

SOUTH AFRICAN PONY CLUB



Stargazer Achievement Badge Workbook



Objectives: To be able to identify 6 different stars/planets/constellations/galaxies

Key points:

- Know the difference between the numerous **types of objects** in the sky

Equipment: You will need

- Red Cellophane Squares/Elastic bands
- Star Charts

Helpful reading:

- Sasol First Field Guide to Skywatching in Southern Africa

Visit a Planetarium/Observatory: There are quite a selection of Observatories and Planetariums throughout South Africa doing regular shows on **The Night Sky**.

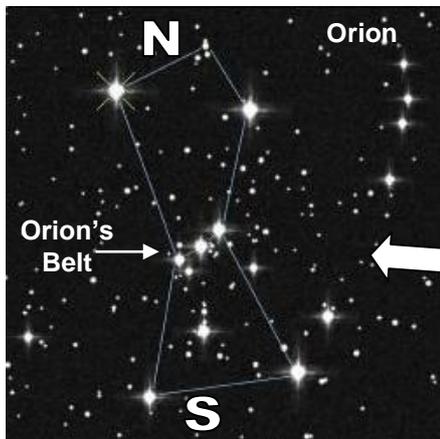
Ask your local Astronomical Society/Amateur Astronomer to do an evening's introduction to the badge. Look through a telescope and experience what the naked eye can't see.

NAME _____

BRANCH _____

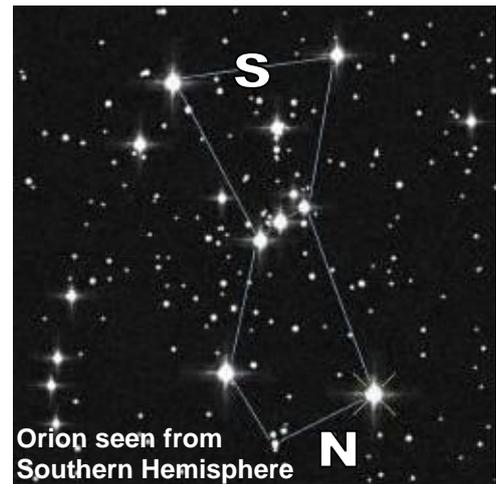
Introduction to Stargazing

Of the billions of stars, planets, comets and asteroids in the sky, about 2000 are visible to the naked eye.



Rural areas, away from city lights and pollution, are the best places to see these celestial objects.

Take Note: A constellation viewed or photographed from the northern hemisphere would appear inverted when seen from the southern hemisphere.



The Sun

The centre of our solar system, the SUN, is a star. And although it is about a million times larger than the earth, it is of average size when compared to other stars.

All the planets, dwarf planets (Pluto), asteroids and comets in our solar system, orbit the sun. Energy from this star in the form of heat & sunlight supports ALL life on earth.

The stars in the night sky are simply the suns of other solar systems and galaxies. How bright they appear is affected by their size, how hot they burn and their distance from earth.



The Planets

Order of the planets in our solar system as they orbit around the sun: **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.** Five of these planets are clearly visible to the naked eye: Mercury, Venus, Mars, Jupiter and Saturn. Unlike stars they do not twinkle, but shine and Venus is the usually the third brightest object in the sky after the Sun and Moon.



Galaxies

A galaxy is a massive, gravitationally bound system consisting of stars, gas and dust. **Our spiral galaxy, the Milky Way contains 200 billion stars and is at least 10 billion years old.**

There is a cluster of about 30 galaxies



called the **Local Group**, of which The Milky Way is one.

Other galaxies close to ours: The **Large Magellanic Cloud**, the **Small Magellanic Cloud** and **Andromeda**. The first two are only visible from the Southern Hemisphere.

