Measure Island Exhibit Themes, Descriptions and Curriculum Links

Questacon’s Measure Island is a touring hands-on exhibition which is mainly targeted at visitors aged 8 to 14 years, but can be enjoyed by people of all ages. This document lists Measure Island exhibit names, descriptions, key themes and subject areas as well as how Measure Island links to the Australian National Curriculum.

Measure Island’s 24 exhibits cover some unusual forms of measurement as well as measurements that we use every day without a second thought, such as time, length, mass, capacity and volume. Some exhibits challenge your understanding of accuracy and precision and how humans can measure and 'tell' time using different clocks, their brain or a tree.

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.

- Why does the crown and gold bar appear to be equally balanced (and equal mass) in mid-air, but unbalanced underwater?
- Watch the way the bubble in the floor moves as the platform tilts. Does the bubble move towards the lower end or the higher end?
- How many balls are in this barrel? Would it be okay to only do one or two samples, or should we do lots of samples?
- Can you match the ring patterns on these tree pieces to each other? The dog statue contains two types of wood. Can you work out which half is older by matching the ring patterns to your tree calendar?
- Compare the two clocks. Can you work out how long a school day would last in decimal time? What decimal time would you have dinner?
- If all five of your quoits hit the right hand side of the target, are you being accurate or precise?
- How do the gems appear in mid-air compared to when they are dipped into the liquid? How does light behave inside the gems and inside the fluid to create this effect?
- Compare how many times the pendulum swings past the centre point in 10 seconds when you release it from the top of the curve, then from halfway up the curve.
- How does the radar gun detect and calculate the speed of your thrown ball? Where have you seen radar guns being used?
- Which material feels warmer to the touch? Which material feels cooler to the touch? How do these materials compare in temperature?
- How does a wind vane point out the wind's direction? Why is the bird's 'tail' larger in size than the 'head'?
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| Archimedes Challenge | Lower a balance containing a crown and 'gold' bar into water and check whether they are unbalanced. When an item is placed into water, the volume of water it shifts or displaces can be used to calculate the item's density (and financial value). | density, buoyancy, balance, mass, volume | Mathematics – measurement (time, size, mass, density, volume)  
Culture – history |
| Balance Platform | Stand on a large circular platform and walk around the platform carefully so it tilts beneath you. Try to balance the platform's giant spirit level bubble in the middle of the platform. Density of gases and liquids can be used to measure whether a surface is even or tilted. | balance, density, buoyancy | Physics – air pressure & fluid mechanics (hydraulics & aerodynamics)  
Physics – forces & motion (inertia, gravity, push, pull, acceleration)  
Mathematics – measurement (time, size, mass, density, volume) |
| Barrel of Beasts | Capture and count balls in a barrel to model estimation of animal populations. By comparing the ratio of tagged to untagged animals (or balls), a reasonably accurate estimate of the total population of animals can be calculated. | sampling, estimating, tag and recapture, ratio, population | Mathematics – statistics, probability & chance  
Biology – ecology (plant & animal populations, food webs) |
| Dendroshift | Assemble a tree calendar by matching ring patterns on tree samples to work out the age of a statue. Growth rings within trees indicate their age as well as climatic conditions. | dendrochronology, timeline, tree rings, age, botany, climate change | Mathematics – measurement (time, size, mass, density, volume)  
Biology – plants (physiology, anatomy & adaptations)  
Earth science – atmosphere & meteorology (weather) |
<p>| Dividing Time | Compare a standard (12 hour) clock with a decimal clock (10 hours) and try to assess the time of day using each clock. | time, decimal, counting systems | Mathematics – measurement (time, size, mass, density, volume) |
| Go with the Throw | Throw quoits at a target and work out whether you were accurate, precise, or both! Accuracy and precision are easily confused, but are separate measurement concepts. | accuracy, game precision, repetition, quoits | Mathematics – measurement (time, size, mass, density, volume) |</p>
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<td>Hidden Treasure</td>
<td>Dip two acrylic 'gems' into a liquid and see how they appear within the liquid and whether they are made from the same material. A material's refractive index can be used to identify its composition.</td>
<td>refractive index, light, materials, forensic</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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<td>High Horse</td>
<td>Measure the height of a horse using your own hands and a pair of model hands. Different units of measurement have been used to measure things in the past.</td>
<td>units, standards, horse, biological measures, withers</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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<td>How Big is My Fish?</td>
<td>Objects such as a fish can be measured in different ways. Catch two toy fish and compare the fish on a ruler and a set of weighing scales.</td>
<td>tot spot, balance, mass, length, estimate, vocabulary</td>
<td>Early childhood, Mathematics – measurement (time, size, mass, density, volume)</td>
