

Summary of Exhibit Concepts for *Earth Quest—Outer Space to Inner Earth.*

Astronomy Zone	Exhibit Message	Exhibit Description
1. Galaxy Gaze	The location of our Sun and other features in the Milky Way. Little is known about our Milky Way due to high levels of dust blocking the view for astronomers.	<p>An illustration of the Milky Way with points (A, B, C and D) marked on the area known as Orion’s Arm.</p> <p>Visitors can look through toy telescopes to view the astronomical features found at these points, including:</p> <ul style="list-style-type: none"> • the Sun • Pleiades star cluster • Orion nebula and • Crab nebula.
2. Spinning Sun	As the Sun spins, it bulges slightly at its equator.	<p>Turning a disc spins an attached ball, which represents the spinning Sun.</p> <p>At certain spinning speeds, the ball bulges around its middle, representing an exaggerated model of the Sun’s equatorial bulge.</p>
3. The Solar System	A model showing the order of planets in the Solar System and the time they take to orbit the Sun.	<p>A tabletop disc is divided up into eight separate rings with eight knobs (labelled with planetary symbols to planets of the Solar System, excluding Pluto).</p> <p>Each ring is marked with Earth months or Earth years and demonstrates how long it takes each planet to orbit the Sun.</p> <p>Planets closest to the Sun take months to complete their orbit, while planets beyond Jupiter take many years to orbit the Sun.</p> <p>The planets move separately and independently in their orbits, rather than moving in comparative orbits like a standard orrery.</p>
4. Seasons in a Spin	How the Earth's tilted axis and orbit around the Sun creates seasons on Earth by changing the angle of sunlight hitting Earth.	<p>A model Earth can be moved by hand in orbit around a model Sun. Pictures showing the season in each hemisphere when the Earth is at certain points of its orbit are shown on the tabletop.</p> <p>The model shows how the Earth is tilted more directly towards or away from the Sun at different times of the year at different points of its orbit around the Sun.</p> <p>The graphic panel also addresses common misconceptions about why seasons occur on Earth and describes how the angle of sunlight hitting Earth is responsible for the seasons.</p>

<p>5. Turn the Tides</p>	<p>Two low and two high tides occur on Earth every 24 hours. Tides are caused by the Moon orbiting the Earth.</p>	<p>Two tabletop graphics show:</p> <ul style="list-style-type: none"> • tidal/water bulges with the Moon orbiting Earth and • the Earth from the perspective of looking down onto the North pole. <p>As visitors spin the Earth graphic, the tide/Moon graphic underneath moves in ratio of 1:28 (moon orbit : Earth spins). This demonstrates how two matching high tides and two matching low tides occur on Earth roughly every 24 hours.</p>
<p>6. Size of Planets</p>	<p>A scaled comparison of the size of planets in our Solar System.</p>	<p>Transparent discs each have scaled pictures of individual planets with planetary symbols printed on them.</p> <p>The planets are not bound to their existing order in the Solar System. This allows users to swap the discs around and compare the size of any two or more planets in the Solar System, such as Pluto against Earth or Jupiter against Mercury, etc.</p>

Atmosphere Zone		
7. The Air Up There	The different layers of Earth's atmosphere and the natural features and aircraft that can be found in each layer.	<p>Separate acrylic arches are layered over a small globe of the Earth, representing layers of Earth's atmosphere.</p> <p>As each arch is flipped down or up, they reveal images of aircraft that fly in that particular layer or natural phenomena such as lightning, sprites, meteors, etc.</p> <p>The graphic panel lists each layer, the aircraft and natural phenomena found in that layer and the layer's true thickness (which cannot be shown to scale on the exhibit).</p>
8. Swirled World	How the Earth's spin and landforms generate weather patterns (Coriolis force).	<p>A clear Perspex globe is filled with a soapy solution and mounted on a spinning pole.</p> <p>When users spin the globe at different speeds or change the globe's direction of spin, they can observe swirling patterns being created in the viscous soap—particularly around the equator.</p>
9. What Weather	Predicting the weather (and judging the best clothing to wear) by observing clouds.	<p>This is a quiz, testing knowledge of cloud types and weather forecasting.</p> <p>Users read information about clouds, then look at unlabelled cloud photos on the tabletop exhibit. For each cloud picture, a ball must be placed next to a picture of the clothing that should be worn (snow gear, wet weather clothing, light sunny clothing, etc) if those clouds are in the sky.</p> <p>Answers can be checked by pushing a lever and checking which balls stay in place (indicating a correct answer) and which balls fall through (indicating an incorrect answer).</p>
10. Air Pressure	Air pressure changes as you reach different levels of the Earth's atmosphere.	<p>While pressing a button, users move a column up and down, to remove air from a glass dome.</p> <p>The removal of air (and drop in air pressure) can be seen by an expanding rubber diaphragm. This represents how air pressure decreases as you travel higher up into the atmosphere (explained on the graphic panel).</p> <p>When users walk away from the exhibit, the button (and valve) is released, resetting the exhibit for the next user.</p>

<p>11. What's in the Air?</p>	<p>Which gas is mostly commonly found in Earth's atmosphere—nitrogen or oxygen?</p>	<p>Users hold up a tray and complete a pie-chart puzzle, using pieces representing oxygen gas (blue) or nitrogen gas (red).</p> <p>While many people may think that Earth's atmosphere contains mostly oxygen, by completing the puzzle, users may be surprised to discover that nitrogen gas is the most common component of air.</p> <p>When the user walks away, the tray drops down and resets the puzzle for the next user.</p>
<p>12. Ozone</p>	<p>Explores facts and myths about the ozone 'hole', while testing visitor's knowledge.</p>	<p>A panel of information describes the ozone 'hole' and addresses some common misconceptions about ozone thinning.</p> <p>After reading the ozone information, users can take the ozone quiz. There are four questions or statements, labelled A, B, C and D. For each statement, a ball must be placed under the TRUE or FALSE column on the tabletop.</p> <p>Answers are checked by pushing a lever. Balls either stay in place (indicating a correct answer) or fall through (indicating an incorrect answer).</p>

Surface Zone		
13. Making Mountains	How movement of the Earth's crust causes the formation of some mountains on the Earth's surface.	<p>Wooden blocks that slide along tracks are used to model two types of mountain formation where:</p> <ol style="list-style-type: none"> 1. tectonic plates 'crumple' up against each other such as the Himalayan mountains or 2. one tectonic plates slips under another, pushing the top plate up into a mountain range such as the Andes mountains. <p>The wooden blocks reset by sliding back to a level position.</p>
14. Deep Sea Glow	Examples of deep-sea creatures that use bioluminescence to attract prey.	<p>Images of hatchet fish, siphonophore and dragon fish are printed on a tabletop disc. The images include phosphorescent vinyl. While the images are exposed to light the phosphorescent areas of the print 'absorb' light energy.</p> <p>Users look down through a viewing scope and turn the tabletop disc so each animal image comes into view. The viewing scope is darkened, so the phosphorescent vinyl glows, representing the bioluminescent glow these animals emit in the deep sea.</p> <p>Users can compare the appearance of the animals in the light and dark.</p>
15. Urban Jungle	Some animals have adapted to find homes in natural and urban environments.	<p>This 'lift and reveal' exhibit is particularly targeted at young children and their adult companions.</p> <p>Children search for six different animals in an urban scene by lifting panels.</p> <p>On a similar forest scene panel, children can search for the same six animals positioned in the trees, grass and water.</p>
16. Hidden Depths	The highest mountains and deepest trenches are found under the Earth's oceans.	<p>A tabletop graphic shows a mountain (Mt Everest) and a trench (Yarlung Tsampo gorge) on land and a mountain (Mauna Kea) and trench (Mariana trench) below the oceans.</p> <p>By sliding the underwater mountain and gorge up to a reference line, users may be surprised to find that these underwater features are higher and deeper respectively than the land features.</p> <p>The sliding mountain and gorge sink back down into position 'underwater' to reset for the next user.</p>

<p>17. Food Pyramids</p>	<p>Demonstrates how there are more animals at the 'bottom' of a food pyramid compared to the 'top'.</p>	<p>This four-tiered puzzle represents four levels of a food chain. Users must:</p> <ul style="list-style-type: none"> • insert the eight corn pieces into the tabletop • balance four mice shapes on the corn • hang two snake pieces over the mice and • balance the eagle on top. <p>This exhibit does not have a reset mechanism and may need to be reset by venue staff if they're passing by the exhibit.</p>
<p>18. Plants in Place</p>	<p>Plants have evolved different features to cope with different temperatures, light levels and water levels.</p>	<p>Once the tray is pushed in and clicked into place, users place tokens with plant photographs into a matching pot, with a landscape picture.</p> <p>Users can check if they correctly matched the plants to an environment by 'unclicking' the tray. If plant tokens fall through, they were correct. Wrong answers are shown where plant tokens stay in the pots.</p> <p>The cactus belongs in the desert, the mangrove tree belongs in the mangrove swamp and the fern belongs in the rainforest.</p>
<p>19. Living Cells</p>	<p>All living things are made from cells, from single celled paramecium through to plants and animals with billions of cells.</p>	<p>Enlarged microscope images of:</p> <ul style="list-style-type: none"> • a single paramecium cell, • plant tissue and • animal tissue <p>are printed on a tabletop disc, hidden from view by a cover.</p> <p>Users look down through a viewing scope and turn the tabletop disc so each microscope image comes into view.</p>
<p>20. Evolution</p>	<p>Different animals living in similar environments have evolved similar limbs and body shapes to move through their common environment. This is known as convergent evolution.</p>	<p>A column of four-sided cubes has pictures of different animals that move through the air, water and underground. These animals come from different classification groups, but have evolved similar limbs and body shapes to allow them to move in their environment.</p> <p>Users match up columns of animals according to their classification group (mammal, reptile, etc).</p> <p>Even though animals in a matching column belong to the same classification group, they look very different and may even look more like animals in other classification groups. For example, a Wallace's flying frog (amphibian) looks more like a flying lizard (reptile) than a fellow amphibian rubber eel.</p>

