

# Reflector

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**Youth & Astronomy Part III**  
**ALCon 2014, San Antonio, Texas**  
**Deep Sky Objects: M42 and the Trapezium**  
**Asteroid CCD Photometry and Light Curve Analysis**

The Orion Nebula, M42, is not a very challenging object to find and observe. The nebula is visible to the unaided eye at the midpoint of Orion's Sword in the constellation that bears this mythological figure's name. While not easily identifiable as a great nebula without optical aid, this behemoth, gaseous stellar nursery is easily identified in a telescope of any size.

As is the case for most deep-space objects, the larger a telescope's aperture, the brighter the object appears and the more detail that can be seen. Very large light buckets, say 20 inches (0.5 m) and larger, will even show color when viewing M42.

Photographic imaging of M42 brings out much more color and detail than can ever be seen by the human eye. However, if the human eye could see color in dim light, the accompanying photograph depicts the way the nebula's blue and red hues would probably appear. This image is a 50-minute exposure using a Canon 30D camera with a 190 mm f/5.3 Maksutov–Newtonian telescope.

At the center of this famous nebula lies a grouping of four stars, ranging from 5th to 8th magnitude, called the Trapezium, which is easily visible in small telescopes. The challenge for eight-inch and larger telescopes is finding the fainter companion stars to the main Trapezium stars.

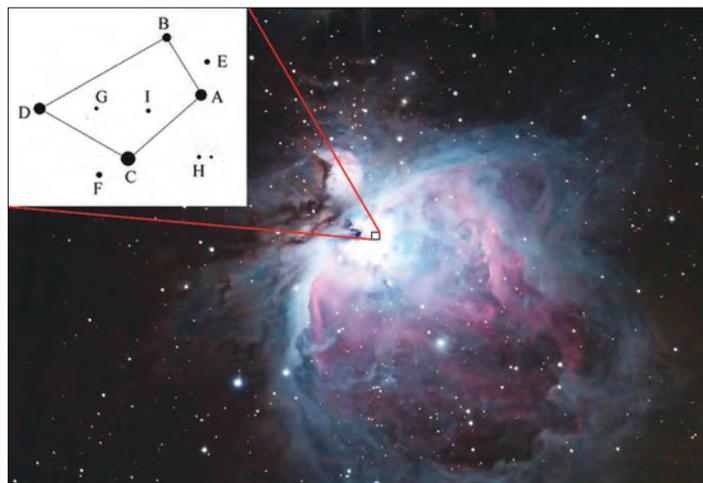
The Trapezium obtained its name because the four brightest stars form a slightly skewed trapezoid. The shortest side of the trapezoid is 8.7 arcseconds, while the longest side is 19.2 arcseconds. The entire cluster fits within a circle half an arcminute across. Very steady seeing and high magnifications (I recommend 200x or greater) are required to find the fainter members of this small star cluster.

The box in the center of the image shows the approximate location of the Trapezium,

# DEEP-SKY OBJECTS

## M42 AND THE TRAPEZIUM THIRTEENTH OF A SERIES

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although the Trapezium is much smaller than the size of the box. The close-up schematic has the stars labeled with letters to aid in their identification.

The southernmost star in the Trapezium, labeled C, is the brightest at magnitude 5.1. The next brightest is the 6.7 magnitude D star, located on the east side of the grouping. The other two Trapezium stars, A and B, are variable stars. A varies from magnitude 7.5 to 6.7, while B varies from magnitude 8.0 to 8.5. The cluster also contains six fainter stars from 10th to 15th magnitude. Keep in mind that every five magnitudes span a factor of 100 in brightness. Therefore, a 5th-magnitude star is 100 times brighter than a 10th-magnitude star and 10,000 (100 x 100) times brighter than a 15th-magnitude star. It follows that the stars in the close-up section of the image span four orders of magnitude in luminosity!

The two 10th-magnitude Trapezium companion stars can be seen with 8- to 10-inch

telescopes. These are labeled E and F. The stars labeled G, H (a doublet), and I, all between magnitude 14.5 and 15.5, are difficult to see in all

but the largest amateur telescopes. The G star and H star are magnitude 14.5. I have seen both in a 14-inch f/6 reflector at 200x under extremely dark and steady skies. The I star is magnitude 15. My schematic shows H as a double star. The components are 2 arcseconds apart. The fainter component is magnitude 15.5.

It is extremely difficult to photograph the fainter stars in the Trapezium without using a large professional ground-based or orbiting telescope. Because of the proximity of the stars, a long focal length is needed to spread out the stars and the glow of the Orion Nebula, so the nebula doesn't drown out the fainter stars. Hubble Space Telescope images of the Trapezium are fantastic and easily show many more, fainter stars than those on the accompanying schematic. These images verify that a star cluster is forming out of the gases around the Trapezium. ☼

### Deadline Approaches for the Mabel Sterns Newsletter Editor Award

The Mabel Sterns Newsletter Editor Award recognizes the work of club newsletter editors across the country.

The deadline for submissions is March 31, 2014. The names of both the newsletter editor and the nominating club officer must appear on the general membership roster of the Astronomical League.

The nomination package should contain a letter from the club president or vice president explaining why their newsletter editor should be considered for the award, a recent issue of the newsletter, and a photo of the newsletter editor, preferably in an astronomical setting. Listing the club's website where electronic copies of past newsletters are posted is also helpful. In addition, the postal address of the newsletter editor should be included.

The newsletter nomination materials may be submitted by any of these three methods:

1. The preferable method is emailing the materials. The supporting club letter and an issue of the newsletter should be attached in Adobe PDF format, although Microsoft Word format is acceptable. The editor's photograph should be attached as a high-resolution JPEG. Please email entries to [SternsNewsletter@astroleague.org](mailto:SternsNewsletter@astroleague.org).

2. If electronic submission is not possible, paper copies may be mailed to the League's national office. Four copies of the letter of recommendation and four copies of the newsletter are required. Only one copy of the photograph is needed.

3. If the newsletter is available on the club's website, then its web address should be given along with any password required to access it. The editor's photograph (JPEG) and club recommendation letter (PDF) can be submitted by email as instructed in method 1.

It is strongly recommended that the Astronomical League's logo be prominently displayed in the newsletter, preferably on the front page.

For complete information about the 2014 Mabel Sterns Award program, please see [www.astroleague.org/allawards/sterns/sternss.html](http://www.astroleague.org/allawards/sterns/sternss.html).