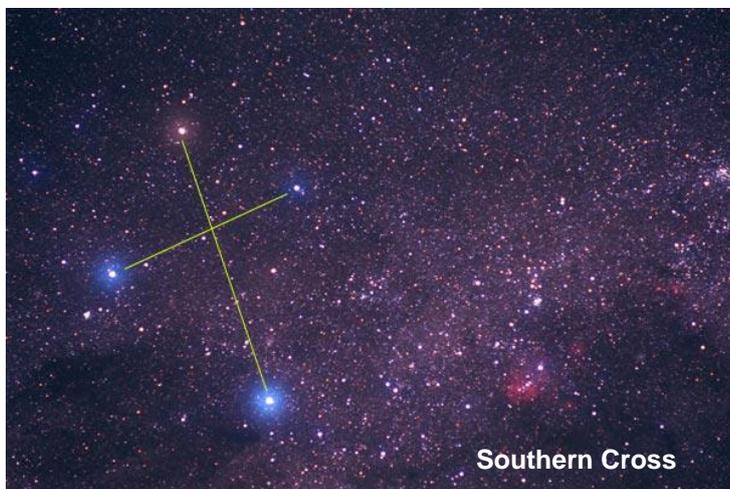
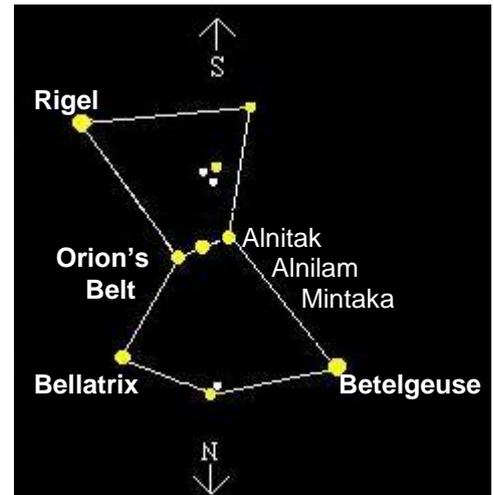
The Constellations

Astronomers have grouped the stars in the sky according to particular figures or shapes. By 2A.D, early astronomers had mapped 48 of the system of **88 constellations** that we have today. The 88 official constellations have exact boundaries, so that every direction or place in the sky belongs within one constellation. The far southern constellations were only added in 1751, when Abbé Nicolas Louis de la Caille visited Cape Town and measured the positions of nearly 10 000 stars in two-and-a-half-years.

A well-known constellation is **Orion**, also known as The Hunter, easy to recognise because of its 'belt'. Orion's belt is situated on the celestial equator, so it is visible from both hemispheres throughout the year.

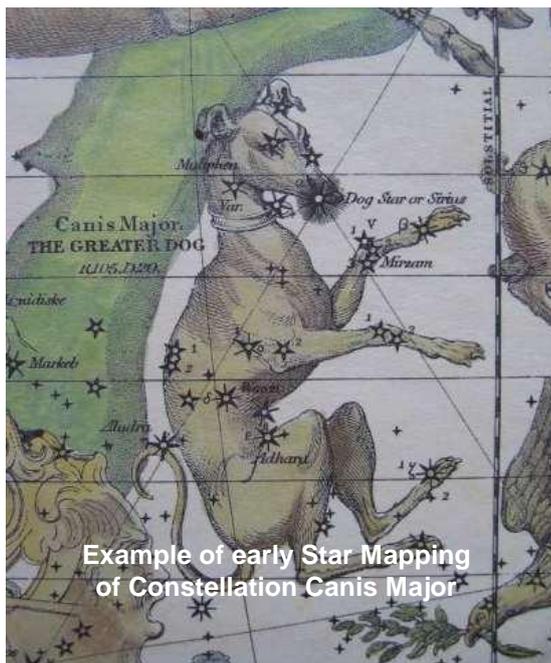
The main stars that form Orion: **Rigel**, **Betelgeuse** and **Bellatrix**.

The three stars in Orion's belt are also known as the Three Kings: **Alnitak**, **Alnilam** and **Mintaka**.



The smallest of the 88 constellations is the **Southern Cross** or **Crux**. Its four main stars mark a kite-like shape. The hot blue **Acrux** is situated at the base of the cross with the red **Gacrux** at the top.

A small telescope reveals that Acrux is in fact a double star. Gacrux is only red because the star has burned through most of its nuclear fuel. This constellation is very useful for navigation in the Southern hemisphere, because these stars are almost always visible.



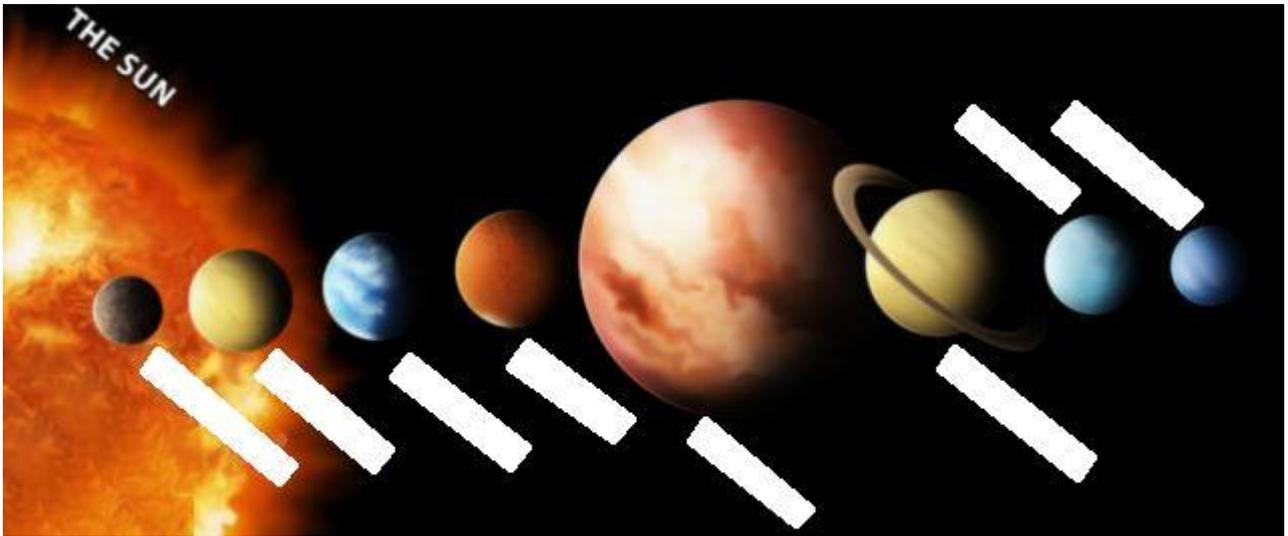
In the constellation **Canis Major** also known as The Greater Dog, is the star **Sirius**. This bright star is commonly known as the Dog Star.

Canis Major is found southeast of Orion.



Stargazing Revision:

Name these planets in their order from the Sun:



Name any three Galaxies a)

b)

c)

Name the biggest planet in our solar system

Name the brightest planet visible in our night sky

Name the three kings of Orion

Name the smallest of the official constellations

Which 5 of our planets are visible to the naked eye?

Name the red star in the Southern Cross Constellation and give the reason for the red colour

Why is the Sun so important to planet Earth?

What is Sirius commonly known as?

<u>Stars</u>	<u>Constellations</u>	<u>Planets</u>	<u>Galaxies</u>
Our Sun		Jupiter	<u>The Milky Way (our Galaxy)</u>
Betelgeuse →	ORION	Saturn	<u>The Large Magellanic Cloud</u>
Bellatrix →		Uranus	
Rigel →		Neptune	<u>The Small Magellanic Cloud</u>
Alnitak →	Mercury		
Alnilam →	ORION's belt	Venus	<u>Andromeda</u>
Mintaka →		Mars	
Acrux →	SOUTHERN CROSS		
Gacrux →			
Sirius →	CANIS MAJOR		

Helpful notes: The human eye takes 20 minutes to become fully accustomed to the dark. Torch light (needed for chart reading) can hinder the process. If you don't own a red-light torch, fit a piece of red cellophane over the clear glass of your torch to help with 'night vision'.

Make sure that the material you are working from (Star Charts/Guides) was produced for the Southern Hemisphere. It can be rather confusing otherwise.

Planetariums/Observatories in RSA: *Johannesburg Planetarium*
Hartebeesthoek Radio Astronomy Observatory, Magaliesberg
SA Astronomical Observatory, Cape Town
Cape Town Planetarium
SAAO Sutherland
Boyden Observatory, Bloemfontein
Port Elizabeth Peoples Observatory

Happy Stargazing!