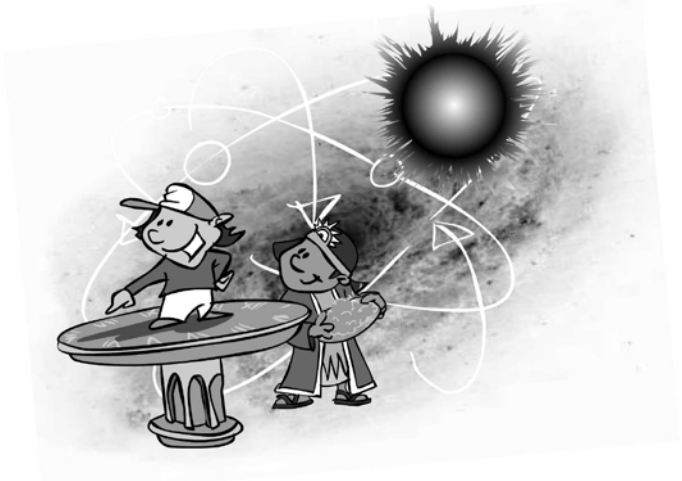

A G.A.T.E.WAYS JOURNEYS PROGRAM

invite gifted Year 5 and 6 children

with a love of science to

'IT'S HOT!!!"

G.A.T.E.WAYS is an independent organization offering challenging and enriching activities and experiences to develop and extend highly able children. This hands-on science *JOURNEY* will run over four mornings.

We live on the third rock from the sun. Just far enough away from the sun not to boil away all our seas like Venus, and yet close enough not to live on a solid ice block like Mars. We live in the Goldilocks zone. Not too hot, not too cold, just right according to Goldilocks. As far as we can tell, our planet is the only one with life and our star is the only one in a galaxy of billions of stars, which has satellites orbiting it and sentient beings watching its every move. The deeper one looks, the more amazing this gigantic nuclear furnace, our sun, becomes. The strength of the sun's gravity not only keeps our planet in the Goldilocks zone, it takes a million years for a tiny photon to escape the centre of its mass and to travel to the surface, whereupon it only takes that same photon eight minutes to reach us as light.

What do we know about the sun? To help get our head around aspects of the sun's character, each week we will make a number of simple, safe, scientific instruments. We'll make an instrument to measure the sun's changing height in the sky (Ptolemy's plinth). We'll measure its changing seasonal path with a simple obelisk. We'll measure the time it seems to cross the sky by making a sun clock or sundial. We will learn how to measure noon, the mid-point of the sun's trip across the sky, sometimes simply called due north. We'll use an instrument, the sun spotter solar telescope, for safely observing the sun's sunspots - even the sun has blemishes! We'll also make a *camera obscura*, which will help us understand how our eyes see sunlight.

Session One

This week we begin by learning about the way the sun was once worshipped as a god. Ancient Egyptians, Greeks, Romans and Aztecs believed the sun was the creator of all life. We make a very safe instrument which enables us to look at the sun and watch its speed without hurting our eyes. Why are the sun's rays so dangerous to our eyes? We also make an instrument which will track the sun's pathway through the seasons. We make four of these obelisks, one for each season. We also try to think of a way to use the sun as a compass. What are the tricks to finding north/south and east/west? How reliable is the sun? Does the sun actually move at all? Does the Earth always travel around the sun at the same speed? Does the Earth always spin at the same speed? When do we need to have leap years and leap seconds? Why don't we have leap months/days/ hours? We complete this session by making some beautiful sun prints.

Session Two

This week we try to make sense of the way the sun seems to move and yet we know it is the Earth which rotates and revolves around the sun. We will make a simple model of the Earth/ Sun system. This model will help us understand day and night as well as how we measure a year. We discover that many people had different starting and ending points for a day but the year took centuries to work out because we take 365 days plus several hours and several minutes to circle the sun and arrive back at our starting point. How did we know when the year started and ended? The sun produces some interesting shadows for us to investigate. We draw some long shadows and short shadows to see if we can change the mood of a drawing. We use shadows to help us make a sundial. The sundial was one of the first scientific instruments that tried to measure an hour. How did the day come to have 24 hours? Why couldn't we have had 20 hours in a day instead?

Session Three

This week we continue to think about some of the sun's mysteries such as why the sun appears bigger when it is rising and setting? We examine the way people see the sun when they draw it. What is the real shape of the sun? Could we draw the sun's actual shape with all its prominences? How does the sun cause rainbows? We look at lots of rainbows and try to figure out what time of the day they occurred. Have you ever seen a fogbow? We look at photographs of sun haloes, sun dogs and sun pillars. We learn how to look safely at solar eclipses with a camera obscura. When is the next solar eclipse? We also learn about planets that transit the sun like Venus in 2012 and 2004. We learn that Captain Cook's main mission in 1769 was to observe the transit of Venus and only as an afterthought travelled on looking for Australia. We use a special solar sun spotter telescope to find out if the sun has any visible sunspots and discover some interesting websites.

Session Four

This week we investigate our nearest solar neighbours. We try to understand the scale of the solar neighbourhood. How close is Proxima Centauri and why can't we see it? How far does light travel in a year? Some comedians have asked why we know the speed of light and not the speed of dark. We draw up a small map which shows some of the nearest stars to us. We consider how lucky we are living on a planet that is just the right distance from the sun, any closer and we would burn up like Venus and any further away and it would be very chilly like Mars. We make a simple instrument that uses a shadow to tell us how high the sun appears in the sky.
Note: You may be required to complete some homework between sessions.

About the Presenter

Tim Byrne worked at Melbourne museum and Scienceworks for 16 years. Tim Byrne has been very interested in our star, the sun, all his life. He remembers as a boy going to extreme lengths to get a tan and now that he is older realises the power and destructiveness of the sun's UV rays. He now wants to stay on the good side of the sun and enjoy all the sun's gifts without suffering sunburn again. Along the way, he has learnt how to monitor and measure the sun with some simple instruments that young students can enjoy too.

Requirements: A blank exercise book, pencil and hat
Week one: an empty PET bottle, from 500ml to 1.5 litre
Week two: some small plastic dolls or animals to draw
Week three: a shoe box (for camera obscura)
Also bring a small photo of yourself to session 1 and a stamped, self-addressed DL envelope for your report (put your name on the back)
Bring a snack each week (no nuts please