Portrait of a Constellation III. Non-stellar and exotics

45 points

Due:_____

Objective:

Discover some of the non-stellar and exotic objects in your constellation.

Materials:

A computer and Starry Night; internet access; your text; possibly other books.

What to Do:

Research 6 non-stellar and/or exotic objects in your constellation. Mark the objects on your constellation portrait. Write a brief but informative report, with the following sections: (1) summary remarks about non-stellar and exotic objects in your constellation; (2) a data table for the 6 objects; (3) a sketch and a brief report for each object. Plan about 1/2 page for the summary and data table and no more than 1/2 page per object.

Types of objects to look for:

- stellar groupings:
  - clusters: globular clusters, open clusters
  - multiple star system (3 or more stars gravitationally bound)
  - spectacular double stars (2 stars with very different colors)
- nebulae:
  - bright nebulae: emission or reflection or planetary
  - dark nebulae: Bok nebulae, other dark nebulae
- galaxies: spiral, elliptical, irregular, dwarf
- exotic objects, such as
  - variable star
  - supernova remnant
  - X-ray source, gamma ray burster
  - black hole candidate
  - pulsar
  - recurring nova
  - white dwarf, brown dwarf
  - stellar dust disk
  - extrasolar planet candidate
  - meteor shower radiant

Choose as wide a range of object types as you can. For example, if your constellation has 6 galaxies, 1 open cluster, 1 extrasolar planet, and 1 pulsar, you should include only 3 of the galaxies in your report.

If a single object falls into two or more categories, then the write up must include a section for each category. For example, if a globular cluster contains white dwarfs, then the write up must have a paragraph about the globular cluster as a cluster, and a second paragraph about the white dwarfs and why they are interesting.

If you cannot find 6 objects within your constellation border, then contact me for some help finding things. Don't wait until the last minute!

Steps:

(1) Read the *Starry Night* Companion.pdf file pages 164-172. This contains a decent summary discussion of clusters, nebulae, and other interesting objects.

(2) Identify and research your objects.
Begin your study with *Starry Night* Messier objects. Turn on labels of Messier objects (click Messier in the Labels pull-down menu). Note the objects listed. Use the Info Window to learn about them.

You will need to use other sources to complete your study of the objects in your constellation.
Try these:

- Astronomy Picture of the Day
  http://antwrp.gsfc.nasa.gov/apod/
  Hint: Use the "Search" feature (buttom at the bottom the main page) to search the site

for references to your constellation. You will need to use the astronomical name (*Scorpius* not *Scorpio*; *Ursa Major* not *Big Bear*).

- Students for the Exploration and Development of Space (SEDS):
  Constellation descriptions - http://www.seds.org/Maps/Const/const_family.html
  Messier object index - http://www.seds.org/messier/data2.html
- Hawaiian Astronomical Society
  Deep Sky catalog constellation list - http://www.hawastsoc.org/deepsky/constellations.html
  Deep Sky object lists (Caldwell, Messier, etc) - http://www.hawastsoc.org/deepsky/lists.html
- Burnham's Celestial Handbook, vols. 1-3 (available in the JHU Eisenhower library on the Homewood campus, or ask to use my set).
- the planisphere; your text book (check the index, for example)
- back issues of *Sky and Telescope* or *Astronomy* (check with your local astronomy club, or visit the MD Space Grant office in this building)
- Books on astronomy with binoculars or small telescopes (check your county's libraries).
- The more complete astronomy Field Guides or Pocket Guides
- Other reliable sources you may find.

Document your sources!
If you don't understand the sources for an object, either ask me or drop this object and find something else.

(3) (5 pts) Create the data table. Include the following information:

- name
- Messier, Caldwell, NGC or other number
- Right Ascension
- Declination
- distance (light years (LY), parsecs (pc), kilo-parsecs (kpc), mega-parsecs (Mpc): use what makes sense for each object)
- object type
- in our galaxy?

(4) (5 pts) Mark the location of each object on your constellation portrait. Use the RA/Dec display options in *Starry Night* for help.

(5) (5 pts each, max of 30) Write the object summaries. Be sure to include **(a)** a thumb-nail sketch of the object as it appears to the eye in a small or moderate sized telescope, in a box roughly 1-2 inches on a side, and **(b)** a written summary of the information displayed in the table for the object. Interpret the data (*eg* the diameter of this globular cluster is twice as big as the full moon). Also address other points: who first observed it, historic significance, color, strange behavior. **If** you are writing about an exotic object which can't be seen in a moderate telescope, then sketch some other type of interpretation of the object (*eg* a drawing which shows the size of the planet's orbit for an extrasolar planet; a drawing of a pulsar model; etc.
Document your sources!

(6) (5 pts) Write summary remarks about the non-stellar and exotic objects that can be found in your constellation.