You are looking through a small telescope at a celestial object, and you have convinced yourself that it is not the Sun, Moon, a planet, a single or multiple star, a satellite, a meteor, or something lower in the atmosphere. What is it? How do you tell?

The key below may help. It is an example of a "dichotomous key", such as are regularly used for identification of species in biology, or for performing complicated analyses in chemistry. It works like a flow chart, or like a game of "Twenty Questions". You start with the first question. Depending on the answer to each question, you may be led to another, or given a possible identification.

The key is neither perfect nor complete, but I believe it will lead to the right answer for many objects, and will indicate how one might usefully think about the problem. Observers should find it useful with telescopes as small as 50 mm aperture.

START HERE:

1) Is the object visible only after consumption of significant quantities of consciousness-altering substances?

   YES: Call Art Bell. (Art Bell hosts a U.S. radio talk show that frequently discusses UFOs and paranormal phenomena.)
   NO: Go to step 2.

2) Does the object move noticeably, with respect to the distant stars, from night to night, or perhaps even from hour to hour?

   YES: Go to step 3.
   NO: Go to step 4.

3) The object is probably part of the solar system. Is it star-like in appearance, even under moderate to high magnification?

   YES: The object is probably an asteroid.
   NO: The object is probably a comet.

4) The object probably lies beyond the solar system. Is it dark, seen in silhouette against a brighter background?

   YES: The object is probably a dark nebula.
   NO: Go to step 5.

5) Examine the object with a variety of magnifications. Is there any sign of resolution into stars? Dark sky and excellent seeing

are particularly valuable for this step.

YES: Go to step 6.
NO: Go to step 7.

6) Is the object well-resolved at low or medium magnification, with perhaps only a handful of stars seen, or with noticeable dark space between the stars? Alternatively, is resolution difficult, with the object appearing at most granular, or with stars crowded densely together?

WELL-RESOLVED: The object is probably a galactic cluster. Note that young galactic clusters are occasionally associated with HII regions and reflection nebulae.
RESOLVED WITH DIFFICULTY: The object is probably a globular cluster.

NOTE: Compact or distant galactic clusters are hard to distinguish from globular clusters, with very small telescopes.

7) In dark sky, examine the object with a narrow-band light-pollution filter, such as the Orion Ultrablock or the Lumicon UHC, at low to medium magnification. Is the contrast of the object against the background sky markedly improved, compared to what it was with no filter in use?

YES: Go to step 8.
NO: Go to step 9.

NOTE: A prism or a piece of diffraction grating, held between the eyepiece and the observer's eye, can also be used for this step, as can a specially built eyepiece spectroscope. If the spectrum of the object is comprised mostly of a few bright lines, go to step 8; if not, go to step 9.

8) The object is probably an emission nebula. Is it highly symmetric in shape, perhaps even round? By "symmetric", I mean "would the object look much the same after reflection in a mirror?"

YES: The object is probably a planetary nebula. A supernova remnant is an alternate, extremely rare, possibility.
NO: The object is probably an HII ("h-two") region. HII regions are often associated with reflection nebulae or with galactic clusters.

NOTE: There is no guarantee that HII regions will not be round or symmetric -- any such will be hard to tell from planetary nebulae.

9) Is the object highly symmetric in shape, perhaps even round? By "symmetric", I mean "would the object look much the same after reflection in a mirror?"

YES: Go to step 10.
NO: The object is probably a reflection nebula, though an irregular galaxy is an alternate possibility. Reflection nebulae are often associated with HII regions or with galactic clusters, and are most commonly found in or near the plane of the Milky Way.

NOTE: The Crab Nebula, a well-known young supernova remnant in Taurus, keys out to step 9, but is not one of the objects described in the formal part of the key.

10) Is the object round?

YES: The object may be a galaxy, or possibly a globular or a galactic cluster, that was not resolved in step 5. It is hard to tell which. The object's position in the sky may provide a useful hint of its nature:

If the object is more than a few degrees away from the Milky Way, it is probably not a galactic cluster. (There are moderate numbers of galactic clusters more than a few degrees from the Milky Way, but they are mostly easy to resolve, and so would not have keyed out to this step.)

If the object is more than a few tens of degrees from the Scorpius/Sagittarius boundary, it is more likely a galaxy than a globular cluster.

If the object is close to or within the plane of the Milky Way, it is less likely a galaxy, than if it is farther away.

NO: The object is probably a galaxy -- a long elliptical, or a spiral seen obliquely.