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<td>Monkeys in the Mist</td>
<td>Touch monkeys on the screen that are hidden within a misty jungle and check your score representing how well you can detect grey shades overlaid onto darker or lighter backgrounds (your contrast sensitivity).</td>
<td>vision, contrast, contrast sensitivity</td>
<td>Biology – human psychology &amp; behaviour, Biology – human body (physiology), Physics – optics (visible light)</td>
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<td>National Measurement Institute Kiosk</td>
<td>This multimedia kiosk contains information about research at The National Measurement Institute (NMI) and careers based on measurement for government and industry.</td>
<td>scientists, careers, research, National Measurement Institute, NMI, measuring tools</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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<td>Order in the Court</td>
<td>Sort statues by height, width, happiness or cuteness classifications! Things can be classified a number of ways, depending on their qualities and your categories of organisation.</td>
<td>sorting, ordering, objective, subjective, classification</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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<td>Pendulum Pace</td>
<td>Swing two pendulums from different heights and estimate which pendulum will reach the centre first. Pendulums are used to keep time in certain clocks, based on their properties of</td>
<td>pendulums, oscillators, centre of mass, time</td>
<td>Physics – forces &amp; motion (inertia, gravity, push, pull, acceleration)</td>
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<td><strong>Read My Mind</strong></td>
<td>While measuring your heart beat, watch photos on a screen and notice what makes your heart beat faster. Fear can be measured as a physiological response.</td>
<td>biometry, heart rate, fear response, adrenalin</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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<td><strong>Sense-a-Swap</strong></td>
<td>Swap a 'diamond' sitting on a pressure sensor with a bag of sand, so you don't wake the statue. Sensors detect force exerted by a weighted object.</td>
<td>pressure, sensors, force</td>
<td>Physics – forces &amp; motion (inertia, gravity, push, pull, acceleration)</td>
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<td><strong>Speedball</strong></td>
<td>Throw a ball at a target, so a radar gun in the middle can measure your throwing speed. Radar guns measure the speed of a travelling ball in kilometres per hour.</td>
<td>speed, doppler, radar, ball, throwing, speedball</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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<td><strong>Stressed Out Bridge</strong></td>
<td>Walk across a bridge and see stress points form on the bridge. Amounts of stress within a structure can be observed and measured using polarised light and filters.</td>
<td>polarised, stress, colour</td>
<td>Physics – forces &amp; motion (inertia, gravity, push, pull, acceleration) Physics – optics (visible light)</td>
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<td><strong>Tall Tails</strong></td>
<td>Young children can measure their height against a ruler, or a stack of monkeys and other animals. Height can be measured in some rather strange units!</td>
<td>tot spot, units, regular, irregular, standard</td>
<td>Early childhood Mathematics – measurement (time, size, mass, density, volume)</td>
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<td><strong>There's an Area in There</strong></td>
<td>Fit the tangram puzzle shapes together to work out which rabbit uses fewer puzzle pieces and takes up less area. The area of an irregular shape can be calculated by measuring its component shapes.</td>
<td>area, tangram, puzzle, polygons, geometry</td>
<td>Mathematics – measurement (time, size, mass, density, volume) Mathematics – geometry &amp; topology</td>
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<td><strong>Thermal Mosaic</strong></td>
<td>Touch different materials then use an infrared thermometer to check whether a material's temperature indicates how warm it feels. Our skin feels heat and coolness, but it is not a reliable</td>
<td>temperature, heat, emissivity, infra-red, thermometer,</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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<td>gauge of temperature.</td>
<td>thermal</td>
<td>Physics – thermodynamics (heat)</td>
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<td>What a Croc! Measure a crocodile's back two different ways and compare the results. It's important to define exactly what is being measured, in order for accurate measurements to be taken.</td>
<td>fractals, vocabulary, trundle wheel, length, centimetres, metres</td>
<td>Mathematics – measurement (time, size, mass, density, volume) Mathematics – geometry &amp; topology</td>
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<td>Worth the Wait See if you can accurately predict 15 seconds by waiting, then pressing a button. Your 'sense of time' may be accurate or wildly inaccurate!</td>
<td>time, estimating, guess, precision, milliseconds, accuracy,</td>
<td>Mathematics – measurement (time, size, mass, density, volume) Biology – human psychology &amp; behaviour</td>
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<td>You're So Vane Construct a wind vane by attaching parts to a bird that is surrounded by air blowers. Wind direction is measured in the direction the wind is coming from.</td>
<td>wind, area, direction, vane, weather</td>
<td>Mathematics – measurement (time, size, mass, density, volume)</td>
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**Australian Curriculum Links**

