

Navigating the Sky



Constellations

- in a **dark** sky ~3000 stars are visible to naked eye
- **constellation**: one of 88 (unequal) regions of sky
- 50 ancient & 38 modern
- many **constellations** originated ~4000 years ago in **Mesopotamia** (Sumerians)
- many constellations renamed by the **Greeks**

- objects **permanently** residing within constellation boundaries **belong** to that constellation

Q: What objects aren't part of constellations?

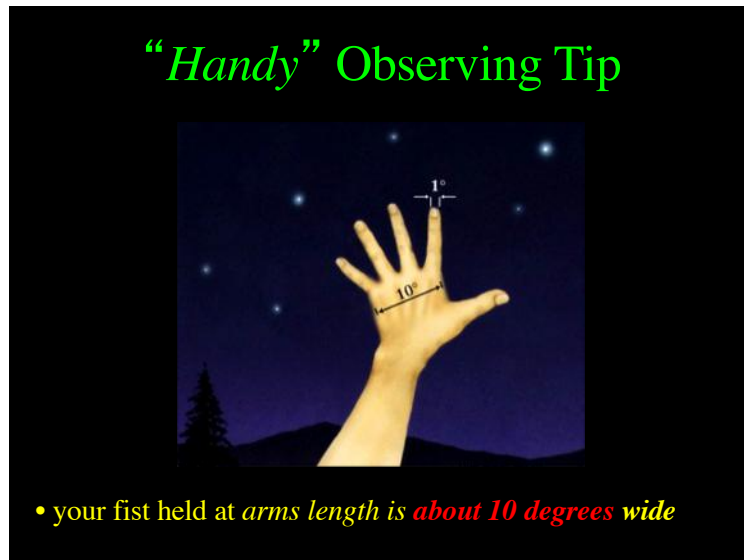
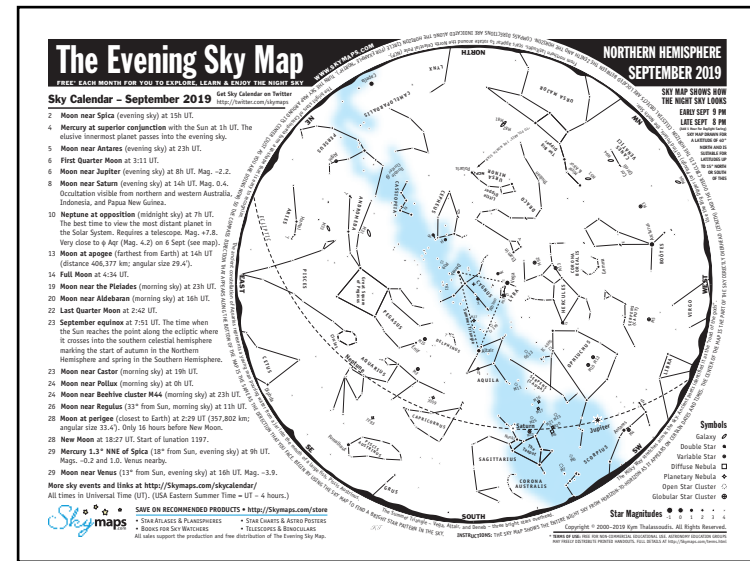
- **asterism**: small named portion of a constellations or a stellar grouping extending across constellations

(eg) **Big Dipper** is an asterism in **Ursa Major**
 (eg) **The Summer Triangle** extends across constellations **Cygnus, Lyra & Aquila**



CLICKER: Which of the following statements about constellations is **false**?

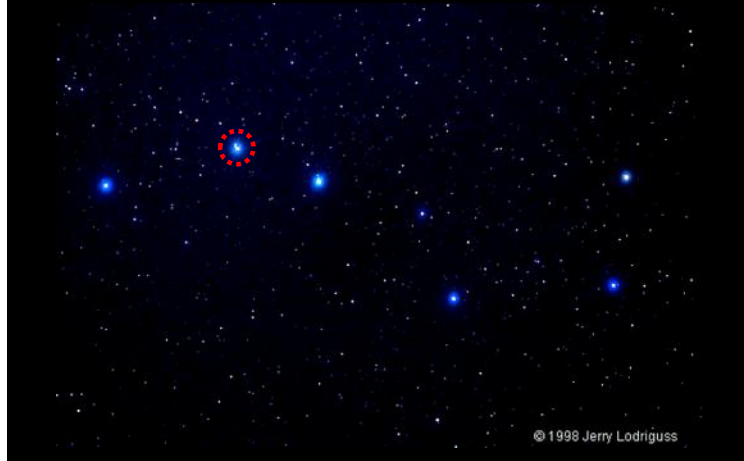
- constellations are patterns of stars in the sky
- there are 88 official constellations
- some are visible from both N & S hemispheres
- some are visible in both winter & summer



The Big Dipper (asterism)

- **Big Dipper:** asterism in *Ursa Major* (“Great Bear”)
- **circumpolar:** never sets due to proximity to *Polaris*
- always visible at night from Nanaimo
- easy to find: “**bucket**” & “**handle**” portions
- **7 relatively bright stars & large size**
- Zeus' lover *Callisto* changed to a bear by *Hera*; Zeus saved her and their son *Arcas* by placing both in the sky

The Big Dipper

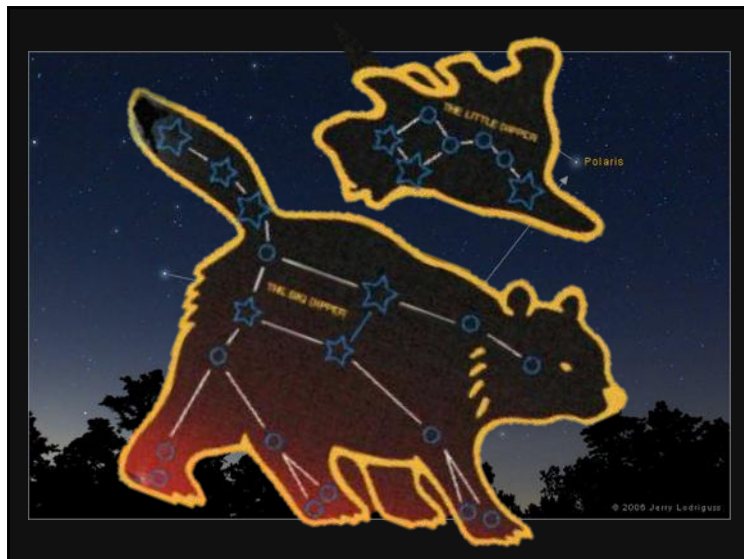


Finding *Polaris* (“North Star”)

- connect *last two stars* of the “*bucket*” of the *Big Dipper*
- follow this line to *Polaris (F7II)*, a *Cepheid variable star*

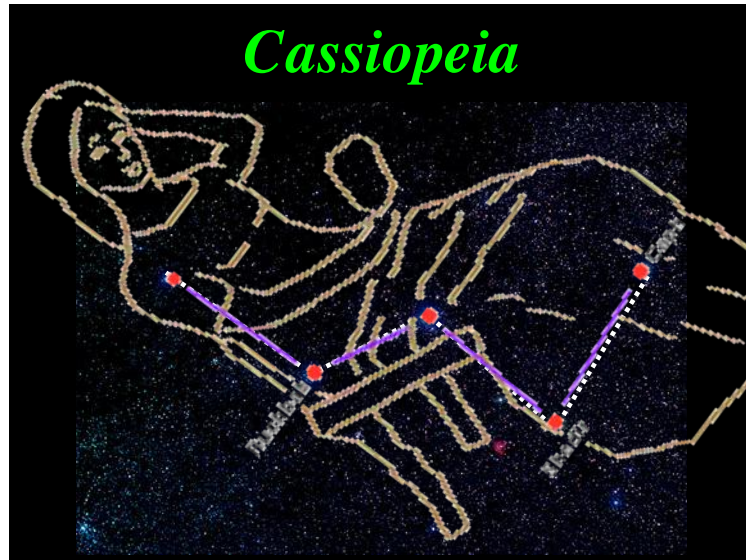


- *Polaris* is in *handle* of *Little Dipper*, an *asterism* within *circumpolar constellation Ursa Minor* (“*Little Bear*”)



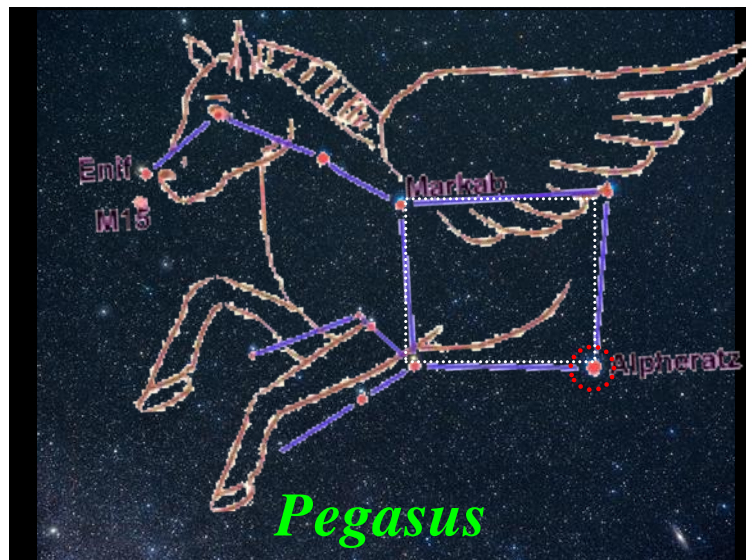
Cassiopeia (*constellation*)

- *Cassiopeia* in the *northern* sky; contains *Milky Way*
- *asterism* has an “*M*” or “*W*” or “*E*” shape
- *Queen of Ethiopia*; her husband *Cepheus* is nearby, as are daughter *Andromeda*, *Perseus* and *Pegasus*



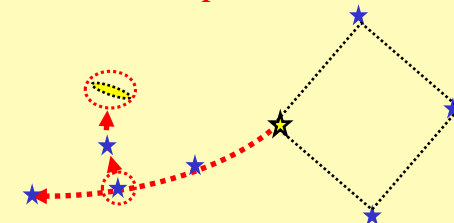
Pegasus & Andromeda (constellations)

- winged horse of *Perseus*
- known for “*Great Square*” of *Pegasus*
- daughter of *Cassiopeia*
- chained to rock as a sacrifice; rescued by *Perseus*
- *Alpheratz* (“horse's navel”) (B8IV)
- formerly in *Pegasus*; now belongs to *Andromeda*
- *Andromeda Galaxy* (M31)
- *most distant naked-eye object*



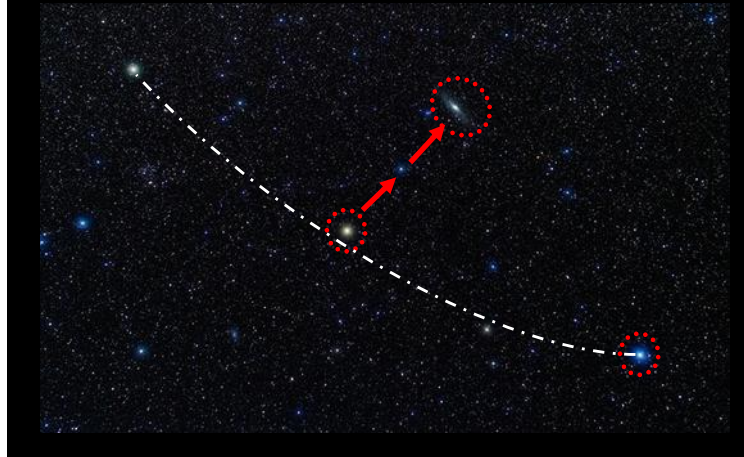
Finding M31

- find *Pegasus* & start at *Alpheratz*



- move along *brighter arc* to *second major star*
- move “*upward*” to next *visible star*
- move “*upward*” again by same *distance*: *M31*

Andromeda Galaxy (M31)

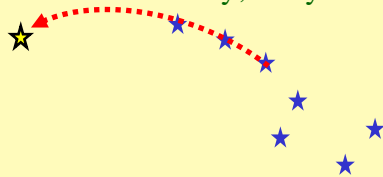


Andromeda Galaxy (M31)



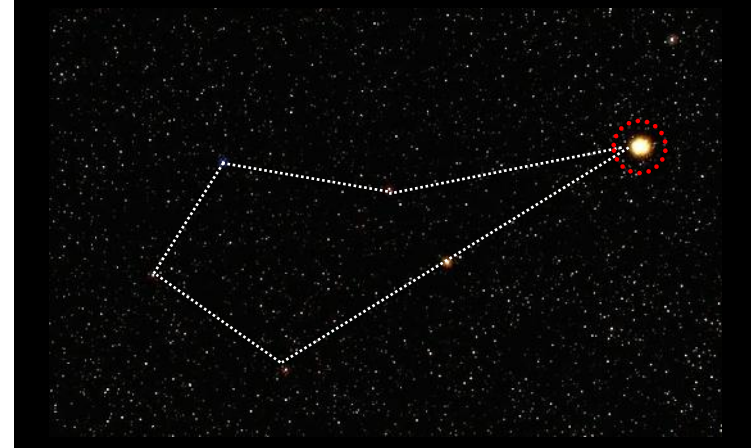
Boötes (constellation)

- **“The Herdsman”**
- **Arcturus** (“Bear Watcher ”) (K2III)
- 4th *brightest* star in the sky; 37 ly away



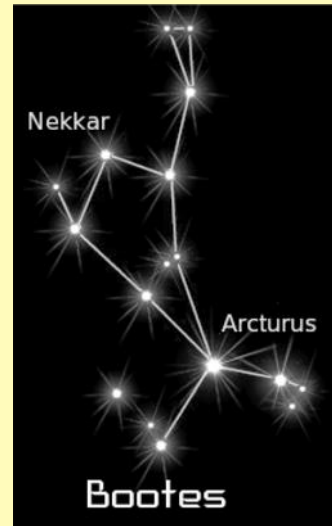
- follow *curve of Big Dipper's handle* away from *bucket*
- **“arc to Arcturus”**

Boötes



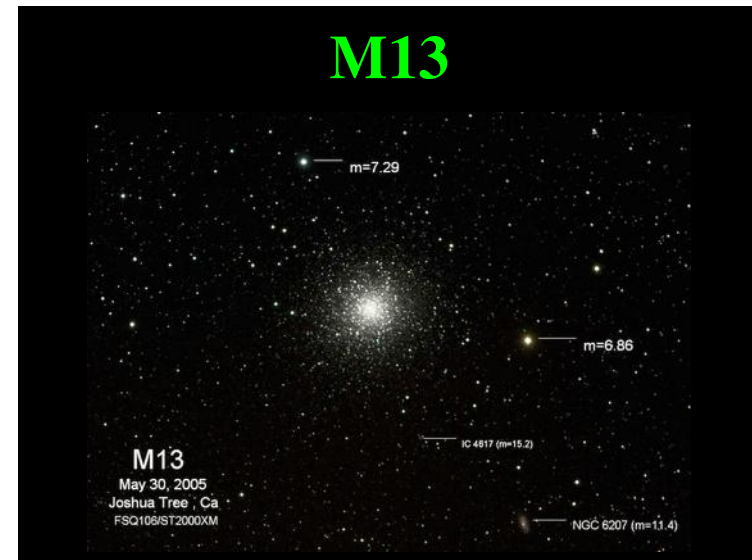
CLICKER: What does
Boötes look like to you?

