

# THE MONTHLY SKYGUIDE

The Monthly Sky Guide is accredited as part of Bristol University's Open Learning programme. The credits gained on this course will be recognised nationally, and are freely transferable among all Continuing Education institutions as units towards a Certificate in Open Studies.

To gain the full 12 credits allocated to this course, you must satisfy the following conditions:

1. Regular attendance
2. Submission of all required coursework within the time limits set.
3. Demonstrate mastery of the subject material (and skills embodied) to the required degree set by the University.
4. Payment of course fees.
5. Return of any materials belonging to the University e.g. library books (etc.)

Assessment will take the form of three components weighted as follows:

6. An observing diary detailing observations of the night sky over an 8 week period detailing subject, observing conditions and sketches of objects as seen by naked eye, binoculars or telescopes (40%).
7. A series of short answer questions on a variety of topics covered during the course (40%).
8. An astronomy scrapbook containing news stories of an astronomical nature culled from printed or electronic media (20%).

The pass mark is set at 40% for the combined total.

Candidates achieving this will be awarded the full 12 credits.

Failure to achieve this level will result in no credits being awarded.

You will be notified in writing of your success/failure after moderation by the Chief Examiner.

This happens twice a year (Autumn and Summer) and for this reason it is not possible to formally award credits until some time after the course has finished - please be patient!

Coursework will obviously have to be retained until moderation. If you want this to be sent back to you, you must provide an appropriate S.A.E. (It is also acceptable to submit photocopies of original work for assessment purposes)

## Assessment Tasks

As a general guide, the **observing diary** should have a minimum of 20 observations which may be as simple as a description of the phase of the Moon and observing conditions, or it could be a sustained telescopic observation of the Moon or planets. Particular attention should be paid to recording scientific information such as date and time and astronomical properties such as magnitude, coordinates and seeing. Sketches are to be encouraged, even by those not considering themselves artists! A hardbound lined or sketchbook is recommended, but observations may be made on separate sheets and bound together in a folder.

The **Astronomy scrapbook** should really be a vibrant collection of stories, opinions and references to literary and visual works designed to give cultural context to Astronomy. These may also be your own interpretations of facets of astronomical knowledge, poetry, snippets of novels, and basically anything that allows you to connect and embed this knowledge into everyday life.

The **questions** are as follows:

### Life cycles of stars

- a) Stars seem to be twinkling pinpoints to the naked eye. What actually are they? Why do they seem to twinkle?
- b) Briefly describe the three main stages in the formation of a typical (Sun-like) star. Over what timescales do each of these stages occur?
- c) What is the expected lifetime of the Sun, and how much longer has it got? As it grows old, theory predicts it will go through three phases. Briefly describe these phases in terms of the energy changes and structural adjustments made by the star.

### Extending Your Vision

- a) Give two ways in which you can make the best use of your eyes when observing
- b) There are two basic types of astronomical telescope; the refractor and reflector. For each type state two advantages and two disadvantages. What advice would you give the following people regarding a choice of astronomical instrument? (Justify your advice)
  - A 12 year old just getting into the hobby
  - A casual observer wanting to look at a variety of astronomical objects, from the Moon and planets to faint galaxies and nebulae without too much trouble
  - A keen amateur who wants to make detailed observations of Saturn and Jupiter.

### The Sun

- a) How does the apparent motion of the Sun across the sky change during the year? Why do we have seasons?
- b) How big is the Sun relative to the Earth and how far away?
- c) Describe a method for observing the Sun safely. List two features that could be observed using this method.
- d) The Aurora Borealis and Aurora Australis are dramatic and beautiful phenomena. What is their cause?

### The Moon

- a) What does it mean to say the Moon is the Earth's satellite? How big is it and how far away?
- b) The Moon appears to go through a regular cycle of phases. How long is this cycle and why does it happen?

- c) Briefly describe what happens to produce a solar and a lunar eclipse respectively
- d) What is the origin of lunar craters and why are they so well preserved?
- e) What is the currently favoured theory for the origin of the Moon?

### **The Inner Solar System**

- a) How does the planet Mars appear to move against the background stars throughout the year? What explanation was originally postulated for this effect? What is the true cause of this motion?
- b) Briefly describe the general layout of the solar system, together with the motions of its constituent bodies.
- c) The inner planets; Mercury, Venus, Earth and Mars are collectively known as the terrestrial planets. What similarities are shared by all of these bodies. For each planet, characterise two aspects of its "planetology" that make it unique.
- d) Why should the planets Venus and Earth have such different environments despite being of similar size, density and composition?

### **The Outer Planets**

- a) Give three characteristics shared by the outer planets (Jupiter, Saturn, Uranus and Neptune).
- b) How do scientists explain the difference between these properties and those of the inner terrestrial planets?
- c) Describe three features of the Jovian system that you could see with a small telescope.
- d) Saturn is famous for its rings. What are they made of, and how does their appearance change with time?
- e) The moons of the outer planets fall into three categories. Describe each of these categories, together with an example.
- f) Pluto seems to be the "odd one out" in the solar system. Give two reasons why this should be the case. What is the probable origin of Pluto?

### **Asteroids, Comets and Meteors**

- a) What is an asteroid and where are you likely to find one? How was the first one discovered?
- b) What is the nature of a comet, why does it have a tail? Where do we think they come from?
- c) What is a "shooting star"? When are you most likely to see one?
- d) Meteorites are classified into three groups. Describe their properties and possible origins.
- e) How likely is it that Earth will be struck by a sizable (10km wide) astronomical object? What would be the consequences of such an event?

### **The Milky Way**

- a) Briefly describe the shape and size of our galaxy and the Sun's position in it.
- b) For each of the following objects, describe: i) its nature, ii) its location in the galaxy and iii) where you would find a good example in the night sky.
  - open cluster
  - emission nebula
  - globular cluster
  - Bok globule

### **Galaxies**

- a) When was it first realised how far away the Andromeda "nebula" really is? How was its distance measured, and by whom?
- b) What constitutes our "Local Group"?
- c) How have galaxies traditionally been classified?
- d) What happens when galaxies collide?
- e) What is a quasar?
- f) Describe the large scale structure of the Universe as we currently understand it.

### **Cosmology**

- a) In the past, the Universe was thought to be infinite in extent and duration. This is highly unlikely. For what reason?
- b) Scientists now favour the "Hot Big Bang" model of creation. What three pieces of evidence are there for this view?
- c) According to the standard model, how old is the Universe and how long after the Big Bang did it settle down to its familiar state?
- d) What are the possible futures of our Universe? What factor governs which of these will take place? What do current measurements predict?