21. Landscape Journey	As you travel around Australia, you pass through many different ecosystems. These different landscapes differ in their temperature ranges, average rainfall and soil type.	A car knob is pushed to five different points on an Australian map. At each point (A, B, C or D), a photograph of the landscape in that area of Australia appears in a round window. The landscapes displayed in the window include: <ul style="list-style-type: none">• coastal• rainforest• desert• wetlands and• alpine.
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Sub-surface Zone		
22. Earthquake	Earthquakes are caused by stresses of tectonic plates moving against each other.	<p>A frame containing polyurethane pieces, covered by a polarising filter is held up to a light.</p> <p>As the user pushes a lever to shift the polyurethane pieces past each other, stress points in the polyurethane sheets can be seen, representing how tectonic plates push against each other, creating stress points and earthquakes.</p>
23. Volcanoes	Some erupting volcanoes create mountains by building up lava deposits over many years.	<p>The tabletop exhibit shows a volcano in cross section, with layers of previous lava flows and a volcanic vent.</p> <p>A lever is moved up and down to release waves of lava (represented by rubber strips) through a volcanic vent in cross section.</p> <p>As each strip comes out from the vent, it spreads out over the previous lava flow to gradually build up a mountain.</p>
24. Core Samples	Core samples allow scientists to study Earth's history and natural resources.	<p>Three landscapes (ice, ocean sea bed and continent) are shown on the exhibit tabletop.</p> <p>Users can pull up a column representing a geological core sample. Each column contains a photographic image of real core samples taken in Antarctica, the seabed off Victoria, Australia and a road cutting near Canberra, Australia.</p>
25 Surface to Core	Displaying Earth's sub-surface layers from the inner core to the crust.	<p>A metal ball hemisphere sits on the tabletop representing Earth's inner core. Separate acrylic arches representing layers of Earth's sub-surface are layered over the globe.</p> <p>Users can then pull each disc across and look down to see individual layers, or the whole of Earth's sub-surface, including:</p> <ul style="list-style-type: none"> • the outer core • the lower mantle mantle and • the upper mantle/crust. <p>As each arch is flipped down or up, they reveal approximate temperatures and layer thickness for that particular layer.</p>

26. Tectonic Plates	The Earth's crust consists of tectonic plates, which fit together like a puzzle (most 'joins' are on the ocean floor).	<p>A map of the world has been cut up into the major tectonic plates, so the pieces can be placed together like a jigsaw puzzle.</p> <p>Once complete, users can check the graphic panel to see the names of the tectonic plates and see where most earthquakes occur (on the boundary lines).</p>
27. Fossil Finder	Certain fossils can help scientists date layers of earth. These fossils lived for a certain period of time and are called index fossils.	A chest of four drawers represents an archaeological dig (with pick and real-scale ruler graphic on top of the chest). Each drawer must be pulled out to view a different fossil. Each fossil is printed on the graphic panel with its age, so users can work out how old that layer of earth is likely to be.
28. How Deep?	How deep humans have ventured into the Earth compared to other living things.	<p>A scaled down model, demonstrating the maximum depths that a mineshaft, penguin, whale and submarine have reached.</p> <p>These objects are shown graphically on the exhibit tabletop, with markers at the same starting point (sea level or ground level). By pushing a lever down, the markers sink to the depths that each animal or thing has reached (from 483 metres to 10 kilometres).</p> <p>Information on the graphic panel also describes how shallow these depths are compared to the thickness of Earth's crust and lists other recorded depths not shown on the interactive exhibit (due to scale).</p>
29. Exploring Earth	How do scientists know what is located within the centre of the Earth, having never been deeper than the crust?	<p>Three metal globes are filled with a:</p> <ul style="list-style-type: none"> • solid (sand) • liquid (water) and • gas (air). <p>When struck with the beater, each globe sounds and 'feels' different. After hitting the globes and trying to guess their contents, users can turn the frame upside down, which reveals a small window in the base of each globe so they can see the globe's contents.</p>
30. Dig a Hole	Explore where you would come out if you dug a hole through the centre of the Earth from different starting points.	<p>A globe of the Earth has pointers attached to the frame holding the globe on the tabletop. After moving one pointer to a chosen point, visitors can check the opposite pointer on the other side of the globe to gauge the point they would dig through to on the other side of the Earth.</p> <p>Users may be surprised to discover that they are most likely to emerge in the ocean if digging through.</p>