

SparkLab

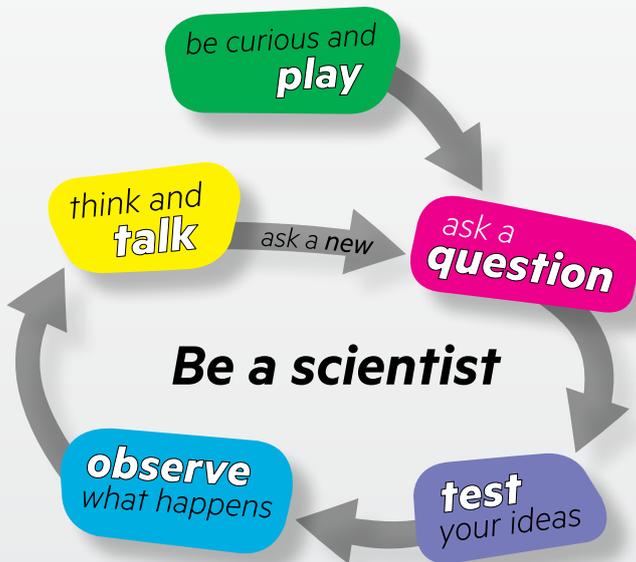
Program Guide and Curriculum Links

Follow your curiosity

Ignite your imagination in *SparkLab*. Follow your curiosity and bring out your inner scientist as you question, investigate and wonder about the world around you.

Explore 32 interactive exhibits across three zones and discover how science, technology, engineering and maths (STEM) affect your everyday world.

Think creatively as you design in the Maker Space, get up close to experiments at the Science Bar and experience the wonder of our changing world with Science on a Sphere.



Be a scientist

As you play and investigate in *SparkLab*, you are using lots of the same skills that scientists, engineers and mathematicians use in their everyday.

Explore your **curiosity** as you **play**.

Ask **questions**, **test** out your ideas and make **observations**.

Design, build and **make** using your imagination.

Share your thinking with others and build on new ideas and questions.

Do, Think, Talk

SparkLab is an active, social and hands-on space. Start in any zone and choose where you want to explore.

Things to do at an exhibit:

- What do you see, feel, notice as you play?
- Change something – Try out different settings, add in new pieces to test, or move in a different way and see what happens.

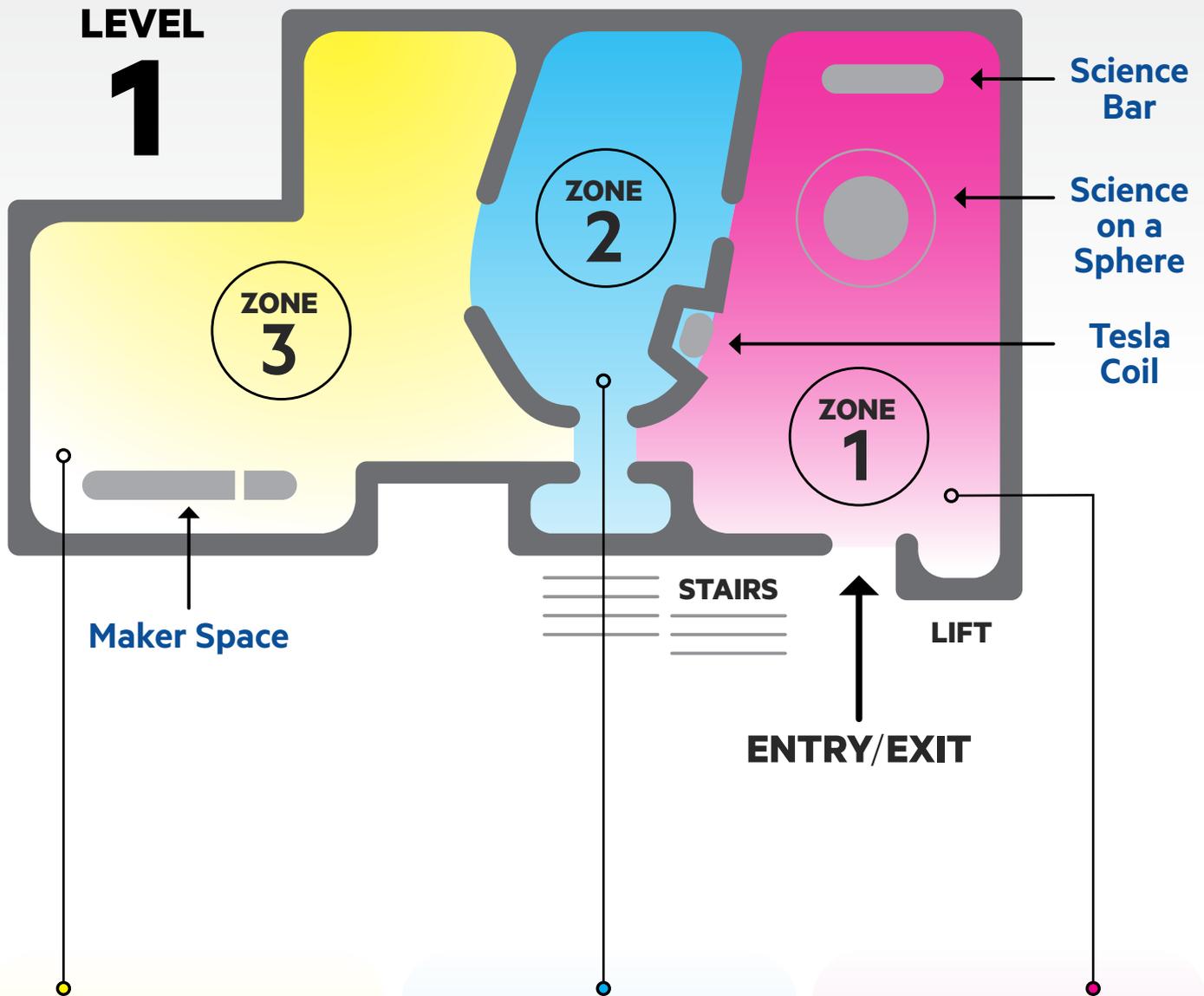
Things to think or talk about at an exhibit:

- What can you explore and test?
- What do you think is happening and why?
- What do you find interesting about what is happening?

Further challenges:

- What new questions do you have? How could you find out more?
- Have you seen or experienced anything similar in your everyday life?
- How might people find this useful in their work or life?

Use the exhibit panels to further guide your exploration and to find out more about what is happening. You can also use the keywords in 'explore more' to do your own research, and discover how science, technology, engineering and maths is useful in our everyday lives.



ZONE 3:

How can we change our world? What does this change do?

Explore forces, energy and structures, and use your imagination to design and build solutions to challenges. Make a change and see the impact.

ZONE 2:

How do we perceive our world? Do we all perceive it the same way?

Play with light and sound as you question, test and discover how we all see and hear the world differently. Compare your perception in relation to other people and animals.

ZONE 1:

Our world and how it works

Wonder at the changing world around us and investigate how matter moves, behaves and changes. Explore Earth's place in the wider universe and how this impacts our world and daily lives.

What's on offer at *SparkLab*

If you would like to request a particular program (Science Bar, Science on a Sphere, or Electric Sparks) please include this request in your booking. While we strive to accommodate all special requests, please note that availability may vary, and we may not always be able to fulfill them.

For full program details, refer to page 7.



Science Bar

Get up close with live science experiments and explorations where the audience can ask questions, predict outcomes and direct part of the investigation.



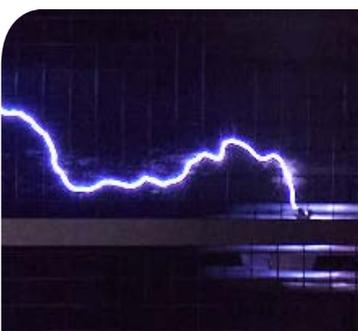
Science on a Sphere

Discover the world in stunning detail when Earth's data comes to life on this mesmerising spherical projection. Join one of our facilitated sessions to ask questions, share observations, and build on new ideas, or follow your own curiosity with self-led exploration.



Maker Space

Imagine and design solutions to real-world challenges at the Maker Space. Make your creation from a range of materials provided, test out your design and share your thinking with others to build on ideas and make improvements.



Electric Sparks

Our Tesla coil takes centre stage as we create, control and transform giant electric sparks! Delve into the science behind it all as you explore the impact of altering spark frequency and intensity on your senses. Listen carefully, for you might discover the surprisingly musical side of these electrifying demonstrations.



