to harness the significance of the Workshops precinct by delivering international standard cultural and tourism related activities, education and public programs associated with the interaction of rail on people's lives.

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Purpose and Overview

The following activities are based on the Science Stations at The Workshops Rail Museum. They are aimed at helping students to develop an understanding of energy and change and how they can be used in real life contexts.

These activities are aligned with the Australian Curriculum: Science content strands of Science Understanding, Science as a Human Endeavour, and Science Enquiry Skills for Years 6, 7 and 8.

Students will further develop and apply their knowledge and understanding of the following Science sub-strands:

- Science Understanding – Physical sciences
- Science as Human Endeavour – Use and influence of science; Nature and development of science
- Science Enquiry Skills – Planning and conducting; and Communicating

Context for learning:

This unit explores ideas related to science as a human endeavour and explores how energy is transferred and transformed, as well as how these scientific understandings are used in rail technology.

The activities require students to use a range of thinking skills in identifying the various answers to questions and completing the activities below. These activities are stepping stones to further study and acquisition of knowledge, and responses can vary according to the year level of students. Teachers should encourage students to explore further the answers to the various questions.

Title: Education on Track: The Science of Rail Trail

KLA: Science

Year level(s): 6, 7, 8

CURRICULUM LINKS

SCIENCE UNDERSTANDING

Physical Sciences

YEAR 6

Electrical circuits provide a means of transferring and transforming electricity (ACSSU097)

Elaboration:

- investigating different electrical conductors and insulators

YEAR 7

Change to an object's motion is caused by unbalanced forces acting on the object (ACSSU117)

Elaboration:

- investigating the effects of applying different forces to familiar objects
- investigating common situations where forces are balanced, such as stationary objects, and unbalanced, such as falling objects
- investigating a simple machine such as lever or pulley system

YEAR 8

Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems (ACSSU155)

Elaboration:

- investigating different forms of energy in terms of the effects they cause, such as gravitational potential causing objects to fall, and heat energy transferred between materials that have a different temperature

Science as Human Endeavour

YEAR 6

Nature and development of Science:

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena (ACSHE098)

Elaborations:

- investigating the use of electricity, including predicting the effects of changes to electric circuits

Use and Influence of Science:

Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives (ACSHE100)

Elaboration:

- considering how electricity has changed the way people live

YEAR 7

Use and Influence of Science:

People use understanding and skills from across the disciplines of science in their occupations (ACSHE224)

Elaboration:

- applying knowledge of forces in a railway context

YEAR 8

Use and Influence of Science:

Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (ACSHE135)

Elaborations:

- investigating how energy efficiency can reduce energy consumption
- investigating the development of vehicles over time

SCIENCE INQUIRY SKILLS

Planning and Conducting

YEAR 6

With guidance, plan appropriate investigation methods to answer questions or solve problems (AC SIS103)

Elaborations:

- Considering which investigation methods are most suited to answer a particular question or solve a problem

YEAR 7

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS125)

Elaboration:

- identifying whether the use of their own observations and experiments or the use of other research materials is appropriate for their investigation

YEAR 8

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS136)

Elaboration:

- working collaboratively to decide how to best approach an investigation

Communicating

Year 6

Communicative ideas, explanations and processes in a variety of ways, including multi-modal texts (AC SIS110)

Elaboration:

- using a variety of communication modes to communicate science ideas

Year 7:

Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate (AC SIS133)

Elaboration:

- presenting the outcomes of research using effective forms of representation of data or ideas and scientific language that is appropriate for the target audience

Year 8:

Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate (AC SIS148)

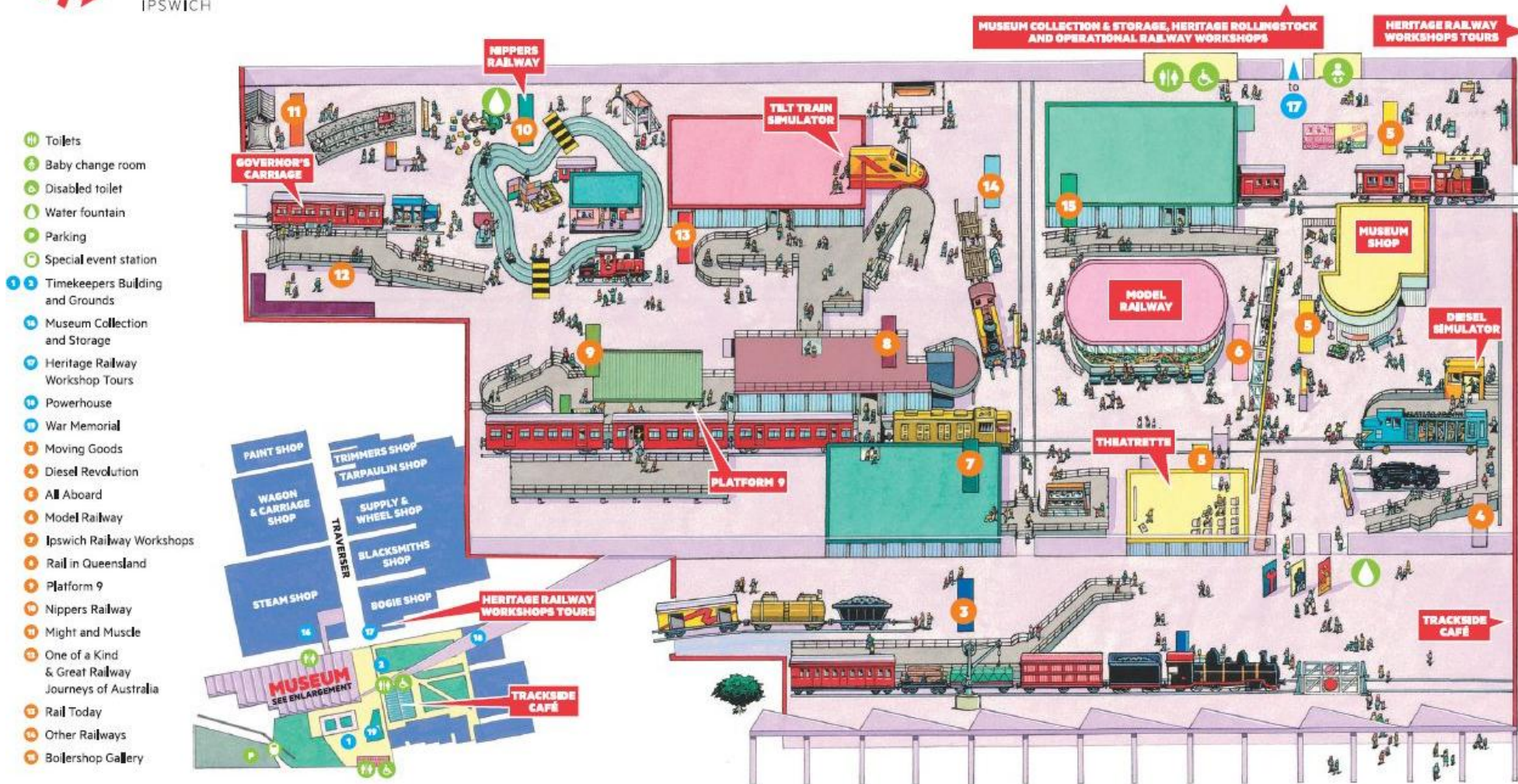
Elaboration:

- selecting and using appropriate language and representations to communicate science ideas within a specified text type and for a specified audience

General Capabilities and Cross-Curriculum Priorities

- **Literacy:** Word knowledge; Text knowledge; Comprehending texts; Composing texts
- **Critical and creative thinking:** Inquiring – identifying, exploring and organising information and ideas; Generating ideas, possibilities and actions; Analysing, synthesising and evaluating
- **Personal and social capability:** Self-management; Social management; Collaboration; Decision-making skills
- **Ethical understanding:** Reasoning and ethical decision making; Considering consequences
- **Sustainability:** Students use science to predict possible effects of human and other activity

MUSEUM MAP



Travel through the Museum and locate the Science Stations referred to below. Most Science Stations are located behind Zone 5: All Aboard, unless indicated otherwise. Complete the activities using full sentences.

Convection Currents

What can you see on the white screen before you turn the heater on?



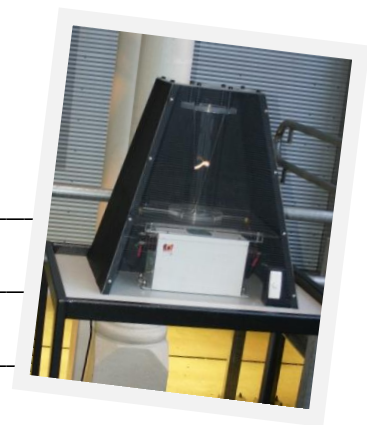
What can you see on the white screen after you turn the heater on?

Describe what is happening.

How do convection currents work in steam engines?

Rising Arc

What happens to the spark between the rods?

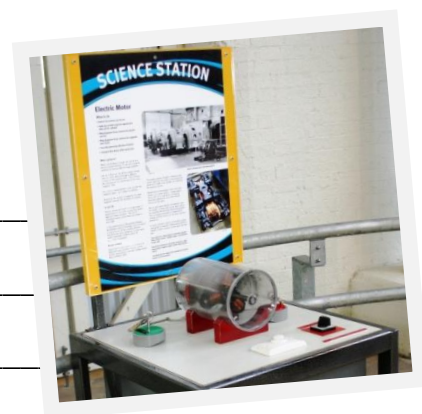


What aspect of electricity is this station demonstrating?

