

Supercharged Science

Deep Sky Objects

We are going to focus on deep sky objects you can see with your eyes, with binoculars or even a small telescope, so after our session together, you can simply walk outside, look up, and understand what you're looking at.

Celestial Objects:

M51 Whirlpool Galaxy in Big Dipper

Mizar & Alcor in Big Dipper

Albireo in Cygnus the Swan

M31: Andromeda Galaxy

M42: Orion Nebula

M45: Pleiades Open Cluster

M44: Beehive Open Cluster

M13: Hercules Globular Cluster

M92: Globular Cluster

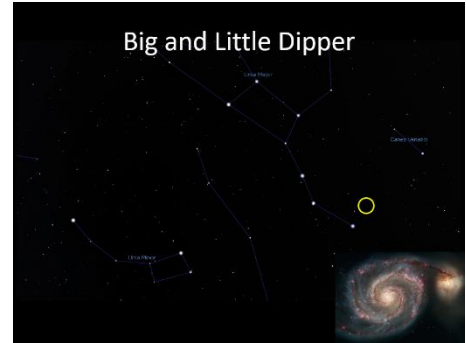
NGC 6210 Turtle Nebula in Hercules

Owl Cluster in Cassiopeia

Whirlpool Galaxy

Galaxies are huge collections of gas, dust, and billions and billions of stars. Many of those stars have solar systems, and everything is held together by gravity.

Some galaxies are spiral-shaped like the one we live in and they have curved arms like a pinwheel. The one pictured here you can see tonight with binoculars if it's really dark (mag 8.4). It's right below the handle of the big dipper.



Double Stars

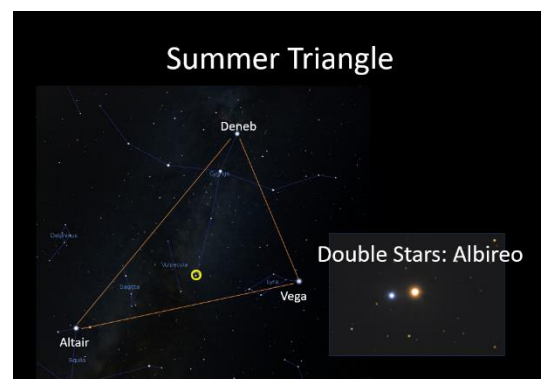
Double stars are more common than single stars! A binary system is one where there are two suns that orbit around a common center of mass and are also gravitationally bound to each other. Astronomers estimate about 85% of the stars are in binary systems, some with triple suns or even higher!

There are also *visual doubles*, which mean the stars look like they are orbiting each other, but they just happen to look like it – they are not orbiting each other.

Mizar and Alcor are two stars forming a double you can see with your naked eye in the handle of the Big Dipper. Mizar is the second star from the end of the Big Dipper's handle, and Alcor its fainter companion. You can see this with your binoculars! Mizar is actually four stars, and Alcor is really two stars, so you have six stars when you think you're seeing the double!



Albireo will appear to your naked eye as one star, but when you use binoculars or a small telescope, you see two stars of very different colors. The brighter yellow (mag 3.2) is contrasted with the fainter blue companion (mag 5.4). We think Albireo might be a true binary star system, meaning that the stars aren't just appearing to be next to each other, they really do orbit around a common point. The stars are about 430 light years from us, so it is hard to tell, so scientists are measuring the velocities of the stars to be able to tell.



Andromeda Galaxy

The Andromeda galaxy is a spiral galaxy, and is the largest one in our local group. It's more than twice the size of our own Milky Way, and it would take our rocket ship over 40 billion years to travel there. This galaxy is actually pretty close to us, astronomically speaking, and you can see this one in the night sky near Cassiopeia without binoculars! (mag 3.4)

Star Clusters: Open

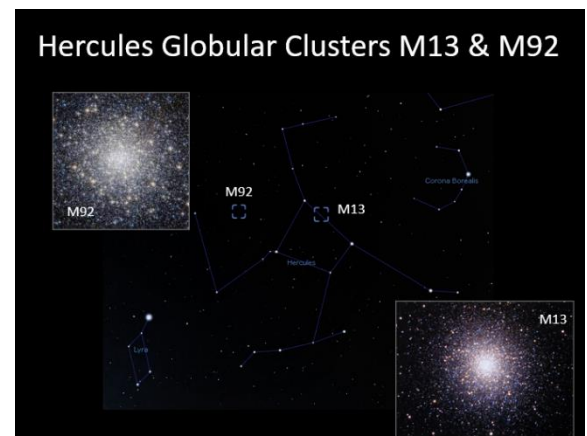
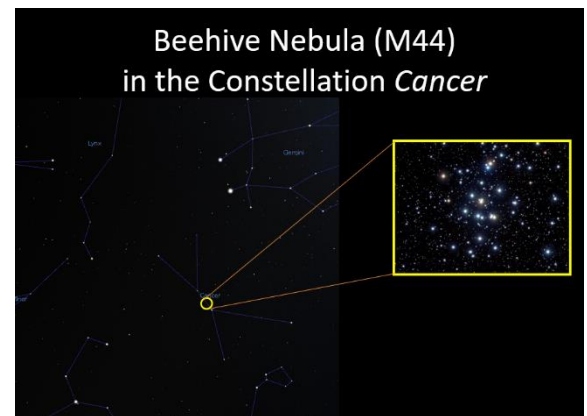
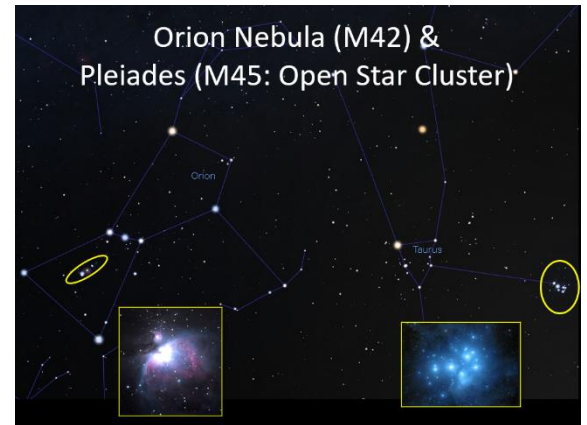
Open clusters are one of the two types of star clusters. They are usually found within the galactic plane and nearly always found within the spiral arms of galaxies. They have a few hundred stars and aren't very populated, kind of like living in the country instead of the city. The Pleiades is an open star cluster you can see with your naked eyes, and look even better with binoculars!

The Beehive Cluster is an open cluster in the constellation Cancer, and it's one of the nearest open clusters to us. A lot of the stars are really bright, and you can see this cluster in binoculars as well as with your naked eyes! (mag 3.7)

Star Clusters: Globular

Globular clusters are the other kind of star cluster, where each bright dot is a star. These stars are packed in a tight ball by gravity, kind of like being in New York City – everybody lives close together.

M13 and M92 in Hercules are both globular clusters, and M13 you can see with binoculars (mag 5.8). It contains several hundred thousand stars! This image was taken by a backyard telescope. Globular star clusters are only about 10-30 light years across.



Equipment Recommendations:

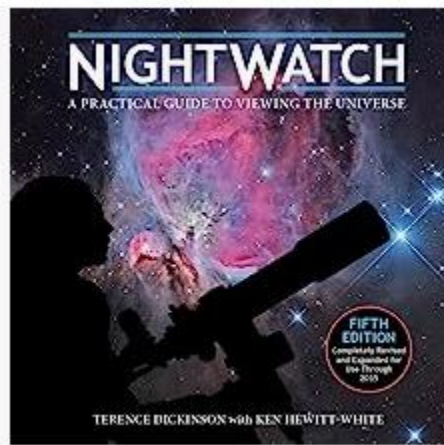
For Beginners:

Star Chart: www.SkyMaps.com

Planetarium Software: www.Stellarium.com

Binoculars for Astronomy: Celestron [Cometron](#) 7x50 Binoculars (\$35)

Starter Books: *Nightwatch* by Terence Dickinson



After you learn the night sky using the items above, then you can think about:

A Dobsonian Telescope!

Sky-Watcher has inexpensive telescopes that work well for beginners. Choose one of these:

[Classic 150P](#)

[Classic 200P](#)