- (a) herdsman
- (b) kite
- (c) necktie
- (d) other



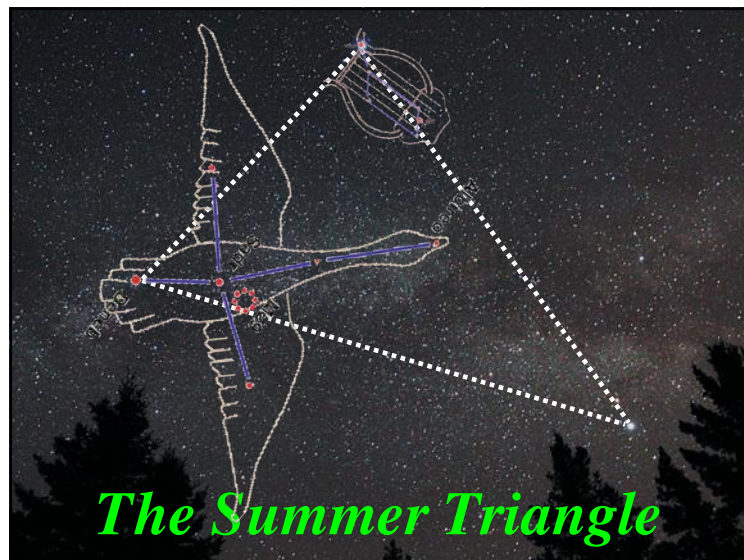
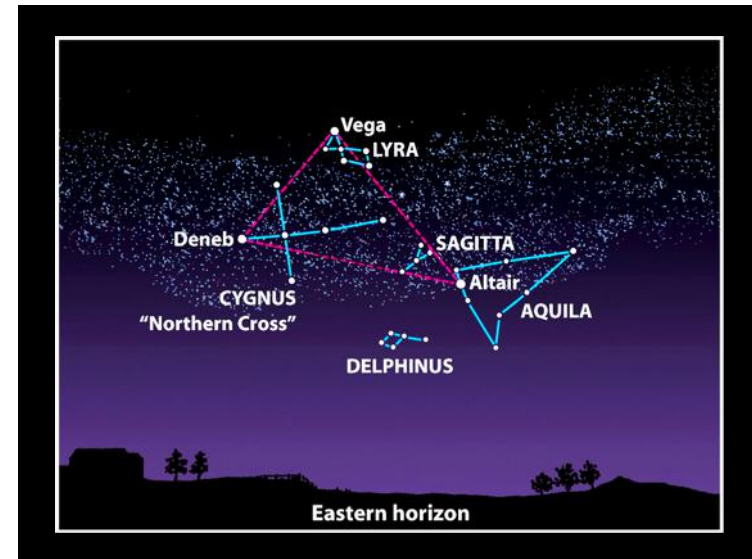
Hercules (constellation)

- Greek hero, famous for his “**12 labours**”
- defeated **Leo** & the **Hydra**
- “**keystone**” (~ size of **Big Dipper's** bucket)
- **M13** is a **globular cluster** of 500,000+ stars
- ~ 12 Gy old
- **Arecibo** sent a radio message to **M13** in **1974**
- **25,000 ly away**, so we'll have to wait a while...☺



The Summer Triangle (asterism)

- **Vega** in **Lyra** (“Harp” – Orpheus) (A0V)
 - 5th brightest star in the sky; 25 ly away
 - ~3 times size of our Sun
- **Altair** (“flying one”) in **Aquila** (“Eagle”) (A7V)
 - 12th brightest star in the sky; 16 ly away
 - spins rapidly (equatorial “bulge”); ~2X size of our Sun
 - Zeus' eagle, tortured **Prometheus**; killed by **Hercules**
- **Deneb** (“Hen's Tail”) in **Cygnus** (“Swan”) (A2I)
 - 18th brightest, ~2500 ly away; 25 times mass of Sun
 - enormous star as big as orbit of Mars!



Size Comparison: Stars of the Summer Triangle



CLICKER: *The Great Square is located in... ?*

- (a) Cassiopeia*
- (b) Pegasus*
- (c) Andromeda*
- (d) Ursa Minor*

