

LIGHT GATHERING POWER

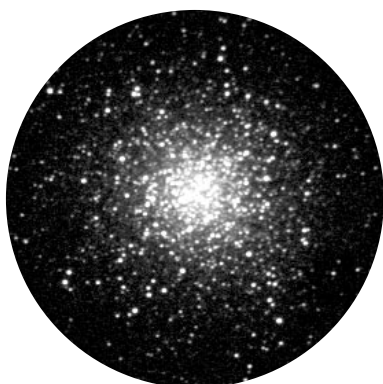
The prime function of a telescope is to gather light. The larger the telescope, the more light it can gather. Telescopes are rated by their aperture so a 152mm (6inch) instrument has a lens or mirror which is 152mm in diameter. The light gathering power of a telescope is proportional to the surface area of the lens or mirror, or the square of its aperture, thus a 152mm (6inch) aperture instrument will gather four times as much light as a 76mm (3inch) telescope.



M13-Globular Cluster through a 3" telescope



M13-Globular Cluster through a 6" telescope



M13-Globular Cluster through a 12" telescope

RESOLUTION—"HOW MUCH"

Resolution is a telescope's ability to reveal fine detail; especially low-contrast detail such as the ability to split binary stars and reveal details on the Solar System's objects. How well an instrument performs depends on the quality of its optics and its aperture.



Saturn through a 3" telescope



Saturn through a 6" telescope



Saturn through a 12" telescope

MAGNIFICATION—"HOW BIG"

Simply changing the eyepiece will vary the magnification that a telescope provides. Magnification is equal to the telescope's focal length divided by the eyepiece's focal length, so a 2000mm telescope fitted with a 40mm eyepiece gives a 50-times magnification. Avoid the temptation to buy very high-powered eyepieces first: you will use low-powered ones more often, and every time you double the magnification you will get only one quarter of the brightness.



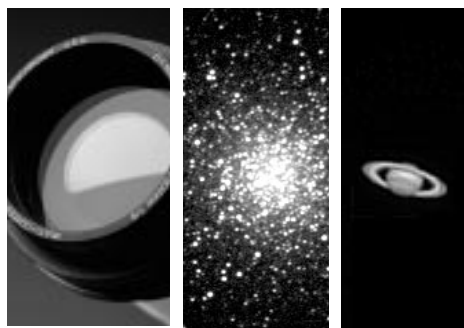
The Moon at 30x magnification



The Moon at 100x magnification



The Moon at 250x magnification



Aperture Diameter of Objective or Primary	Light Gathering Power	Resolving Power	Lowest Power ⁴ Wide Field	Low Power ⁵ General Viewing	Medium Power ⁶	Optimum High Power ⁷	Maximum Possible Useful Power ⁸
mm – inch	Compared to your eye Faintest Star magnitude ¹	Dawes Limit ² Working Value ³	4x per inch	6-8x per inch	12x per inch	32x per inch	50x per inch
50 – 2.0	69x ----- 10.3	2.32 ----- 4.0	10x	17x	25x	62x	100x
60 – 2.4	100x ----- 10.7	1.90 ----- 3.3	12x	20x	30x	75x	120x
75 – 3.0	156x ----- 11.2	1.55 ----- 2.7	15x	25x	37x	93x	150x
90 – 3.5	225x ----- 11.5	1.29 ----- 2.2	18x	30x	45x	112x	180x
102 – 4.0	289x ----- 11.8	1.14 ----- 2.0	20x	35x	51x	127x	204x
130 – 5.0	469x ----- 12.3	0.89 ----- 1.5	26x	43x	65x	162x	260x
150 – 6.0	625x ----- 12.7	0.77 ----- 1.3	30x	50x	75x	187x	300x
203 – 8.0	1147x ----- 13.3	0.57 ----- 0.99	40x	68x	101x	253x	406x
254 – 10.0	1792x ----- 13.8	0.46 ----- 0.78	50x	85x	127x	317x	508x
305 – 12.0	2584x ----- 14.2	0.38 ----- 0.66	61x	102x	152x	381x	610x
406 – 16.0	4579x ----- 14.8	0.29 ----- 0.50	81x	135x	203x	507x	812x

1. Star Magnitude

The brightness of a star, its magnitude, is rated on a scale so that the brighter the star, the lower its magnitude, consequently the faintest stars have the highest number. Each step on the scale is 2.5 times difference in brightness; five steps on the scale indicate a difference of 100 times comparative brightness.

2. Dawes Limit

The minimum separation between two stars of equal brightness discernible by a telescope of given diameter. Expressed in arc seconds and equal to 117 divided by the telescope's aperture in millimetres (or 4.6 divided by aperture in inches.)

3. Working Value

Because of atmospheric interference, Dawes' limit is usually unachievable. A more realistic level of discernible separation obtained in average seeing conditions.

4. Lowest Power

Perfect, under dark skies for wide field observations such as diffuse nebulae, large galaxies and comet seeking. It is usually around 3x the aperture in inches.

5. Low Power

An ideal magnification for general viewing, stargazing and generally navigating around the sky.

6. Medium Power

Offering maximum resolution this level of magnification will provide small but bright, crisp planetary images. A magnification to view bright nebulae and galaxies.

7. Optimum High Power

This is the highest useful magnification, under perfect seeing conditions, for lunar and planetary observation, and close double stars.

8. Maximum Possible Useful Power

For seeking the very faintest of stars, but only practical under very good to excellent seeing conditions.