

# Choosing a Telescope



Peterborough Astronomical Association  
Novice Astronomy Class #12  
March 3, 2023  
Brett Hardy

## Prerequisites

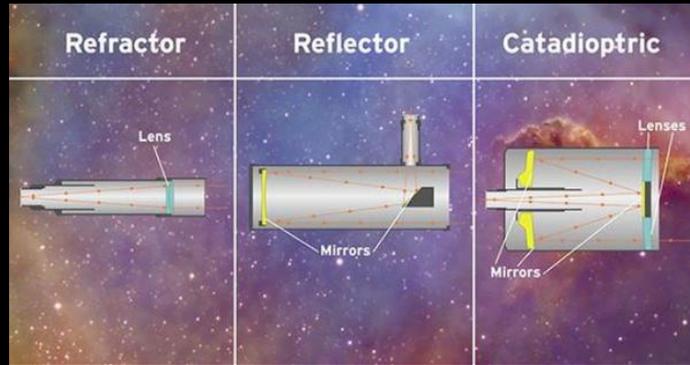
- You have spent at least 6 months or more using your unaided eyes, binoculars and a planisphere navigating the night sky
- You can recall the names of bright stars and can find them in the night sky
- You can identify and locate many constellations & popular asterisms
- You know what the ecliptic is and know where to find it
- Congratulations!



Rick Stankiewicz

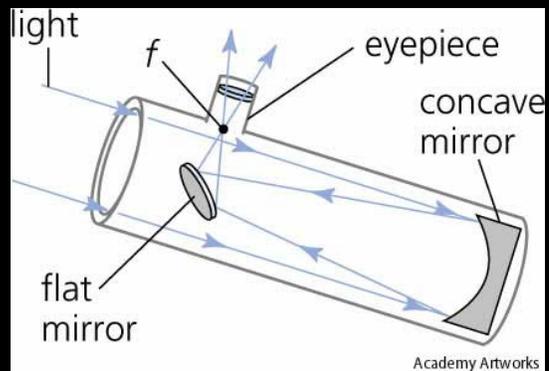
Types of Telescopes

- Three basic types:
  - refractor
  - reflector
  - catadioptric

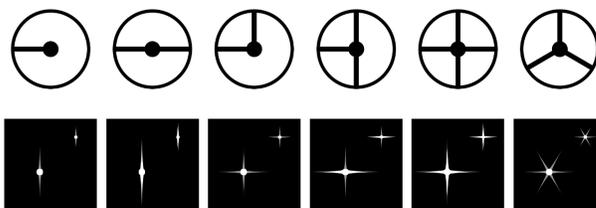


Newtonian Reflector

- Utilize mirrors
- Open tube design
- Two types:
  - solid tube
  - truss tube
- Central obstruction
- Least expensive
- Easier to make in larger apertures
- No chromatic aberration
- Coma
- Diffraction spikes
- Fast focal ratio options
- Large apertures get heavy quickly
- Large mirrors require extended cooling time
- Require collimation



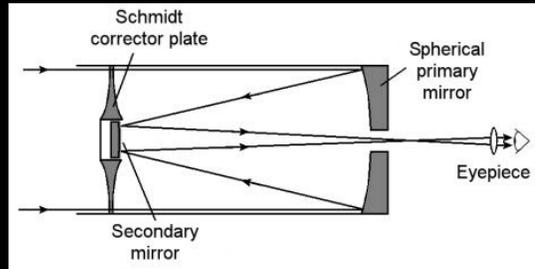
Academy Artworks



Christopher S. Baird

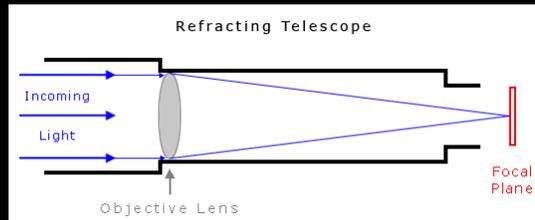
Catadioptric

- Compound design using lenses & mirrors
- Many variants
  - Schmidt-Cassegrain
  - Maksutov
  - Ritchey-Chrétien
- Central obstruction
- No chromatic aberration
- larger aperture in compact design
- Intermediate price
- Usually closed tube
- Longer focal ratio
- Most commonly computerized
- Coma
- Focus & mirror shift
- Require extended cool-down
- Very sensitive to dew
- Collimation required



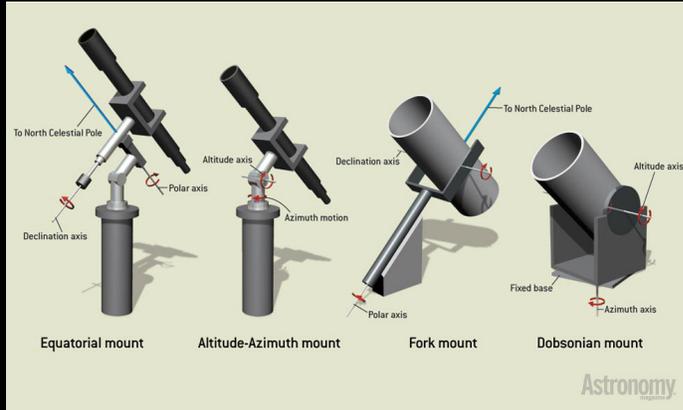
Refractor

- Simple design
- Use lenses
- Two basic types:
  - achromatic
  - apochromatic
- Light weight
- Closed tube
- Intermediate focal ratio
- No central obstruction
- No collimation required
- Chromatic aberration
- Difficult to make in large apertures
- Most expensive



Mounts

- Most important component is the mount, then comes ...
- Tripod legs 3.81 cm (1.5") or larger
- Ease of use:
  - Alt-azimuth (Alt/Az)
  - Dobsonian
- Fork mounts
- GOTO mounts
- Equatorial mounts



Small Refractor

- 70 mm NewStar refractor
- Alt-azimuth mount
- Red Dot finder (8x finder scope)



Boyd Wood

Small Refractor

William Optics RedCat 51  
51 mm refractor  
Celestron AVX computerized German  
equatorial mount



James Lee

Small Refractor

SVBony SV503ED  
80 mm doublet refractor



Rodger Forsyth

Midsize Refractor

TeleVue NP101 IS  
101 mm triplet refractor  
Stellarvue M002C alt-azimuth mount  
MEC012 column  
Celestron CGEM 2" tripod  
Nexus DSC computer with Stellarvue  
M2 encoder kit



Jim Glover

Small Reflector

Zhumell Z100  
100 mm Newtonian reflector  
Dobsonian tabletop mount



Ronald Oades

Small Reflector

Meade ETX-90

90 mm Maksutov catadioptric

Meade computerized alt-azimuth  
mount on a Manfrotto tripod &  
equatorial mount platform



Rick Stankiewicz

Midsized Reflector

Celestron NexStar 130 SLT

130 mm Newtonian reflector

SkyAlign alt-azimuth computerized mount



Dave Temple

### Midsized Reflector

Zhumell Z130  
 130 mm Newtonian reflector  
 Dobsonian tabletop mount  
 Orion Alt-azimuth mount



Paul Ward

### Things to Consider

- Two most important factors:
  - budget
  - portability
- Ease of use and setup
- Larger apertures are more susceptible to seeing
- Larger apertures give increased resolution and light grasp
- Aperture & light grasp
  - $\text{light grasp} = \text{aperture}^2$  (in mm)
  - 80 mm vs. 130 mm = 2.64 x
- Avoid telescopes that use 0.965" eyepieces
- Eyepieces, diagonal & finder scope
  - Telrad, Rigel Quickfinder, red dot
- Avoid astrophotography
- Collimation
- Warranty & customer service/support
  - manufacturing location?
- Multiple use



Dave Temple

### Buying Tips

- Don't !
- Research, research, research ...
- Expectations?
- Don't buy a telescope from a department store (online versions too)
- Beware of magnification claims!
- Be careful of plastic focusers on low end Dobsonians
- Consider a 2" focuser
- Expect to pay \$600.00 +
- Purchase from a reputable vendor specializing in telescopes
  - KW Telescope
  - Telescopes Canada
  - Ontario Telescope & Accessories
- Buy used: astrobuysell.com



IC 1396 Elephant Trunk

### Procedural & Viewing Tips

- Before taking your telescope outside for the first time, read the manual thoroughly
- Beware the Sun!
- Set up in the daytime first
- Familiarize yourself with all the components and know what they do
- Align your finder during daytime
- Focus on a distant terrestrial object during the day to get close
- Allow sufficient cool down time
- Always use low power eyepieces first
- Target bright, easily locatable objects: Moon, planets, double stars & bright Messier objects
- Use a barlow sparingly
- Get a good quality Moon or neutral density filter
- Use a dew shield and dew heaters
- Small step ladder & observing chair
- Storing your telescope



Ronald Oades

### Using Your Telescope

- Learning curve
- You are not alone!



*Rick Stankiewicz*  
Mars & Moon

### Telescope Summary

- Best budget option: Newtonian reflector on a Dobsonian mount
- Refractors offer highest resolution
- Schmidt-Cassegrains offer large aperture at intermediate cost



Rick Stankiewicz: Orion & Friends

## Reflector Options

- Sky-Watcher Classic 150P
- 150 mm Newtonian reflector
- 2" focuser
- \$620.00 @ Telescopes Canada



## Reflector Options

- Celestron NexStar 130 SLT
- 130 mm Newtonian reflector
- 2" focuser
- Celestron computerized alt-azimuth mount and tripod
- SkyAlign technology
- Red dot finder, diagonal, two eyepieces (25mm & 9mm), Celestron's Starry Night software
- \$864.00 @ Telescopes Canada



## Catadioptric Option

- Celestron NexStar 127 SLT\*
- 127 mm Maksutov catadioptric
- Computerized alt-azimuth mount and tripod
- Red dot finder, diagonal, two eyepieces (25mm & 9mm), Celestron's Starry Night software
- \$945.00 @ Telescopes Canada



## Refractor Options

- William Optics ZenithStar 73 III
- 73 mm doublet refractor
- 2.5" focuser
- \$896.00 @ Telescopes Canada
- Popular manufacturers
  - Vixen
  - StellarVue
  - Orion
  - Sky-Watcher
  - Explore Scientific
  - William Optics
  - TeleVue



Mount Options

Sky-Watcher AZ5 with steel tripod  
Alt-azimuth  
5 kg (11 lbs) weight capacity  
\$570.00 @ Telescopes Canada



Mount Options

Explore Scientific Twilight 1  
Alt-azimuth  
6.8 kg (15 lbs.) weight capacity  
\$455 @ Telescopes Canada



Mount Options

Vixen Porta II  
Alt-azimuth  
9 kg (20lbs) weight capacity  
\$475.95 USD @ starizona.com



Mount Options

Orion VersaGo II  
Alt-azimuth  
6.8 kg (15 lbs.) weight capacity  
\$249.99 USD



## Mount Options

## StellarVue M002C

Alt-azimuth

11 kg (25 lbs.) weight capacity

\$399.00 USD (mount head only)

\$799.00 USD (complete package)

@stellarmvue.com



## Final Thoughts ...

## Celestron NexStar 8SE

- 203.2 mm Schmidt Cassegrain
- Celestron computerized alt-azimuth mount and tripod
- SkyAlign technology
- Red dot finder, diagonal, 25mm eyepiece, Celestron's Starry Night software
- \$2,160 @ Telescopes Canada



# Novice Astronomy Class # 13

## Eyepieces

April 7, 2023

