Classroom activities to do before or after a visit to the *Earth Quest* exhibition

Students gain most benefit from a visit to the Earth Quest exhibition when they undertake activities before (pre-visit) or after (post-visit) seeing the exhibition. This can involve doing a practical, hands-on activity or having a literacy class, using some background notes on the exhibits.

Information about the exhibits, including an exhibit summary and further information about the exhibit concepts can be found at http://www.questacon.edu.au/html/earth_quest.html. The support notes for each exhibit also contain links to further information for Background Research projects.

ASTRONOMY	
Galaxy Gaze	**Background Research** Do Astronomers have photographs of the whole Milky Way or the whole Universe? Have Astronomers photographed other galaxies close to the Milky Way? What is the nearest galaxy to the Milky Way? If you were an Astronomer taking photographs, what problems would you encounter? Print out a picture of the Milky Way. Where is the Solar System in the Milky Way? NASA Planetary Photojournal http://photojournal.jpl.nasa.gov/ Views of the Solar System (multiple languages) http://www.solarviews.com/ss.html Welcome to the Planets http://pds.jpl.nasa.gov/planets/welcome.htm David Malin images http://www.davidmalin.com/index.html Anglo Australian Observatory images of the Universe http://www.aao.gov.au/images/ Astronomy Picture of the Day http://antwrp.gsfc.nasa.gov/apod/lib/aptree.html An Atlas of the Universe http://www.anzwers.org/free/universe/ Links to Astronomy Education Activities http://antwrp.gsfc.nasa.gov/apod/lib/edlinks.html
Spinning Sun	**Background Research** The Sun bulges around its equator as it spins due to centripetal force. Information about centripetal force can be read at http://www.glenbrook.k12.il.us/gbssci/phys/mmedia/circmot/ucm.html **Activity** Cut a plastic or PET softdrink bottle in half. Take the bottom half of the bottle and punch small holes in a line around its middle. Punch two holes opposite each other near the top, so a string handle can be threaded through the holes. Place a soaked piece of material in the plastic bottle, so it reaches the holes. Twist the string handle many times, then let it go and watch how water travels out through the holes. The Sun's equator has a tendency to travel outwards like this, but it is pulled around (not allowed to escape like the water). Therefore, the Sun's equator bulges.
Size of Planets	**Activity and Background Research** Is it possible to build a small scale Solar System, showing the size planet and their distance from the Sun at the same time? It's harder than you think! Use The Exploratorium's Build a Solar System website http://www.exploratorium.edu/ronh/solar_system/. Students can individually or in small groups research and practice marking out a scaled model of the Solar System. They will soon

	realise how difficult it is to show planet size and their distance from the Sun in the same model.
Seasons in a Spin	**Background Research** Use NASA website about Seasons http://kids.msfc.nasa.gov/earth/seasons/seasons.htm Bad Astronomy website http://www.badastronomy.com/bad/misc/seasons.html **Activity** Use an electric light globe (Sun) and a globe of the Earth in a darkened room to represent how sunlight shines on the Earth's surface as it moves in orbit around the Sun (torch). Does the angle of sunlight change as it hits the hemispheres?
Turn the Tides	**Background Research** Choose the nearest coastal area to your town. What other body apart from our Moon controls tides on Earth? How many hours pass between low and high tides in one place? Tide Predictions for Australia and the Pacific http://www.ntf.flinders.edu.au/TEXT/TIDES/tides.html Tidal Predictions in the United States of America http://co-ops.nos.noaa.gov/tp4days.html Australia-wide tidal charts http://www.coastalwatch.com/tides.asp World-wide tide charts http://www.tides.info/ (type in location)

ATMOSPHERE	
What Weather?	**Background Research** Use BOM website Cloud Quiz http://www.bom.gov.au/lam/Students_Teachers/animations/cloudzstart.shtml **Activity** Make a wet/dry indicator from pipe cleaner and cobalt chloride solution. Soak the pipe cleaners in the cobalt chloride solution and let them dry. When the pipe cleaners are pink, this indicates dry weather. When the pipe cleaners are blue, this represents humid or rainy weather. Shape the pipe cleaners into a human form, design and paint a sign "If I'm pink it's dry. If I'm blue, it's wet." Collect weather predictions from local newspapers. Draw up a calendar chart of days and predicted weather. Write on the chart each day what cloud type was present. Next day, write the weather that was actually experienced.
Air Pressure	**Activity** Fill a flat-rimmed glass until it is almost overflowing. Gently slide a piece of cardboard or thin plastic across the top of the glass, so it sticks to the glass rim. While holding the cardboard firmly over the mouth of the glass, turn the glass of water upside down and remove your hand holding the cardboard in place. Does the cardboard fall off or stay in place? If the card is staying in place, what could possibly be holding it there?

SURFACE	
Deep Sea Glow	**Activity** Make papier mache models of deep sea creatures. Use fluorescent tape (available from hardware stores for placing on light switches, etc) or bioluminescent paint to decorate the creatures. Deep Sea Fish activity http://marinediscovery.arizona.edu/lessonsF00/tube_worms/2.html
Plants in Place	**Activity** Obtain a potted cactus and a potted fern or palm of similar size to the cactus. Place plastic bags of equal size over same areas of leaf. Water each plant with the same amount of water each day. How much water collects in the plastic bags over a few days? Does one plant seem to release less water than the other? Look at microscopic slides of cactus, casuarina leaves, geranium, elodea, etc. Count how many stomata 'holes' are on same areas of leaf. These stomata holes allow water to evaporate from the leaves. Obtain three leaves of the same size and with equal length stems off a plant. Obtain three small glasses (such as Vegemite glasses) and fill them to the three-quarter mark with water, with a thin layer of cooking oil on top of the water (to stop evaporation of the water from the glass). Rub some petroleum jelly (Vaseline) on the top side of one leaf, on the bottom side of the second leaf and leave the third leaf uncovered. Place the stems into the glasses so they are in the water. Watch the water levels over the next few days-which leaf drops the water level the fastest? If a leaf lowers the water level more, what does this indicate about the number of unblocked stomates it has? Do you think there are more stomates on the top or bottom layer of the leaf?
Evolution	**Background Research** Research similarities and differences between sharks and dolphins – how they move, breathe, swim, their senses, etc. What is meant by convergent evolution and divergent evolution?

SUB SURFACE	
Earthquake	**Background Research** You are attempting the world record in building the tallest stack of playing cards. You have a choice of building the stack in either San Francisco (United States) or Tokyo (Japan). Both of these cities are prone to major and minor earth tremors, and you must choose one or the other place. Which city would you choose to attempt your record? Are you best to try in a city with larger, but infrequent earthquakes, or a city with regular, much smaller earthquakes? http://quake.usgs.gov/research/seismology/wg02/ http://earthquake.usgs.gov/faq/#pred
Tectonic Plates	**Activity** Cut up a globe of the Earth into major tectonic plate pieces (check second hand stores for cheap, damaged globes). Try and piece the globe back together as a three dimensional globe. Cut up 2D map of tectonic plates. See if you can put the globe back together. Map of tectonic plates http://geology.about.com/library/graphics/crustalplates.gif
Fossil Finder	**Activity** Place a small seashell in a ball of plasticine, allowing a small access hole to run through the shell from the top and out the bottom of the plasticine. You can make the hole using a wooden skewer. Drop a little vinegar into a hole each day to dissolve the shell and allow gases from the chemical reaction of the shell breakdown to escape. This will be messy, so do it over a sink! Then, block one of the holes and pour a little plaster of Paris into the plasticine to create a cast from the mould left by part or all of the shell. Allow the plaster of Paris to set for a few days, then remove the plasticine to see your 'fossil'. **Background Research** How fossils form http://www.minerals.nsw.gov.au/minfacts/61.htm Australian Museum information about fossils http://www.austmus.gov.au/webinabox/fossils/resources/information.htm
How Deep?	**Activity** Students use a globe of the Earth to find out where they should start digging in the northern hemisphere, so they came out on a continent in the southern hemisphere. If you start digging in the northern hemisphere, are you more likely to come out in an ocean or through a continent in the southern hemisphere?
Exploring Earth	**Activity** Fill four aluminium soft drink cans with sand, liquid soap, water or air. As you hit each can 'feel' for any difference in the vibrations on the other side of the can. Is it easier to feel the vibrations through some fillings more than others? Do you think the Earth's layers are liquid or solid?

Dig a Hole	**Activity** Imagine it takes on average half an hour (30 minutes) to dig a hole 20 centimetres deep. If you need to dig 6 000 kilometres to the centre of the Earth, how long would it take if you dig at this rate? You may even like to experiment and see the average time taken for five students each to dig a 5 cm hole in the playground, using a ruler to measure depth, and setting the width at a certain number of centimetres. The class can then calculate how long it would take an average digger, the slowest digger and the fastest digger to reach the centre of the Earth.