Curriculum links

SparkLab exhibits and programming link to link to Version 9.0 of the Australian Curriculum in Science, Design and Technologies and Mathematics, with a strong focus on:

- Science Inquiry Skills
- Science as a Human Endeavour
- General Capabilities: Literacy, Numeracy, Critical & Creative Thinking.

Program type	Curriculum Link (9.0)	Program Name	P	1	2	3	4	5	6	7	8
Science Bar	Physical Sciences	Going Downhill	•	•			•			•	
		Good Vibrations			•						
		Human Circuits							•		
		Lights, Colour, Action!						•			
		Melting Moments				•					
		Will it Float?					•				
	Chemical Sciences	Melting Moments				•		•			
		Mix Master						•	•		•
		Slime Time			•			•		•	
		Under Pressure						•			
Up in Flames						•		•		•	
SOS	Earth and Space Sciences	Daily and Seasonal Changes		•							
		Earth and Solar Systems			•						
		Water Sources and Cycles					•				
		Earth's Surface Changes						•			
		Movement of Earth and Planets							•		
		Plate Tectonics									•
Tesla Coil	Physical Science	Electric Sparks			•			•			

Program type	Curriculum Link (9.0)	Program Name	P	1	2	3	4	5	6	7	8	
Exhibits	Chemical Science	Air Cannon						•				
		Air Flow						•		•		
		Cloud Rings				•		•		•		
		Flight Tester			•							
		Flowing Mist				•		•				
		Frozen Shadows						•				
		Touch the Lightning									•	
	Physical Science	Air Cannon		•				•			•	
		Balance Bridge						•			•	
		Circuits								•		•
		Coloured Shadows							•			
		Confusing Mirror							•			
		Flight Test	•					•			•	
		Frozen Shadows							•			
		Giant Arch						•			•	
		Gravity Run	•					•			•	•
		Lift a Fridge		•				•			•	
		Magnetic Liquid						•				
		Magnetic Pendulum		•				•				
		Mirror, Mirror							•			
		Pulley Up		•				•			•	
		Rotation Station		•							•	
		See the Heat					•					
		Seeing Colour							•			
		Slow the Fall	•					•			•	
		Sound Studio				•						
		Speedy Planets	•					•			•	
	Splashes of Sound				•							
	Touch the Lightning								•			
	Earth and Space Sciences	Cloud Rings						•				
		Flowing Mist						•				
		Speedy Planets								•		
		Spin up a Storm		•								
Spinning Earth			•						•	•		

Science Bar programs

Soapy and sour

Students investigate and describe how universal indicator is used to identify the presence and concentration of particular substances.

Key inquiry question: How can we change how soapy or sour something is?

Key concepts:

- Chemicals have properties, which indicators can reveal.
- Indicators can determine if a chemical is acidic, neutral or basic.
- The pH scale orders chemicals from acidic to basic along a spectrum.

Mix Master

Students predict and observe what happens when a variety of household products are mixed. What are the clues that that a chemical reaction has occurred?

Key inquiry question: What happens when you mix two or more things together?

Key concepts:

- Mixing chemical substances can cause changes, sometimes producing new substances (products) in a chemical reaction.
- Changes can be observed through sight, sound, smell, or touch and may be fast, slow, dramatic, or subtle.
- Not all changes are chemical; some are physical.
- Substances interact differently depending on their properties.





Good Vibrations

Students investigate and describe ways to create a sound. They select different materials to test and compare how the properties of materials affect the volume and pitch of the sounds they create.

Key inquiry question: How can we change a sound we make?

Key concepts:

- Sound is made by something vibrating, and these vibrations travel through substances like air or water as compression waves.
- Vibration speed (frequency) affects pitch. Larger objects vibrate more slowly, producing lower pitches.
- Vibration intensity affects volume. Stronger vibrations make louder sounds.
- Sounds can be reflected or absorbed by different materials.

Melting Moments

Students investigate by suggesting how to change solids into liquids. Students design experiments to explore how different materials and heat sources can change the way something melts. They make predictions and describe their observations.

Key inquiry question: How can we change the way a solid melts?

Key concepts:

- Temperature changes can cause materials to freeze, melt, boil/evaporate, or condense, which are changes of state.
- Heat can be generated in many ways and transferred between substances.
- Solids, liquids, and gases are states of matter with different properties and behaviours.
- Temperature changes can cause changes that are reversible or irreversible.
- Material properties influence how and why they are used.

