



# Table of Contents

<b>Introduction</b> .....	3
<b>Lesson: Me and My Shadow</b> .....	4
<b>Lesson: Making a Sundial</b> .....	6
Sundial and Protractor .....	7
<b>Lesson: What Shape Is the Moon Tonight?</b> .....	8
Parent Letter for Moon Observations.....	9
Student Moon Record.....	10
Classroom Moon Record .....	11
<b>Lesson: Moon Shapes</b> .....	12
Moon Phase Cutouts.....	14
The Phases of the Moon.....	15
<b>Lesson: The Moon in Motion</b> .....	16
Moon Flipbook Pages.....	18
<b>Lesson: Star Patterns</b> .....	20
Zodiac Constellations .....	22
<b>Lesson: Pictures in the Sky</b> .....	25
Parent Letter for Sky Observations .....	26
Southern Hemisphere Constellations .....	27
<b>Lesson: The Hunter</b> .....	28
The South Polar Constellations .....	29
The Saucepan in the Hunter .....	30
Orion.....	31
<b>Lesson: More About the Saucepan</b> .....	32
The Saucepan's Magic Arrows.....	34
Making a Model of the Saucepan .....	35
The Stars in the Saucepan .....	36
<b>Lesson: Scale Model of the Planets</b> .....	37
<b>Lesson: Scale Model of the Solar System</b> .....	40
<b>Lesson: Making a Comet</b> .....	42
Parts of a Comet.....	43
<b>Teacher and Student Resources</b> .....	44



# Introduction

Astronomy is perhaps one of the oldest sciences, since it was originated by the earliest civilisations. They used the stars to predict when to plant and harvest their crops and invented calendars and time according to the annual and daily motions of the sun. They invented star patterns (*constellations*) to create star maps of the sky. These ancient astronomers (*astrologers*) were interested in recording and then predicting the motions of the wandering stars (*planets*) and the moon, which they believed controlled human destinies. Modern astronomers recognise the contributions of these early scientists. Although we no longer believe in astrology, the legacy of observations made by the astrologers provided the foundation for mankind to learn about what we see in space and ultimately to venture out for a closer look.

This book is designed to help students see how easy it is to learn by observing what is happening in the sky, both day and night. It begins with a simple experiment to show students how they can use their shadows to learn about the sun's daily motion. They discover that the sun appears to move east to west, making their shadows change length and direction during the day. Proving that it is Earth which is doing the moving, and not the sun, was difficult for our ancient ancestors. For over 2000 years they believed that Earth was the centre of all we see in space, and everything – including the sun, moon, planets, and stars – revolved around our planet. Many of our young students have these same misconceptions. By following the shadow activity with a demonstration using a globe with a paper figure on it and the sun, the children can see that the shadow's changes can be created by the rotating Earth.

The mystery of why the moon changes its shape is solved through nightly observations and drawings students make of the moon from first crescent to full phase. This data is collected each night and then brought to school to be recorded on a classroom chart. The data is applied during an activity to simulate the phases of the moon, using styrofoam balls as the moon and a bright light as the sun. Even young children can begin to solve the mystery of the cause for the phases of the moon through these activities.

Using the ancient constellations, students begin to find their way around the night sky. They look at the pictures ancient astronomers superimposed on the star patterns and then invent their own modern constellations from these same patterns. Using the dot-to-dot method, the children find the saucepan and the hunter hidden in the sky. They place this pattern over the outline of a hunter which astronomers invented long ago for this set of stars.

Students also learn about the comparative sizes of the planets and their distances from the sun and each other. This is done using scale models created by the teacher to enable students to experience these concepts concretely. Finally students explore comets and simulate the ingredients that make up comets.



The students' families are involved throughout these activities which take place during and after school. Thus, the child has the opportunity to show his or her family that science is really fun.

# Me and My Shadow

## Teacher Information

The sun appears to move east to west across the sky each day. Most young children believe this is caused by the sun's motion. This lesson is designed to help children correct this misconception. A quick assessment of their understanding of the concept is done prior to the lesson. Using their own shadows and the shadow of a paper child on a globe, students learn through a simulation how the sun's apparent motion can be caused by the Earth's motion.

**Overview:** *Students will use shadows to demonstrate that the Earth is moving, not the sun.*

## Materials

- chalk
- large globe
- file card
- blu-tack
- scissors



## Pre-assessment

- Distribute paper to the students and have them make drawings that describe how they think day and night occur.
- Tell them to label their drawings. Let them share these in small groups.
- Save these drawings to compare them with the post-assessment drawings.

## Activity One

1. Early on a sunny day, take the students to an area where paving is available to do this activity. Have the students spread out so they can all see their own shadows. Explain that you will give them some time to play with their shadows to see what they can learn about them. Demonstrate how this can be done safely by pointing out your own shadow and how you can change its shape. Don't give too many suggestions; you want the students to discover on their own. Let students have about five minutes to investigate their shadows and then have them share what they have learned. Be sure they have discovered that their shadow looks just like their shape but shows neither colour nor complete features, such as a face.
2. Divide the students into groups of three and provide a piece of chalk for two members of each group. Explain that one member of the group will create a shadow and hold the pose while the other two draw around the shadow. They should begin by drawing around the shoes so the person will know exactly where he or she is standing. The entire shadow should be outlined. Let the student whose shadow has been drawn compare it to his or her actual size by lying on it with his or her heels in the outline of the feet. (*Alternate method:* Use string which is the same height as the student to compare the length of the shadow and the student.) Tell the students they will return to this same location in a few hours to see what has happened to their shadows.