

INTRODUCTION:

Astronomy is the study of the sun, moon, stars, planets, comets, gas, galaxies, gas, dust and other non-Earthly bodies or phenomena. NASA defines astronomy as simple “the study of stars, planets and space.”

Many people know about **Astrology** but it's no longer recognized as having anything to do with astronomy and is not a science.

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Historically, astronomy has focused on observations of heavenly bodies. It's a close cousin to astrophysics. Astrophysics is the study of the physics of astronomy and the behaviour, properties, or motion of objects in the universe. Modern astronomy is inclusive of Cosmology and Astrophysics. 'Astronomy' comes from the Greek words for star law and is the scientific study of all objects beyond our world. It's also the process by which we seek to understand the physical laws and origins of our universe.

BACK YARD VIEWING – GETTING STARTED

There is nothing complicated about looking up and at the night sky. Even if you are in a wheelchair or cant manage to see much there is still something to be enjoyed from your back yard.

Many people are over whelmed when they think about the vastness of all things in space. Astronomy is a highly sophisticated science and its easy to want to know or understand its fascinating obscurities. From your back yard its possible to see things which will keep you mesmerised. Astronomy at home is not about the complicated or obscure. It's about enjoying the things you can see. You need a clear cloudless dark night when the moon is small. The moons brightness makes it hard to see many features in the sky. Dress comfortably for the out doors and find a real dark spot to observe from. Away from street and house lights. It can take your eyes some time to settle down and get used to seeing in the dark.

We all approach Astronomy with different expectations and knowledge. **You don't need to start with expensive equipment.** Before you go off and buy a Telescope get advice from an experienced Astronomer. I'm told its surprising what one can see with the naked eye on a clear night. If you have a Telescope learn to look through it at things you can see and clearly understand. Know what is possible with what you have and enjoy using it.

Things to see:-

The Moon: the moon is one of the first and easiest things to observe. Its best viewing will be when its just a thin crescent. This is because when its like this the sun is casting light on it at a very sharp angle and the surface features will cast long shadows which makes them easier to see. With a full or near full moon the light hits the surface of the moon directly and casts no shadows.

The Milky Way Galaxy: Our solar system is part of a tremendous spiral galaxy called the Milky Way galaxy. You can see this galaxy as a band of diffuse light stretching across the sky.

The Constellations: Each constellation or picture pattern represents an object, animal, or historic figure. Many people enjoy learning the stories or legends behind the various constellations and finding these.

The Planets: The planets move around in the sky quite a bit and sometimes are too close to the sun to be seen. At least five of the planets are easily visible with the naked eye. They are Mercury, Venus, Mars, Jupiter and Saturn. Often they appear as the brightest objects in the sky. A rule of thumb for determining whether something is a star or a planet is whether or not it twinkles. Stars twinkle and planets do not.

Colourful Stars: Stars are not all white as many think. Stars are a variety of brilliant colours; bright red ‘Betelgeuse’ in Orion, the bright light-blue ‘Rigel’ also in Orion, the yellowish-white ‘Altair’ in Aquila, and the bright red ‘Antares’ in Scorpio.

Think about what you can expect to see and appreciate how the content of the space above your head changes week by week.

To maximize what you can see in the night sky there are a few things you should do as preparation. Of course the first thing you need is a clear and cloudless night. You should try to observe on a night with no moon; or at the least the smallest sliver of moon possible. Its brightness will wash out many of the dimmest and most dramatic objects in the sky. Second you should consider your comfort. Make sure you dress appropriately for the weather and bring extra layers of clothing if you are observing during cold months. The temperature late in the evening can be substantially lower than during the day and because observing the sky means not moving around much you will get cold. Take out with you any items to help your comfort such as a reclining lawn chair so you can look up without hurting your neck.