What would happen if a person stood too close to high voltage wires on railway tracks?

Electric Motor

Describe how the motor uses magnetism to spin.



How do diesel and electric locomotives use electric motors?

Floating Magnets

Why are the magnets floating?

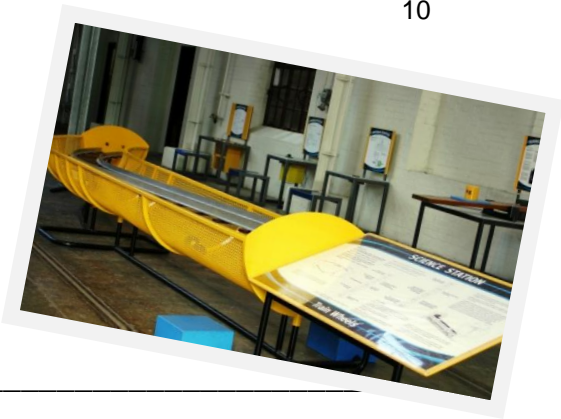


What happens when you push on the magnets and then let go?

Describe where you would attach magnets if you were to make a train float above the tracks.

Train Wheels

(Located in Zone 11: Might & Muscle)



Which roller do you think will stay on the track the best? Why? (This is your hypothesis)

Test your hypothesis by experimenting with the different rollers. Which one stays on the track the best?

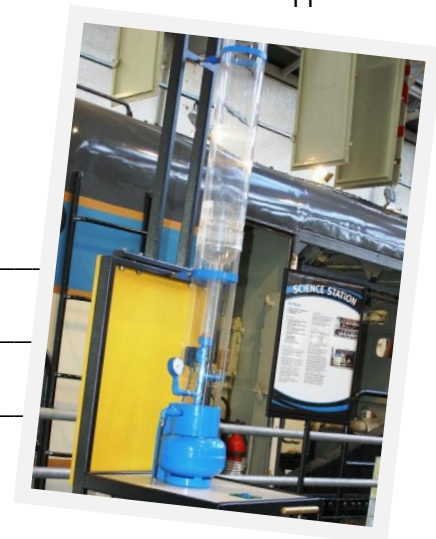
Was your hypothesis correct? Why or why not?

Describe why one roller works better than the others.

Air Blast

(Located in Zone 4: Diesel Revolution)

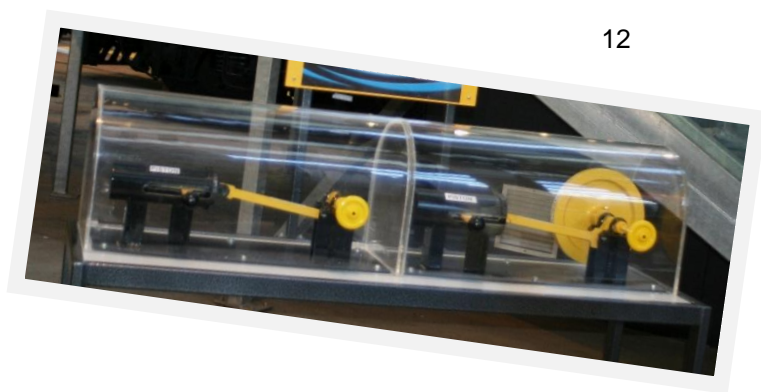
How high can you propel the ball?



How is compressed air used in the railways?

List three things that compressed air is used for in everyday life.

The Flywheel



Which hand wheel is easiest to move?

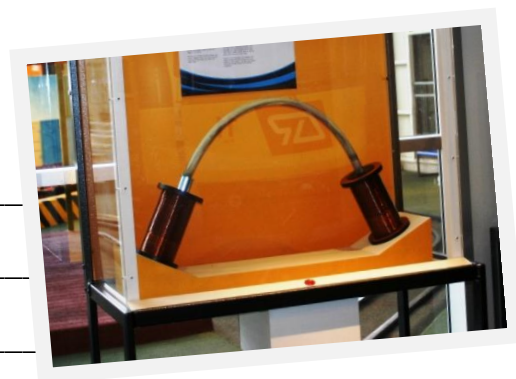
Why is it easier to move?

How are flywheels used in locomotives?

Magnetic Shuttle

(Located in Zone 13: Rail Today)

Why does the shuttle move from one side to the other?



How is this type of science used in rail today?

Draw and label a diagram showing how a Maglev train works: