



Australian Government



## ***Fascinating Science* Exhibit Themes, Descriptions and Curriculum Links**

Questacon's *Fascinating Science* is a touring hands-on exhibition which is suitable for visitors aged 8 years and older. The complete *Fascinating Science* exhibition contains 31 exhibits which explore principles of human perception, physical phenomena and mathematical puzzles.

This document lists *Fascinating Science* exhibit names, descriptions, key themes and subject areas as well as how Science on the Move links to the Australian National Curriculum.

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.

- Are any colour combinations more difficult to see through the yellow filter? Looking through the yellow filter is similar to the effect of our eyes becoming cloudy as we age. What other difficulties in vision occur as we age?
- Can you balance one ball on each ledge at the same time?
- Can you arrange the blocks on the mirror to show a die with faces of 6, 5 and 3 dots?
- How many solutions can we find for making the cube from the seven block pieces?
- How do the magnetite particles line up when you move the magnet nearby? If the 'aquarium' contained other types of metals, would they all react the same way to the magnet?
- Which cone shape is easiest to pick up? Are there any cone shapes you simply cannot pick up? Why?
- Which part of your brain controls your left hand? Which part of your brain controls your right hand? Was it easier to tap the rhythm using your left hand or your right hand?
- Can these grey squares turn darker or brighter before your eyes?
- Can you read something that's shaking?! What would be the advantage of being able to focus your vision while your head is moving?
- Can you 'thread the needle' with one eye closed?
- If you follow the puzzle rules, can you transfer the stack of discs to another peg in a certain number of moves? Is there a mathematical pattern for solving the puzzle with three, then four discs? How many moves would you need for five discs?
- When you slide the tiles and swap the Zed with the Zee tile, how would you describe the way tiles move around each other?

Fascinating Science Exhibit Name	Exhibit Description	Key Themes	Subject Areas
A Maze	Tilt and turn the table to roll a ball around a maze of pegs. Can you find a way out? Moving (or navigating) through a maze requires memory and planning skills.	visuo-spatial, spatial, puzzle, problem solving, navigation,	Mathematics – puzzles & number tricks Biology – human psychology & behaviour
Ageing Eyes	Try to read coloured words through a yellow filter. Are any colour combinations harder to read? Sight changes as we age making some signs or colours more difficult to read.	vision, ageing, colours, light	Biology – human psychology & behaviour Biology – human body (physiology)
Aim Without Eyes	Close your eyes and put your arm in the air. Now put the other hand on your nose and then try to touch the outstretched hand. Stretch receptors (proprioceptors) in our body let you know where your body is positioned and moving.	stereovision, proprioception, body awareness, physiology, perception	Biology – human psychology & behaviour Biology – human body (physiology)
Appearing Pencil	Swap two panels containing pencils and count the total number of pencils in each setting. A pencil seems to appear, then disappear before your eyes in this optical illusion.	psychology, visuo-spatial, spatial, puzzle, problem solving, illusion	Mathematics – puzzles & number tricks Biology – human psychology & behaviour
Balancing Balls	Visitors are challenged to perch two loose balls inside an enclosed container onto two separate ledges. This demonstrates how physics combined with problem solving skills can be used to solve a puzzle.	physics, centrifugal, inertia, rotation, balancing	Physics – forces & motion (inertia, gravity, push, pull, acceleration)
Bit Dicey	Construct a die/dice puzzle, so each visible face shows 6, 5 and 3 dots respectively in this visuo-spatial puzzle.	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Blackout	While peering through a peephole in a box, two slots can open and close to reveal the colour of the box inside. The colour seems to change simply due to reflected light.	physics, optics, light, reflection, colour, vision	Physics – optics (visible light) Biology – human psychology &

Fascinating Science Exhibit Name	Exhibit Description	Key Themes	Subject Areas
	Darkness or absence of light can result in misleading decisions about the colour of objects.		behaviour Biology – human body (physiology)
Blind Spot	Find your blind spot using this simple visual test. Everyone has a blind spot, due to our eyeballs missing some photoreceptors in certain spots.	psychology, perception, physiology, eyes, brain, blind spot, vision	Biology – human psychology & behaviour Biology – human body (physiology) Physics – optics (visible light)
Bright as a Peg	Black and white pegs must be moved around a board within a minimum number of moves to create a new pattern. This is a visuo-spatial intelligence puzzle that tests problem solving skills and mathematical combination theory.	psychology, visuo-spatial, spatial, puzzle, problem solving, translation	Mathematics – puzzles & number tricks
Crazy Cube	A visuo-spatial intelligence puzzle, based around the Soma Cube. Seven different shaped pieces must be fitted together to make a six-sided cube. Once mastered, the visitor is challenged to make other shapes using the same seven pieces.	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Illusions	An illusion is something that causes a false or distorted impression, or a misrepresentation of what is really there. A variety of traditional optical illusions test your sense of visual perception.	psychology, perception, vision, illusion	Biology – human psychology & behaviour
Keyhole Cross	Three notched pieces of plastic must be interlocked in sequence to create a three-dimensional cross in this key and lock puzzle.	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Linked Links	Untangle the metal hoops using logical thinking skills rather than brute force	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks Mathematics – geometry & topology

<b>Fascinating Science Exhibit Name</b>	<b>Exhibit Description</b>	<b>Key Themes</b>	<b>Subject Areas</b>
Magic Mirror	Place the triangular puzzle pieces against the mirror, so a secret message can be read. Symmetry of shapes and letters can be demonstrated using a mirror.	physics, optics, light, reflection, symmetry, vision	Mathematics – puzzles & number tricks
Magnetic Aquarium	Metals are more strongly attracted to the ends or north-south poles of a magnet, where magnet strength is greatest. Slide a magnet across a Perspex box containing magnetite and observe three dimensional magnetic fields.	physics, magnet, repel, attract, field, iron, magnetite	Physics – electricity & magnetism
Magnetic Floaters	Magnetic poles and concepts of induction. Metal plates are sandwiched between two powerful magnets. The metal plates seem to float and repel each other when pushed down.	physics, magnet, repel, field	Physics – electricity & magnetism
Mirror or Window	Mismatching signals between your senses and your brain can cause confusion. Slide a ring along a rod, while watching this hand in a mirror. Many people confuse the reflection of their sliding hand with their hidden hand behind the mirror.	psychology, visuo-spatial, spatial, puzzle, problem solving	Biology – human psychology & behaviour Biology – human body (physiology)
Mouse in the House	A visuo-spatial intelligence puzzle, testing problem solving skills. Slide various puzzle pieces together, so they interlock and form a three dimensional mouse mansion!	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Pick Up Points	The relationship between friction, direction and gravity. The cones in this exhibit are all the same mass, but their different shapes affect how much friction and grip can be generated, allowing your fingers to pick up each cone.	physics, friction, force, area, gravity, mass	Physics – forces & motion (inertia, gravity, push, pull, acceleration) Chemistry – material science, atoms & particles
Pyramid Piles	A test of visuo-spatial skills based on efficient packing of spheres. Different pieces made from connected spheres must be piled together in a certain way to construct a pyramid.	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks

<b>Fascinating Science Exhibit Name</b>	<b>Exhibit Description</b>	<b>Key Themes</b>	<b>Subject Areas</b>
Pyramid Puzzle	This is a spatial puzzle that tests your ability to reconstruct three-dimensional shapes. Three blocks which are the same shape must fit together to make a pyramid.	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Rhythm on the Brain	See the difference in how the left and right hemispheres of the brain control regular and complex rhythms. Try tapping a steady beat on your leg with one hand and then use the other hand on the other leg to tap 'Mary Had a Little Lamb'. Now swap sides. Which way was easier?	psychology, visuo-spatial, brain, perception, music, coordination	Biology – human psychology & behaviour
Shades of Grey	Place the panel with grey squares on top of the shaded panel. Do the squares seem to get darker or lighter? We perceive shades based on the context (surroundings) of the object. Colours appear brighter against a dark background and darker against a bright background. Can the grey squares grow darker or lighter?	psychology, visual perception, contrast, vision, brain, perception, ageing, elderly	Biology – human psychology & behaviour
Shake and Read	Hold up the panel, shake your head or your head from side to side and try to read the words on the panel. It is easier to read when our head is shaking than when the panel shakes, because reflexes in our inner ear instruct our eyes where to move.	psychology, visual perception, brain	Biology – human psychology & behaviour
T or tree	Slot the three pieces together to make a T shape. Now try and make the 'tree' shape from the same puzzle pieces.	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Tangrams	Geometric puzzle pieces can be re-used to create a cat, swan, square or triangle.	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Thread the Needle	Attempt to thread a larger-than-life needle at arm's length and with one eye closed in this test of stereovision and	psychology, visuo-spatial, spatial, hand,	Biology – human psychology & behaviour

Fascinating Science Exhibit Name	Exhibit Description	Key Themes	Subject Areas
	hand-eye coordination.	eye, coordination, stereovision, monovision	
Touch Test	Match hidden texture patches to patches that can be seen on the tabletop. The way we interpret what we touch is often related to what we can also see.	biology, physiology, touch, tactile, senses	Biology – human psychology & behaviour
Tower of Brahma	Move discs between three poles, using the minimum number of moves. The number of moves required to solve this puzzle can be determined by a mathematical formula.	mathematics, puzzle, problem solving, brahma, recurrence relations, formula	Mathematics – puzzles & number tricks
Tri Circles	Can you make 3 linked circles from the 6 separate pieces in this visuo-spatial intelligence puzzle?	psychology, visuo-spatial, spatial, puzzle, problem solving	Mathematics – puzzles & number tricks
Zed to Zee	Slide puzzle pieces around to swap the Zed and Zee tiles, representing mathematical concepts of translation and rotation.	psychology, visuo-spatial, spatial, puzzle, problem solving, translation, rotation, programming	Mathematics – puzzles & number tricks

### Australian Curriculum Links

*Fascinating Science* 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

Physical sciences (ACSSU005) The way objects move depends on a variety of factors, including their size and shape

#### Foundation optional link

Nature and development of science (ACSHE013) Science involves exploring and observing the world using the senses

**Year 1 core link**

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

**Year 2 core link**

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

**Year 2 optional links**

Nature and development of science (ACSHE034) Science involves asking questions about, and describing changes in, objects and events

Measurement and Geometry (ACMMG045) Investigate the effect of one-step slide and flips with and without digital technologies

Measurement and Geometry (ACMMG065) Create and interpret simple grid maps to show position and pathways

**Year 3 core link**

Nature and development of science (ACSHE050) Science involves making predictions and describing patterns and relationships

**Year 4 core links**

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

Measurement and Geometry (ACMMG091) Create symmetrical patterns, pictures and shapes with and without digital technologies

**Year 4 optional link**

Nature and development of science (ACSHE061) Science involves making predictions and describing patterns and relationships

**Year 5 core links**

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

**Year 7 core link**

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

**Year 8 core link**

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

**Year 9 core link**

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

## **Year 10 core link**

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

## **Senior Secondary Years: Physics**

### **Unit 2: Linear Motion and Waves**

#### **Science Understanding**

Newton's Three laws of motion describe the relationship between the force or forces acting on an object, modelled as a point mass, and the motion of the object due to the application of the force or forces

Momentum is a property of moving objects, it is conserved in a closed system and may be transferred from one object to another when a force acts over a time interval

Waves are periodic oscillations that transfer energy from one point to another

Longitudinal and transverse waves are distinguished by the relationship between the direction of oscillation relative to the direction of the wave velocity

Waves may be represented by time and displacement wave diagrams and described in terms of relationships between measurable quantities, including period, amplitude, wavelength, frequency and velocity

A mechanical system resonates when it is driven at one of its natural frequencies of oscillation energy is transferred efficiently into systems under these conditions

A ray model of light may be used to describe reflection, refraction and image formation from lenses and mirrors

A wave model explains a wide range of light-related phenomena including reflection, refraction, total internal reflection, dispersion, diffraction and interference, a transverse wave model is required to explain polarisation

### **Unit 3: Gravity and Electromagnetism**

#### **Science Understanding**

When an object experiences a net force of constant magnitude perpendicular to its velocity, it will undergo uniform circular motion, including circular motion on a horizontal plane and around a banked track

## **Senior Secondary Years: Biology**

### **Unit 2: Cells and multicellular organisms**

#### **Science Understanding**

Multicellular organisms have a hierarchical structural organisation of cells, tissues, organs and systems

The specialised structure and function of tissues, organs and systems can be related to cell differentiation and cell specialisation