Find yourself a dark spot from which to observe away from street lights, city lights, house lights, or any other type of light source. If this is not possible then try to find the darkest spot you can. Man-made Light sources have an effect on the night sky, washing out dimmer objects and affecting your eyes by causing the pupils to close. This will decrease your ability to see the dimmer objects. It takes your eyes up to half an hour to fully adjust to the darkness and night vision.

Here is a good YouTube item about "Night Vision" <http://youtu.be/52D8M2d9yvw>

Night vision is the ability to see in reduced illumination or increased ability to see dim object, such as faint stars, due to a sensitization of the eye's 'rod' receptors. Exposure to bright light desensitizes the rods and therefore reduces night-vision.

If you go outside and immediately begin looking for objects in the sky you may be disappointed because your eyes haven't adjusted to the dark. Relax and take time to let your eyes fully adjust then you will be amazed at how much there is to see and understand.

Looking -

Its surprising what one can see with the naked eye on a clear night. If you have a Telescope **learn to look through it at things you can see and clearly understand.** Know what is possible with what you have and enjoy using it.

Its worth having a good clear un-cluttered star and planet chart. Because it will be dark outside you won't be able to read them! If you turn on a light or torch your night vision will be ruined. There is however a way to read charts and materials without ruining your night vision. Cover your torch with some type of red cellophane or tape so it only gives off a dim red glow. The red light will have less effect on your eyes so your pupils will not dilate.

Noting what you see -

My passion is for getting started. Its really important to appreciate the enormity of the heavens. Keep a diary or note book in which you describe in words you understand how things appeared to you. At first opportunity check out observations with either an experienced Astronomer or published Guide book. As a novice I have set myself two Astronomical tasks –

1. To view and understand the moon.
2. To locate and identify our planets.

Enjoy the night sky

There are a lot of dumb notions about stargazing and astronomy. Much of the science seems to be a challenge for the beginner.

The fun and enjoyment of a a dark night sky is accessible even if the moon is the only object you know about. You need not worry about all the strange words and big numbers when you are starting out in Amateur Astronomy. Taking time to pause and ponder the heavens is often best when you are relaxed and able to concentrate.

Its surprising what can be seen just with the naked eye but peering even deeper into the sky with inexpensive binoculars you will appreciate much more. Binoculars are not hard to use and are relatively inexpensive. The aim of any hobby is to have fun and enjoyment. Astronomy is something which can be enjoyed on your own or with friends.

Talk about it... Chat and check

Its important to be clear in your own mind about information and what it means for you. As a novice never feel you cant ask a question. You can and you should.

There are really two main branches of astronomy:-

- optical astronomy (the study of celestial objects in the visible band) and
- non-optical astronomy (the use of instruments to study objects in the radio through gamma-ray wavelengths).

Optical Astronomy: Today, when we think about optical astronomy, we most instantly visualize the amazing images from the Hubble Space Telescope (HST), or close up images of the planets taken by various space probes. What most people don't realize is these images also yield volumes of information about the structure, nature and evolution of objects in our Universe.

Non-optical Astronomy: While optical telescopes are sometimes considered the only pure instruments for doing astronomy research, there are other types of observatories that make significant contributions to our understanding of the Universe. These instruments have allowed us to create a picture of our universe that spans the entire electromagnetic spectrum, from low energy radio signals, to ultra high energy gamma-rays. They give us information about the evolution and physics of some of the Universe’s most dynamic treasures, such as neutron stars and black holes. And it is because of these endeavours that we have learned about the structure of galaxies including our Milky Way.

Subfields of Astronomy

There are so many types of objects which astronomers study, and so its convenient to break astronomy up into subfields of study.

Planetary Astronomy: Researchers in this subfield focus their studies on planets, both within and outside our solar system, as well as objects like asteroids and comets.

Solar Astronomy: While the sun has been studied for centuries, there is still a significant amount of active research conducted. Particularly, scientists are interested in learning how the Sun changes, and trying to understand how these changes affect the Earth.

Stellar Astronomy: Simply, stellar astronomy is the study of stars, including their creation, evolution and death. Astronomers use instruments to study different objects across all wavelengths, and use the information to create physical models of the stars.

Galactic Astronomy: The Milky Way Galaxy is a very complex system of stars, nebulae, and dust. Astronomers study the motion and evolution of the Milky Way in order to learn how galaxies are formed.

Extragalactic Astronomy: Astronomers study other galaxies in the Universe to learn how galaxies are grouped and interact on a large scale.

Cosmology: Cosmologists study the structure of the Universe in order to understand its creation. They typically focus on the big picture, and attempt to model what the Universe would have looked like only moments after the Big Bang.

Even though man has studied the heavens for thousands of years, we still know very little about the Universe we live in. And as we continue to learn more, we are consistently amazed, and sometimes confused, by what we learn.

Some things to talk about

Here is a collection of ten amazing, interesting, and strange astronomy facts, in no particular order which you might like to consider and talk about.

(1) Scientists believe that we can only see about 5% of the matter in the Universe. The rest is made up of invisible matter (called Dark Matter) and a mysterious form of energy known as Dark Energy.

(2) Neutron stars are so dense, that a soup can full of neutron star material would have more mass than the Moon.

(3) The Sun produces so much energy, that every second the core releases the equivalent of 100 billion nuclear bombs.

(4) Galileo Galilei is often incorrectly credited with the invention of the telescope. Instead, historians now believe the Dutch eyeglass maker Johannes Lippershey as its creator. Galileo was, however, probably the first to use the device to study the heavens.

(5) Black Holes are so dense, and produce such intense gravity, that even light can not escape. Theoretical physicists predict that there are situations under which light can escape (which is called Hawking radiation).

(6) Light from distant stars and galaxies takes so long to reach us, that we are actually seeing objects as they appeared hundreds, thousands or even millions of years ago. So, as we look up at the sky, we are really looking back in time.

(7) The Crab Nebula was produced by a supernova explosion in 1054 A.D. The Chinese and Arab astronomers at the time noted that the explosion was so bright, that it was visible during the day, and lit up the night sky for months.

(8) Shooting stars are usually just tiny dust particles falling through our atmosphere. Comets sometimes pass through Earth's orbit, leaving trails of dust behind. Then as Earth plows through the dust in its path, the particles heat up, creating the streaks in the night sky.

(9) Even though Mercury is the closest planet to the Sun, temperatures can reach -280 degrees F. Why? Since Mercury has almost no atmosphere, there is nothing to trap heat near the surface. So, the dark side of Mercury (the side facing away from the Sun) is very cold.

(10) Venus is considerably hotter than Mercury, even though it is further away from the Sun. The thickness of Venus' atmosphere traps heat near the surface of the planet.

Since the beginning of time humans have marvelled at nature and what it provides. The things above below and within us have fascinated many.

Gather and understand information to the best of your ability. If you don't know simply ask. Never fudge it and pretend you know or understand. Seek clarification and test what you hear against the things which are known and clearly agreed upon. Make notes for yourself and share them with your Astronomy friends. These notes arise out of my own interest in the wonders of Astronomy. As a new comer I soon came to realise there is much to be learned and understood about the ever expanding panorama which is the Sky. As a new Astronomer listen intently and engage in conversation about what is before you. Many think Astronomy is about seeing the panorama of deep space. I have very real difficulty seeing the stars and appreciate it when people take the time to help my understanding. Astronomy may be about looking and seeing but for me understanding and visualisation in the mind is as important. I enjoy reading about what others have seen and documented.

When beginning in Astronomy have a simple strategy of inquisition which you can become master of.

Keep things clear and simple.

- Look at objects you can confidently identify.
- Gather information to support your learning and experience.
- Share your observations and experience with others.
- Belong to and be active in a local Astronomy group.
- One of the most important tools for a new Astronomer is 'the art of 'reflective conversation'

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These notes have been compiled for your pleasure. You can email the author at Kiwilittle@inspire.net.nz

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