SCIENCENTRE AT QUEENSLAND MUSEUM

Australian Curriculum Links for Years 9-10 - Term 3, 2017

Sciencentre exhibits link to the Australian National Science Curriculum specifically in the strands of Science Understanding and Science Inquiry Skills. Links to general capabilities and other learning areas may also be relevant.

Direct links below indicate content that is directly covered within the exhibition, while indirect links indicate content that is dependent on how people use and facilitate various exhibits.

General capabilities relevant to Sciencentre exhibits

Direct links	
Literacy Comprehending texts through listening, reading and viewing. **Numeracy** Recognise and using patterns and relationships.	**Critical and Creative Thinking** Inquiring – identifying, exploring and organising information and ideas. Generating ideas, possibilities and actions. Reflecting on thinking and processes. Analysing, synthesising and evaluating reasoning and procedures.

Action Stations - Sciencentre

Get hands-on with everyday science. Science is everywhere - at home, school, work and play. Discover what makes everyday things tick.

	Direct link	**Indirect link**	**Sample exhibits that support the curriculum**
Year 9	Physical sciences (ACSSU182) Energy transfer through different mediums can be explained using wave and particle models.	Questioning and predicting (ACSIS164) Formulate questions or hypotheses that can be investigated scientifically. Processing and analysing data and	• Staying cool – light energy is absorbed by different coloured metal 'car bodies' and transformed to heat. Feel and compare the heat radiating from these surfaces. Convection

		information (ACSIS170) Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.	occurs above the hot surfaces as the air heats up and rises. • Splashes of sound – sound energy is transformed into kinetic energy causing the liquid to vibrate. Watch the liquid water splash, feel the vibration in the solid table, hear the sound vibrations in the air. Observe the pattern of waves made by different frequencies. • Hand battery – complete the circuit and become part of the path for the electrical energy to flow. Consider factors that might influence the flow of electrical energy, eg. breathe moisture onto your palms and see if the conductivity changes.
Year 10	Physical sciences (ACSSU190) Energy conservation in a system can be explained by describing energy transfers and transformations. Physical sciences (ACSSU229) The motion of objects can be described and predicted using the laws of physics.	Questioning and predicting (ACSIS198) Formulate questions or hypotheses that can be investigated scientifically. Processing and analysing data and information (ACSIS204) Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.	• Newton's cradle – pulling a ball to the side gives it potential energy, releasing the ball transforms this to kinetic energy. The kinetic energy is transferred through all of the balls causing the end ball to move. Try two or more balls at once and consider the energy transfers. Discuss and apply Newton's Third Law. • What next? – follow the wacky pendulum on its random path. Explain some of the energy changes that occur whilst it moves. • Ball race – two balls fall from the same height along different paths. Consider Newton's Second Law to describe the motion of the balls.

			• Spinning chair – as you spin, move your arms and legs in and out. Notice that when you pull your limbs in again you speed up – energy has not been lost when the chair slowed down. • Pulley yourself up – trace the rope along the system of pulleys. Describe the forces acting in the system, how does Newton's Second Law apply? • Stop the spin – compare the motion of the wheels. One tends to want to keep spinning – consider the laws of conservation of energy and conservation of angular momentum.

Body Zone - Sciencentre

Your body - like you've never seen it before. Challenge it, move it, re-assemble it, confuse it. Collect your vital statistics. For a total hands-on, minds-on, body-on experience – jump in!

	Direct link	**Indirect link**	**Sample exhibits that support the curriculum**
Year 9	Biological science (ACSSU175) Multi-cellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment.	Questioning and predicting (ACSIS164) Formulate questions or hypotheses that can be investigated scientifically. Processing and analysing data and information (ACSIS170) Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.	• Body bits – explore different systems of the human body in the layers of this puzzle. Discuss how these systems respond to changes in our environment eg. circulatory system in a cold environment. • Hairs to hear with – the hairs inside our ears are part of an adaptation to help us hear different sounds in our environment. • Read with your fingers – rely on the

			sense of touch to decode messages using braille. Consider the internal systems involved eg. nervous system, muscular system.
Year 10	Biological sciences (ACSSU184) Transmission of heritable characteristics from one generation to the next involves DNA and genes. Physical sciences (ACSSU229) The motion of objects can be described and predicted using the laws of physics.	Questioning and predicting (ACSIS198) Formulate questions or hypotheses that can be investigated scientifically. Processing and analysing data and information (ACSIS204) Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.	• Family features – complete the questions with a fellow student, then do it again remembering the features of someone in your family. Reflect on how the results are influenced by genetic linkage and inheritance. • One of a kind – reflect on the large amount of collected data showing genetic traits. How many people have the same 9 characteristics as you? • Bullseye! – apply a force to the ball in your hand, a small force gives it a slow speed and a large force gives it a fast speed. Consider how Newton's Second and Third Laws apply to the motion of the ball.

Mathamazing - Sciencentre

Until 3 September 2017

Mathamazing encourages students to playfully explore maths concepts through 22 hands-on exhibits, five floor-based Mega Maths Puzzles and sixty Puzzle Placemats. Each *Mathamazing* experience will inspire mathematical curiosity and confidence, and build greater understanding of mathematical concepts. These concepts all link to real world experiences. For example:

- Where can we see the strong catenary arch shape in natural structures and buildings?
- What is the shape of the orbits of planets around our Sun? A shape where the sun is located on one of two focal points.
- How can you measure the distance to objects or places that are far away?
- Why do you need to collect more data to get a more accurate result and make better predictions?

Students will leave the exhibition thinking that there is a lot more to maths than previously thought!

This exhibition is targeted at students in year 6 and over, but can be enjoyed by all year levels.
Five floor-based Mega Maths Puzzles are built to an oversized scale, so they have strong visual impact and they offer highly interactive maths experiences for groups and individuals and/or younger students.

Learning resources highlight the exhibition's main themes, identifies curriculum links and provides education materials which support pre, during or post a visit to *Mathamazing*.

Education materials have been developed for this exhibition. These include Teacher Notes with curriculum links and detail about each exhibit which covers:

- How the exhibit works
- Things to try or ask around the exhibit
- Background Science for the exhibit

Teachers may copy any material for educational purposes.

This exhibition supports the Australian National Mathematics Curriculum. Direct links to the curriculum exist for Measurement and Geometry including Shape, Geometric Reasoning, Location and Trigonometry (Year 9), Linear and non-linear relationships (Year 10).

The exhibition also supports Problem Solving and Reasoning Skills.

Mathamazing. Developed by Questacon – The National Science and Technology Centre, Canberra.

Fire and Ice Show - Sciencentre

School show topic 10 July – 8 December 2017

From supercool liquid nitrogen to fireworks, things are heating up in the Sciencentre with the Fire and Ice Science Theatre Show. We will bring the temperature down as we rapidly cool, freeze and condense liquids and gases with some unexpected results. Things won't stay cool forever, as we burn our way through chemical reactions and hot colourful flames. This cool show will fire your imagination as we explore the science of fire and ice.

The Fire and Ice Show supports investigation of concepts in the **Chemical** and **Physical Sciences** sub-strands in the Australian Curriculum. Students will also apply **Science Inquiry Skills**, including questioning, predicting, observing cause and effect relationships and explaining.

The Fire and Ice Show is an interactive show where student volunteers are part of the show and students are encouraged share their observations, answer and ask questions and share their explanations.

Concepts explored in a Yr 9-10 show include:	**Demonstrations and materials**
States of matter – exploring properties and behaviours of solids, liquids and gases	• Liquid nitrogen • Water vs ice
States of matter – changing state from a solid to a liquid and liquid to solid, physical change, reversible	• Instant ice blocks and challenge (liquid nitrogen)
Effects of low and high temperatures on materials - gas	• Shrinking dog balloon (liquid nitrogen) – Yr 9
Effects of low and high temperatures on materials – gas, stress / strain on balloon rubber	• Exploding balloon (liquid nitrogen) – Yr 10
Making changes to materials can be reversible or irreversible – combustion is a chemical change and irreversible	• Magnesium burn
Chemical reactions such as combustion	• Burning paper – optional • Burning 'money'
Chemical reactions such as combustion; electrons and energy	• Coloured flames

	Direct link	**Indirect link**
Year 9	Chemical sciences (ACSSU178) Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed. Chemical sciences (ACSSU179) Chemical reactions,	Questioning and predicting (ACSIS164) Formulate questions or hypotheses that can be investigated scientifically. Processing and analysing data and information

	including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer.	(ACSIS170) Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.
Year 10	Chemical sciences (ACSSU187) Different types of chemical reactions are used to produce a range of products and can occur at different rates.	Questioning and predicting (ACSIS198) Formulate questions or hypotheses that can be investigated scientifically. Processing and analysing data and information (ACSIS204) Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.