
Australian Government


Awesome Earth Exhibit Themes, Descriptions and Curriculum Links

Questacon's *Awesome Earth* exhibition in Gallery 3 (based in Canberra), contains hands-on exhibits suitable for visitors aged 8 years through to adults including the popular *Earthquake House* simulator and *Caged Lightning* Tesla coil. This document lists *Awesome Earth* exhibit names, descriptions, key themes and subject areas, as well as how *Awesome Earth* links to the Australian National Science Curriculum.

Each exhibit in *Awesome Earth* explores how geology and meteorology shape planet Earth and how humans measure and respond to powerful natural disasters. Several exhibits highlight how scientists predict, measure and respond to natural disasters, which strongly links to the Australian Curriculum Science as a Human Endeavour strand.

The following suggestions and questions are useful for strengthening the educational experience for students and encouraging them to connect exhibit concepts to what they encounter in their everyday lives.

- Have you ever watched a lava lamp or a simmering saucepan of water? Do they use convection currents to move things around?
- The next time you see a rainbow, note where the Sun is positioned. Try to make a rainbow at home by spraying water from a spray bottle or your garden hose, then work out where the Sun should be positioned so you can see a rainbow in the water spray.
- Do you use rock-based products at home like scoria, marble, gravel, pumice or sandstone?
- How do scientists predict whether an earthquake or a tsunami might occur?
- How would you build a house that will resist wind damage or earthquake damage?
- How can we strengthen the tornado in this Tornado exhibit?
- Do you think lava is the same as magma, or are they different?
- Can you remember whether the Sun is positioned higher in the sky during Winter or Summer?
- How would your family respond if a bushfire or a flood was threatening your home?

Awesome Earth Exhibit Name	Exhibit Description	Key Themes	Subject Areas
Australian Seismometers in schools	The website lists all the schools in Australia that are part of the Seismometers in Schools program. This provides real data to the global network of seismometers used by seismologists around the world.	earthquakes, energy, waves, seismic waves, seismometers, recording	Earth science – geology (volcanoes, earthquakes, erosion & rocks)
Blue Sky	A cylinder full of fluid illuminated by red and blue lights. The fluid represents the atmosphere and scatters blue light out, letting red through. This is why the sky is blue.	Refraction, scattering, light, gas	Physics – light scattering, wavelengths Perceived Colour
Building Resonance	Different objects have their own natural resonance frequency. During an earthquake this can have an impact on buildings with a resonance that matches the vibrations of the ground	earthquakes, energy, waves, seismic waves, resonance	Earth science – geology (volcanoes, earthquakes, erosion & rocks) Engineering – construction, resonance, earthquake safety
Caged Lightning	A Tesla coil (approximately 6 metres tall) gives a spectacular demonstration of electricity and plasma.	electricity, plasma, lightning, Tesla coil	Physics – electricity & magnetism Technology
Convection Currents	A vertical tank of liquid is heated from the base. As cooler, dense liquid at the top sinks it pushes up the warmer, less dense liquid being heated at the base. This cycle continues to create convection currents that are also found in Earth's sub-surface and atmosphere.	convection currents, density, heat, fluid, tectonic plates, ocean currents	Earth science – geology (volcanoes, earthquakes, erosion & rocks) Earth science – atmosphere & meteorology (weather) Physics – air pressure & fluid mechanics (hydraulics & aerodynamics)
Detecting the Big Bang	Watch a video that explores evidence for the Big Bang. As the universe cooled it became transparent to light which moved outwards. As space expands in all directions, the light has	Light spectrum, stars, The Big Bang,	Physics – light scattering, wavelengths

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	stretched and become weaker until it is a tiny amount of microwave background radiation across the night sky. We can pick this up as static in many devices.		
Earthquake Lab	Experiment with the shaking of an earthquake. Feel it, experience it and learn about it. The shake platform has several experiments using models and accelerometers you can perform with the help of the Gallery Assistant there. You can also view earthquakes from around the world in real time on the screen.	earthquakes, energy, waves, seismic waves, experimentation, observation	Earth science – geology (volcanoes, earthquakes, erosion & rocks)
Epicentre	Use the rulers to find the epicentre of the earthquakes. Earthquakes can be felt for hundreds of kilometres in all directions, but it's not obvious where they started. We have to measure the time difference between the P and S waves reaching different seismometers in order to determine how far away the centre is from each one.	earthquakes, energy, maths, trilateration	Earth science – geology (earthquakes) Mathematics – Trilateration
Fluidisation	Direct a stream of air through a tank of glass beads. Observe fluidisation or flow which represents how volcanoes and cinder cones are created from magma below the Earth's surface.	fluidisation, volcano, magma	Earth science – geology (volcanoes, earthquakes, erosion & rocks) Physics – air pressure & fluid mechanics (hydraulics & aerodynamics)
Geochron	An illuminated map of the world shows where sunlight is shining on Earth at any given moment. The Geochron can also be used to calculate the current time anywhere in the world.	time, diurnal, Earth rotation, tilt, axis, Sun	Earth science – atmosphere & meteorology (weather) Physics – astronomy (space)
Gravity Well	Release a ball into a vortex bowl and watch the	gravity, vortex, friction,	Physics – forces & motion (inertia, gravity,

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	ball spin around the bowl due to gravity and potential and kinetic energy.	energy, potential energy, kinetic energy	push, pull, acceleration)
Jacob's Ladder	Watch sparks as they move up the ladder. A spark can jump across a spark gap given the right energy levels. The charge ionises the air between the two bars until it is charged enough to allow the current to pass between.	electricity, plasma, lightning	Physics – electricity & magnetism Technology
Momentous Magnitudes	Place your hands on a metal plate and feel an earthquake's movement at different levels on the moment magnitude scale (a logarithmic scale which is used by seismologists to label earthquakes based on the energy released by an earthquake).	earthquake, scientists, seismometer, measurement, technology	Earth science – geology (volcanoes, earthquakes, erosion & rocks)
Painting with Data	Up to date data sets are contained within the exhibit. Choose a data set and paint across the map to reveal what's happening. Choose multiple ones and see if they interact with one another.	Data collection, atmosphere, earthquakes, oceans	Oceanography – salinity, temperature Meteorology – temperature, humidity Seismology - earthquakes
Parallax	Objects at different distances appear to move different amounts relative to one another. We can use this to measure how far away they are.	Astronomy, distance, angles	Maths – measuring angles to determine distances (trigonometry)
Pipe Wrenched	A section of gas pipe damaged during an earthquake measuring 6.9 magnitude, shows the impact of earthquakes on built structures.	earthquake, structures, buildings, technology	Earth science – geology (volcanoes, earthquakes, erosion & rocks) Technology
Quakemaker	Jump up and down in front of a seismometer and watch the screen to see how earth tremors are detected and measured.	earthquake, scientists, seismometer, vibration, wave energy	Earth science – geology (volcanoes, earthquakes, erosion & rocks)

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		measurement, technology	Technology
Rainbow	A light shines on tiny glass beads which refract the light to create rainbows. This models how sunlight creates a rainbow spectrum when raindrops refract (or bend) the light.	light, refraction, rainbow, colour, spectrum	Earth science – atmosphere & meteorology (weather) Physics – optics (visible light)
Raise the Roof	Change the direction of the wind and see how it affects the roof on a model house. Also observe the Venturi meters to see how high-speed winds change air pressure, so a roof can be lifted off a building.	buildings, structures, wind, air pressure, Bernoulli, Venturi metres, cyclone	Earth science – atmosphere & meteorology (weather) Physics – air pressure & fluid mechanics (hydraulics & aerodynamics)
Ring Launcher	Fire a ring into the air with nothing but electricity. The current generates a magnetic field in the aluminium ring which repels from the field in the generator. As the ring is lighter, it gets pushed away.	electricity, magnetic fields, repulsion	Physics – electricity & magnetism Technology
Seasons in a Spin	Move the model Earth around the Sun to show how sunlight hits Earth at different angles at different times of the year to cause the seasons of Summer, Autumn, Winter and Spring.	seasons, orbit, planets, Earth, Sun, angle, light, axis, tilt	Earth science – atmosphere & meteorology (weather) Physics – astronomy (space)
Sediment Tank	Turn the tank to watch as the sediments form layers. This is how sedimentary rock forms over long periods of time.	Rocks, deep time, erosion	Geology – sedimentary rocks
Shear stress	Turn the wheel and watch the blocks judder and slide under stress. Earthquakes are often caused by sudden slips of rock. As the plates move they generate a lot of friction which can result in sudden jumps as the stress eventually	earthquakes, energy, waves, seismic waves	Earth science – geology (volcanoes, earthquakes, rocks, stress, tectonic plates)

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	gives out.		
Slow Flow	A highly viscous type of silicone rubber was installed in this exhibit in 1982. Since then, the rubber has been influenced by the force of gravity, to gradually drop and hit the bottom of the tank.	chemistry, viscosity, gravity, time	Chemistry – material science, atoms & particles Physics – forces & motion (inertia, gravity, push, pull, acceleration)
Star Fingerprints	Look at the spectrum tubes with the special glasses to see the light split into its component wavelengths, Stars emit and absorb light from different elements and provide unique colour 'fingerprints' that tell you how old or young they are.	Light spectrum, stars, absorption, emittance	Physics – light absorption/emittance, wavelengths Perceived Colour
Topic panels	Various screens highlighting different phenomena across the Earth and Space.	Various themes relating to phenomena in different areas (lava, salinity etc)	Earth science – geology (volcanoes, earthquakes, erosion & rocks) Technology
Tornado	Watch a tornado of water vapour spin in front of you. See if you can affect its movement by standing around the column. Real tornadoes are formed by pockets of very low pressure in the atmosphere.	weather, tornado, air pressure, vortex, fluid, atmosphere	Earth science – atmosphere & meteorology (weather) Physics – air pressure & fluid mechanics (hydraulics & aerodynamics)
Turbulent Orb	Spin the fluid-filled globe and watch the fluid form swirling patterns. The patterns appear to be random but they are following mathematical rules. Weather systems and ocean currents are also random, but are affected by the spinning of the planet and temperature differences, which complicates weather forecasts.	weather, atmosphere, chaos, oceans, currents, turbulence, air pressure	Earth science – atmosphere & meteorology (weather) Physics – air pressure & fluid mechanics (hydraulics & aerodynamics)

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Waves and Wobbles	Crank the handles to see how models of how the ground moves during an earthquake. Earthquakes generate three types of seismic waves (P, S and L waves), which carry different amounts of energy and cause the ground to shake in different formations.	earthquakes, energy, waves, seismic waves	Earth science – geology (volcanoes, earthquakes, erosion & rocks) Physics – forces & motion (inertia, gravity, push, pull, acceleration)
Wimshurst Machine	Turn the wheel to generate static electricity. This is a static generator, a machine designed to produce static electricity. It turns two wheels in opposite directions to build up a charge before releasing it between the electrodes.	electricity, plasma, lightning, friction, static	Physics – electricity & magnetism Technology

Australian Curriculum Links

Awesome Earth exhibits link to the Australian National Science Curriculum (particularly Science Inquiry Skills across all school years). Core links indicate content that is directly covered within the exhibition, while optional links indicate content that is dependent on how people use and facilitate various exhibits.

Foundation core links

Chemical sciences (ACSSU003) Objects are made of materials that have observable properties

Earth and space sciences (ACSSU004) Daily and seasonal changes in our environment, including the weather, affect everyday life

Foundation optional links

Planning and conducting (ACSIS011) Explore and make observations by using the senses

Measurement and geometry (ACMMG007) Compare and order the duration of events using the everyday language of time

Year 1 core links

Earth and space sciences (ACSSU019) Observable changes occur in the sky and landscape

Physical sciences (ACSSU020) Light and sound are produced by a range of sources and can be sensed

Nature and development of science (ACSHE021) Science involves asking questions about, and describing changes in, objects and events

Year 1 optional links

Use and influence of science (ACSHE022) People use science in their daily lives, including when caring for their environment and living things

Year 2 core links

Physical sciences (ACSSU033) A push or pull affects how an object moves or changes shape

Year 2 optional links

Measurement and geometry (ACMMG044) Interpret simple maps of familiar locations and identify the relative positions of key features

Year 3 core links

Earth and space sciences (ACSSU048) Earth's rotation on its axis causes regular changes, including night and day

Physical sciences (ACSSU049) Heat can be produced in many ways and can move from one object to another

Year 4 core links

Earth and space sciences (ACSSU075) Earth's surface changes over time as a result of natural processes and human activity

Physical sciences (ACSSU076) Forces can be exerted by one object on another through direct contact or from a distance

Year 5 core links

Chemical sciences (ACSSU077) Solids, liquids and gases have different observable properties and behave in different ways

Earth and space sciences (ACSSU078) The Earth is part of a system of planets orbiting around a star (the Sun)

Physical science (ACSSU080) Light from a source forms shadows and can be absorbed, reflected and refracted

Year 5 optional links

Use and influence of science (ACSHE083) Scientific understandings, discoveries and inventions are used to solve problems that directly affect people's lives

Year 6 core links

Earth and space sciences (ACSSU096) Sudden geological changes or extreme weather conditions can affect Earth's surface

Year 6 optional links

Physical sciences (ACSSU219) Energy from a variety of sources can be used to generate electricity

Year 7 optional links

Earth and space sciences (ACSSU115) Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the Sun, Earth and the Moon

Year 8 core links

Measurement and geometry (ACMMG199) Solve problems involving duration, including using 12- and 24-hour time within a single time zone

Year 8 optional links

Chemical sciences (ACSSU151) The properties of the different states of matter can be explained in terms of the motion and arrangement of particles

Year 9 core links

Earth and space sciences (ACSSU180) The theory of plate tectonics explains global patterns of geological activity and continental movement

Physical sciences (ACSSU182) Energy transfer through different mediums can be explained using wave and particle models

Senior Secondary Years: Earth and Environmental Science

Unit 1: Introduction to Earth systems

Science Understanding: Development of the geosphere

- Earth has internally differentiated into a layered structure: a solid metallic inner core, a liquid metallic outer core and a silicate mantle and crust, the study of seismic waves and meteorites provides evidence for this structure

Unit 2: Earth processes – energy transfers and transformations

Science Inquiry Skills

- Select, construct and use appropriate representations, including maps and other spatial representations, diagrams and flow charts, to communicate conceptual understanding, solve problems and make predictions
- Processes within and between Earth systems require energy that originates either from the sun or the interior of Earth
- Transfers and transformations of heat and gravitational energy in Earth’s interior drives the movement of tectonic plates through processes including mantle convection, plume formation and slab sinking

Science Understanding

- The movement of atmospheric air masses due to heating and cooling, and Earth’s rotation and revolution, cause systematic ocean currents, these are described by the global ocean conveyer model

Unit 4: The changing Earth – the cause and impact of Earth hazards

Science as a Human Endeavour

- People can use scientific knowledge to inform the monitoring, assessment and evaluation of risk

Science Understanding

- Plate tectonic processes generate earthquakes, volcanic eruptions and tsunamis, the occurrence of these events affects other Earth processes and interactions
- Monitoring and analysis of data, including earthquake location and frequency data and ground motion monitoring, allows the mapping of potentially hazardous zones, and contributes to the future prediction of the location and probability of repeat occurrences of hazardous Earth events, including volcanic eruptions, earthquakes and tsunamis
- The impact of natural hazards on organisms, including humans, and ecosystems depends on the location, magnitude and intensity of the hazard, and the configuration of Earth materials influencing the hazard (for example, substrate)

Senior Secondary Years: Physics

Unit 2: Linear Motion and Waves

Science Understanding

- Longitudinal and transverse waves are distinguished by the relationships between the direction of oscillation relative to the direction of the wave velocity
- Mechanical waves transfer energy through a medium, mechanical waves may oscillate the medium or oscillate the pressure within the medium
- The mechanical wave model can be used to explain phenomena related to reflection and refraction (for example, seismic phenomena)
- A ray model of light may be used to describe reflection, refraction and image formation from lenses and mirrors