Lights, colour action!

Students select coloured lights, filters, and various objects to change the way something looks. They identify and describe what happens when light is mixed.

Key inquiry question: How can we use colours and light to change the way things look?

Key concepts:

- Light can be separated into component colours.
- Colours mix to form new ones through additive or subtractive mixing.
- Some colours exist only as mixtures of others.
- Light interacts with different objects in different ways. For example it can be absorbed, reflected, or refracted.

Will it Float?

Students select and examine how objects and liquids float or sink in water. Students predict if mixing something into the liquid, or changing the size or shape of an object, will change how different objects float.

Key inquiry question: Does everything float (in water)? How can we change whether something sinks or floats?

Key concepts:

- An object sinking or floating in water generally reveals it is more or less dense than water.
- An object sinking or floating reveals its density.
- Some properties cannot be observed directly.
- A solid's surface area, material, shape, structure, and composition affect how it behaves in liquid.

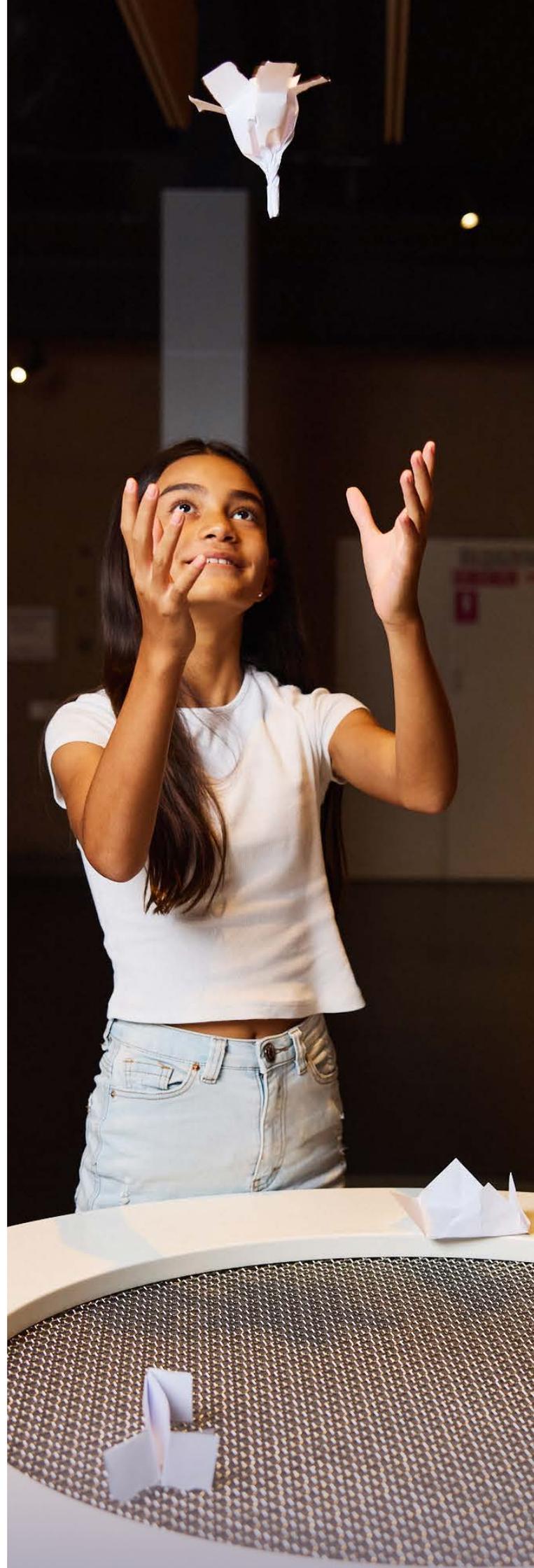
Under Pressure

Students select different objects and identify any physical changes that happen when the object is placed in a vacuum.

Key inquiry question: What happens to a marshmallow in the vacuum of space?

Key concepts:

- Air surrounds us and constantly pushes in every direction—this is air pressure.
- A vacuum is a space with no air pressure.
- Gas moves from regions of high pressure to low pressure.
- Changing air pressure, such as in a vacuum, can cause observable changes.





Human Circuits

Students use their inquiry skills to investigate how electricity flows through different objects and then make a giant human circuit.

Key inquiry questions: How does electrical energy move around? Does everything allow electrical energy to flow easily?

Key concepts:

- Electrical energy transfers through a completed circuit.
- Electrical energy flows more easily through some materials than others.
- Materials may be conductors, insulators, or both.

Going Downhill

Students experiment with how forces that can cause objects to move, and fill cylinders with different materials to investigate how they can change the way something moves down a ramp.

Key inquiry question: What can we do to change how a container moves (down a ramp)?

Key concepts:

- How a container moves down a ramp depends on factors such as size, shape, and weight distribution. Changing any of these affects its movement.
- Forces act on an object when placed on a ramp, making it move.
- Tools like scales, timers, and measuring tapes help us predict and observe these movements.

Up in Flames

Students will explore how a range of materials have different properties that can be used for a variety of purposes. Some materials and liquids are flammable, whilst others are not. Students will help in this experiment by selecting different flammable and non-flammable materials to explore how the flames change when ignited.

Key inquiry question: What happens when things burn? How can the properties of different materials change a flame's colour, size or temperature?

Key concepts:

- Different materials have different properties that mean they can be used for different purposes.
- Some materials/liquids are flammable, but others are not flammable.
- During combustion, a chemical change takes place.
- Water has a very high level of heat absorption.
- Fire needs three things to burn; fuel, oxygen and heat.



Science on a Sphere programs

Storm chasing

Time to chase some storms! Using real-time satellite data, identify and track cyclones, hurricanes and typhoons that have occurred somewhere around the globe.

Volcanoes in space

Blast off into the cosmos and explore weird and wonderful volcanoes that exist in space! Discover how similar and different they can be to the volcanoes of Earth.

Animal migrations

Animals are on the move! Join us to uncover the mysteries of animal migration. Discover why they embark on epic journeys and how they navigate across the globe.

Alien environments

Journey through the galaxy to explore strange and exciting alien worlds. Find out which planets might harbor life and what makes them so special.

Earthquakes

Come explore earthquake data from the past century and look for patterns. Help us find the biggest quake and predict where the next one might strike.

Mission to Mars

Ready for a red planet adventure? Join our mission to Mars, and explore its atmosphere, craters, canyons, and volcanoes and what it takes to live on our neighbouring planet.

Moons of the solar system

Explore the fascinating moons orbiting the planets of our solar system. Discover their unique features and the secrets they hold.

Extreme weather

Investigate weather patterns around the world on our giant animated globe. Through looking at real-time rainfall data and a model of surface temperature over time, we investigate some of the factors that drive extreme weather such as cyclones in Queensland and some other parts of the world.

Transportation

How do we get from A to B? Discover the many ways we move around our local area, around our country and our world. Use different data and discover the fascinating world of transport.

Where's the water?

Join us on a quest to find water in our solar system! We know that water is critical for life, so where can we find it? Explore planets and moons and discover where we might stop for a drink in the cosmos.

Interactive exhibits

Explore 32 interactive exhibits across three zones and discover the wonder of STEM in your everyday world.

Zone 1: Our world and how it works

Touch the lightning

Students interact with a large plasma ball, investigate the intensity of the plasma filaments and determine where and why they are attracted to certain positions on the glass globe. Students identify where heat energy is produced as a by-product of energy transfer.

Speedy planets

Students observe and recognise how the shape of the gravity well changes the path the balls (planets) take as they roll.

Spinning Earth

Students investigate the rotation of the Earth, recognise various changes on the Earth's surface and consider how Earth's movement relates to different measures of time.

Spin up a storm

Students recognise and describe patterns in a fluid-filled sphere. What changes happen as they spin the sphere fast, slow or in a different direction? Compare this to weather patterns on Earth or giant storms on Jupiter.

Flowing mist

Students explore how they can move and swirl mist, as it flows down a slope, and then appears to 'disappear' when the heat from their hands, heats up the water droplets and causes them to change to invisible gaseous water.

Cloud rings

Students apply a changing force onto a rubber membrane, which forces mist out of a circular hole. Describe what shape the cloud takes as it rises to the ceiling. Explore ways to change the shape or how it moves.

Air flow

Students move different shaped objects into a stream of fast- or slow-moving air. Students recognise how fluids can flow and move over objects and explore patterns of turbulence in the air.

Space matter

Watch the trails that subatomic particles leave as they travel through our cloud chamber. Look for muons, fast-moving electrons and big alpha particles, and consider how these particles surround us (and pass through us) every day.

Zone 2: How do we perceive our world?

Frozen shadows

Students pose in front of a phosphorescent wall and after a bright flash, step away leaving behind their shadow. Investigate how the transfer of light energy causes the wall to glow (except for the part of the wall you block with your body).

See the heat

Students visualise the transfer of heat energy as they view their body or other objects through an infrared (heat) camera.

Seeing colour

Students examine objects illuminated under one of the three primary colours of light: red, green and blue. Infer why the objects appear to change colour and what colour would the object appear under white light. The colour we perceive is the colour of light reflected into our eye.

Mirror, mirror

Students examine reflections with a series of repeated mirrors. Explore how changing where you stand changes the reflections that you see. Look for the position where your reflection is the same in almost every panel.

Confusing mirror

Students consider how their reflected image can be inverted or enlarged when standing at different distances away from a concave, convex, and other strangely shaped mirrors.

Coloured shadows

Students stand in front of spotlights of red, blue and green light. When combined, these primary colours of light make white light. By blocking one or two of these lights students create a number of coloured shadows.

Splashes of sound

Students observe how changing the pitch of a sound creates different splash patterns in the liquid.

Sound studio

Students play a song on the thong-o-phone or create a beat using cajóns. Compare the size of tubes and the sounds they make, and explore how these properties change the sounds that are created.

UV glow

Step into a room of ultra violet light and see how different materials can glow. Compare how both natural and synthetic materials can look completely different in white light compared to UV. Use the mirror to identify any glowing parts of your clothing and shoes.

Voice manipulation

Explore the sound of your own voice and test out how changing pitch can alter the way you sound. Add special effects to your voice as you explore how technology can be used to manipulate sound.

Zone 3: How can we change our world?

Gravity run

Students use a series of pipes, curves, wheels, hanging bells and balls to explore forces, motion and energy transfer and transformation. Students work together to investigate relationships between kinetic and potential energy.

Flight test

Students design and create a flying machine out of paper and test their design in the vertical wind tunnel. Students describe how their machine moves in the air flow, modify their design to see the impact of that change and explore how a change in wind speed affects how their machine moves in the air.

Rotation station

Students spin in a chair and investigate how changing their position affects the speed of their rotation.

Magnetic pendulum

Students swing a large pendulum which has a magnet in the bob. The pendulum swings over magnets in the base. As the magnetic fields interact with each other, the pendulum is repelled in unexpected directions. Students can investigate relationships between kinetic and potential energy in this simple system.

Slow the fall

Students drop discs made of varying materials and patterns between a track lined with magnets. Eddy currents within the discs generate a magnetic field. The interaction between the two magnetic fields will change how each disc falls.

Magnetic liquid

Students use rotating handles to move two magnets closer and further away from a plate of magnetic liquid. They explore the effects of the two magnetic fields on the Ferrofluid.

Circuits

Students create simple circuits to demonstrate electrical energy transfer and its transformation into heat, light, sound or motion. Students also explore different sources of electrical energy.

Balance bridge

Students construct different shaped bridges across ever widening gaps in a river. Decide if the bridges will be high enough for a boat to pass underneath, and explore the science of counterweights as part of a stable bridge design.

Giant arch

Students work together to construct a giant arch with specific numbered blocks. After putting in the final keystone, the giant arch will stay up without any glue or nails. Knocking over the arch is as fun as building it.

Lift a fridge

Students investigate a giant lever and compare the effect of pulling down on ropes located at different positions on the lever.

Pulley up

Students use a simple machine called a pulley to help lift themselves up. Pulleys can reduce the amount of force needed to lift an object. While using more pulleys makes lifting easier, it increases the amount of rope needed to move.

Air cannon

Students lift a heavy bowling ball and let it fall from varying heights. The ball pushes the air in the large tube into a smaller tube, causing a light tennis ball to fly up high. Students compare how changing what happens to the bowling ball affects the movement of the smaller ball.

Shape maker

Students use 2D shapes to construct 3D shapes of many shapes and sizes. Students can create identifiable solids like a cube or a triangular prism, or get creative and design their own – the challenge is, what to call it!