Telescope Cheat Sheet

San Jose Astronomical Association — SJAA — EST. 1954

Refractor

Binoculars

Dobsonian (Dob)

Newtonian

Schmidt-Cassegrain Telescope (SCT)

Smart Telescope

	Targets		Optics			Convenience			
	Deep Sky	Planetary	Wide Field	Visual	Imaging	Portability	Ease	Comfort	Average Price
Great	Dobsonian	SCT	Binoculars	Dobsonian	Refractor	Binoculars	Binoculars	Smart	Binoculars
	Newtonian	Dobsonian	Smart	Binoculars	Newtonian	Smart	Smart	Binoculars	Newtonian
	Smart	Refractor	Refractor	Refractor	Smart	Dobsonian	Dobsonian	Newtonian	Dobsonian
	SCT	Newtonian	Dobsonian	Newtonian	SCT	SCT	Refractor	Dobsonian	Smart
	Refractor	Smart	Newtonian	SCT	Dobsonian	Refractor	SCT	SCT	SCT
Less Great	Binoculars	Binoculars	SCT	Smart	Binoculars	Newtonian	Newtonian	Refractor	Refractor

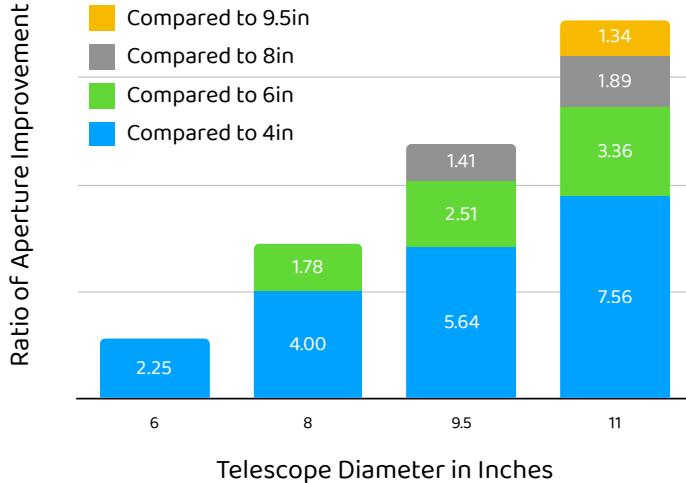**Trusted Retailers:** Agena Astro, Highpoint Scientific, B&H Photo, TelescopeS.NET, Edmond Optics

Trusted Brands: Celestron, Askar, Explore Scientific, Stellarvue, Orion, ZWO, Apertura, Sky-Watcher, Astro-Physics, and more
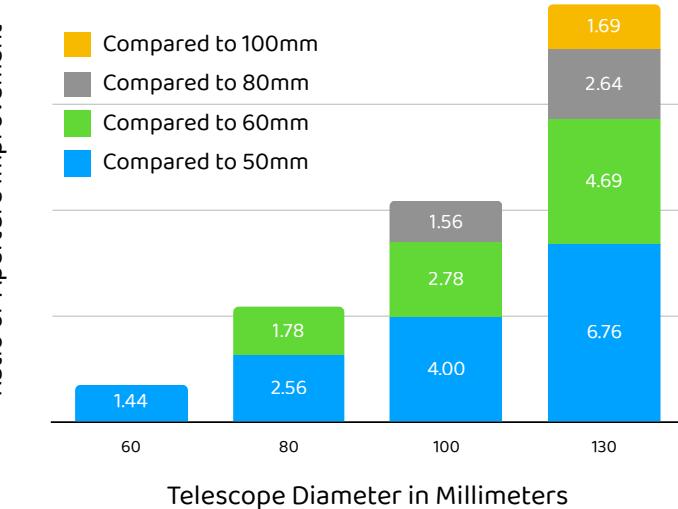
Terminology ✳

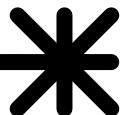|	
Aperture	How large the objective (lens or mirror) is on a telescope. Usually measured in millimeters (mm) or inches (in).
Power	Also known as "magnification." How large an object appears and measured in "times." (i.e. 10x)
Field of View (FOV)	How much of the sky you can see. Also known as "True FOV." Measured in degrees-minutes-seconds. (i.e. 5° 20' 16")
Apparent FOV	How much angular distance an eyepiece can reveal. Must be combined with Power to achieve True FOV. Measured in degrees.
Exit Pupil Size	How much light from and eyepiece hits your eye. Measured as the diameter of a circle in millimeters (mm).
Eye Relief	How far from the eyepiece your eye should be for optimal viewing. Measured in millimeters (mm).
Focal Length	How far light needs to travel after being affected by a lens or mirror in order to achieve focus. Used in determining magnification. Measured in millimeters (mm).
F Ratio	How easily a lens or mirror can collect light. A lower F Ratio is "fast" and collects light more quickly than higher F Ratio instruments. Denoted as F/N. (i.e. F/5)

Aperture Ratios As Telescope Diameter Increases

Ratio of Aperture Improvement

- 🟧 Compared to 9.5in
- ⬜ Compared to 8in
- 🟩 Compared to 6in
- 🟦 Compared to 4in

Telescope Diameter in Inches			
6	8	9.5	11
2.25	4.00	5.64	7.56
	1.78	2.51	3.36
		1.41	1.89
			1.34

Aperture Ratios As Telescope Diameter Increases

Ratio of Aperture Improvement

- 🟧 Compared to 100mm
- ⬜ Compared to 80mm
- 🟩 Compared to 60mm
- 🟦 Compared to 50mm

Telescope Diameter in Millimeters			
60	80	100	130
1.44	2.56	4.00	6.76
	1.78	2.78	4.69
		1.56	2.64
			1.69

Formulas — Example ✳

$$\text{F Ratio} = \frac{\text{Telescope Focal Length}}{\text{Telescope Diameter}}$$

$$\text{Power} = \frac{\text{Telescope Focal Length}}{\text{Eyepiece Focal Length}}$$

$$\text{True FOV} = \frac{\text{Apparent FOV}}{\text{Power}}$$

$$\text{Exit Pupil} = \frac{\text{Eyepiece Focal Length}}{\text{F Ratio}}$$

Telescope Diameter	50mm
Telescope Focal Length	300mm
Eyepiece Apparent FOV	70°
Eyepiece Focal Length	26mm

$$\text{F Ratio} = \frac{300mm}{50mm} = 6 \quad = F/6$$

$$\text{Power} = \frac{300mm}{26mm} = 11.5 = 11.5x$$

$$\text{True FOV} = \frac{70°}{11.5} = 6°$$

$$\text{Exit Pupil} = \frac{26mm}{6} = 4.3mm$$