Measure Island exhibits link to the Australian National Mathematics and 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 optional link**
Communicating (ACSIS012) Share observations and ideas

**Year 2 core links**
Measurement and Geometry (ACMMG037) Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units
Measurement and Geometry (ACMMG038) Compare masses of objects using balance scales

**Year 3 core links**
Measurement and Geometry (ACMMG061) Measure, order and compare objects using familiar metric units of length, mass and capacity
Measurement and Geometry (ACMMG062) Tell time to the minute and investigate the relationship between units of time
Physical sciences (ACSSU049) Heat can be produced in many ways and can move from one object to another

**Year 3 optional link**
Measurement and Geometry (ACMMG066) Identify symmetry in the environment

**Year 4 core link**
Measurement and Geometry (ACMMG084) Using scaled instruments to measure and compare lengths, masses, capacities and temperatures
Measurement and Geometry (ACMMG085) Convert between units of time
Chemical sciences (ACSSU074) Natural and processed materials have a range of physical properties; These properties can influence their use
Measurement and Geometry (ACMMG109) Calculate the perimeter and areas of rectangles using familiar metric units.

**Year 4 optional links**
Physical sciences (ACSSU076) Forces can be exerted by one object on another through direct contact or from a distance
Nature and development of science (ACSHE061) Science involves making predictions and describing patterns and relationships
Processing and analysing data and information (ACSIS216) Compare results with predictions, suggesting possible reasons for findings

**Year 5 core links**
Measurement and Geometry (ACMMG108) Choose appropriate units of measurement for length, area, volume, capacity and mass
Chemical sciences (ACSSU077) Solids, liquids and gases have different observable properties and behave in different ways
Measurement and Geometry (ACMMG110) Compare 12- and 24-hour time systems and convert between them
Physical science (ACSSU080) Light from a source forms shadows and can be absorbed, reflected and refracted

**Year 6 core link**
Statistics and Probability (ACMSP146) Compare observed frequencies across experiments with expected frequencies

**Year 6 optional link**
Nature and development of science (ACSHE099) Important contributions to the advancement of science have been made by people from a range of cultures

**Year 7 optional links**
Use and influence of science (ACSHE121) Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management

**Year 7 core link**
Measurement and Geometry (ACMMG159) Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving

**Year 8 optional links**
Measurement and Geometry (ACMMG199) Solve problems involving duration, including using 12- and 24-hour time within a single time zone

Use and influence of science (ACSHE136) Science understandings influence the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management

**Year 9 core link**
Physical sciences (ACSSU182) Energy transfer through different mediums can be explained using wave and particle models

**Year 9 optional links**
Nature and development of science (ACSHE158) Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries

Use and influence of science (ACSHE161) Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities