Some useful equations to fit your observing goals to your instrument

Maximum Useful Magnification = 60 X Power per inch of Aperture

$$\text{Magnification} = \frac{\text{Focal Length of Telescope}}{\text{Focal Length of Eyepiece}}$$

Dawes Limit - Theoretical Resolving Limit of Telescope

$$\text{Resolving Power Seconds of Arc} = \frac{4.56}{\text{Aperture (Inches)}} \text{ Seconds of Arc}$$

$$\text{Resolving Power Seconds of Arc} = \frac{11.6}{\text{Aperture (cm)}} \text{ Seconds of Arc}$$

Note: Resolving power is a theoretical limit only. There are many other factors that effect the resolving power of any instrument

$$\text{f/stop} = \frac{\text{Focal Length of Telescope}}{\text{Aperture of Primary}}$$

$$\text{Actual FoV (degrees)} = \frac{\text{Apparent Field of View of Eyepiece}}{\text{Magnification (of eyepiece attached to OTA)}}$$

$$\text{Exit Pupil} = \frac{\text{Eyepiece Focal Length}}{\text{f/stop of OTA}}$$

It is useful to have a spread sheet with all these equations for each instrument you have along with the eyepiece specifications when coupled with the instrument.

Listing the specs of your instruments helps on those nights when every thing freezes up including your brain, and someone asks you,
"What is the magnification of that?"
Have such a spread sheet also illustrates where potential new purchases would be beneficial to your current setup or if you are better suited to yet another telescope.

Types of Telescopes

Refractors

Galilean It uses a convex objective lens and a concave eyepiece lens. Galilean telescopes produce upright images.

Keplerian Invented by Johannes Kepler in 1611, is an improvement on Galileo's design. It uses a convex lens as the eyepiece instead of Galileo's concave one.

Reflectors

Newtonian Invented by the British scientist Sir Isaac Newton (1643-1727), using a concave primary mirror and a flat diagonal secondary mirror. Newton's first reflecting telescope was completed in 1668 and is the earliest known functional reflecting telescope.

Cassegrain The classic Cassegrain configuration uses a parabolic reflector as the primary while the secondary mirror is hyperbolic.

Ritchey-Chrétien Invented by George Willis Ritchey and Henri Chrétien in the early 1910s, is a specialized Cassegrain reflector which has two hyperbolic mirrors (instead of a parabolic primary). It is free of coma and spherical aberration at a nearly flat focal plane if the primary and secondary curvature are properly figured, making it well suited for wide field and photographic observations

Catadioptric ***A catadioptric optical system is one where refraction and reflection are combined in an optical system***

Schmidt-Cassegrain Combines a cassegrain reflector's optical path with a Schmidt corrector plate to make a compact astronomical instrument that uses simple spherical surfaces.

Maksutov The Maksutov is a catadioptric telescope design that combines a spherical mirror with a full diameter weakly negative meniscus lens at the entrance pupil (commonly called a "corrector plate" or "meniscus corrector shell") in a design that takes advantage of all the surfaces being nearly "spherically symmetrical".

Maksutov Cassergrain Maksutov's design notes from 1941 explored the possibility of a 'folded' Cassegrain-type construction with a secondary silvered "spot" on the convex side of the meniscus facing the primary mirror

"New fandangled stuff" Celestron HD range - Meade ACF range

This is by no means a complete list of the different types of telescopes, this list is some of the more prominent telescopes used by amateur and professional astronomers.