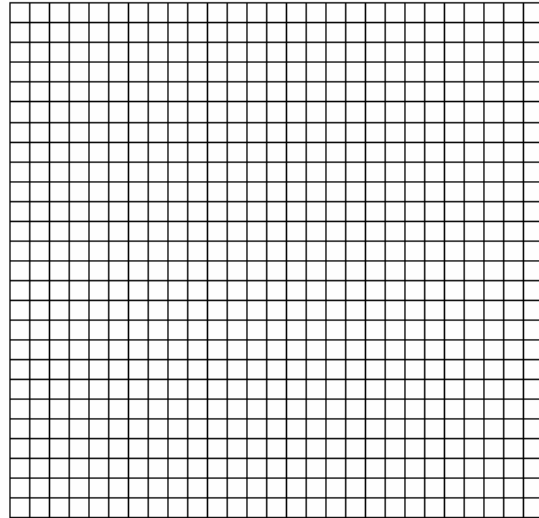


Resolving the Moon

Although a pair of binoculars or a telescope can see amazing details on the Moon, the human eye is not so gifted!

The lens of the eye is so small, only 2 to 5 millimeters across, that the sky is 'pixelized' into cells that are about one arcminute across. We call this the resolution limit of the eye, or the eye's visual acuity.

One degree of angle measure can be divided into 60 minutes of arc. For an object like the full moon, which is $1/2$ -degree in diameter, it also measures 30 arcminutes in diameter. This means that, compared to the human eye, the moon can be divided into an image that is 30-pixels in diameter.



Problem 1 - Convert the following degree measures into their equivalent measure in arcminutes (amin); A) 5 degrees; B) $2/3$ degree; C) 15.5 degrees; D) 0.25 degrees

Problem 2 - Convert the following arcminute measures into their equivalent measure in degrees: A) 15 amin; B) $1/2$ amin; C) 120.5 amin; D) 3600 amin.

Problem 3 - Convert the following area measures in square-degrees into their equivalent measures in square arcminutes (amin^2): A) 1.0 deg^2 ; B) 0.25 deg^2

Problem 4 - The figure to the above-left is a telescopic photo of the full moon showing its many details including craters and dark mare. Construct a simulated image of the moon in the grid to the right to represent what the moon would look like at the resolution of the human eye. First sketch the moon on the grid. Then use the three shades; black, light-gray and dark-gray, and fill-in each square with one of the three shades using your sketch as a guide.

Problem 5 - Why can't the human eye see any craters on the Moon?

Problem 1 - Convert the following degree measures into their equivalent measure in arcminutes (amin); A) 5 degrees; B) 2/3 degree; C) 15.5 degrees; D) 0.25 degrees

Answer: A) 5 degrees x (60 amin/1 deg) = **300 amin.** B) 2/3 degree x (60 amin/1 deg) = 120/3 = **40 amin.** C) 15.5 degrees x (60 amin/1deg) = **930 amin;** D) 0.25 deg x (60 amin/1 deg) = **15 amin.**

Problem 2 - Convert the following arcminute measures into their equivalent measure in degrees: A) 15 amin; B) 1/2 amin; C) 120.5 amin; D) 3600 amin.

Answer: A) 15 amin x (1 deg/60 amin) = **0.25 deg.** B) 1/2 amin x (1 deg / 60 amin) = **1/120 deg.** C) 120.5 amin x (1 deg/60 amin) = **2.0 deg.** D) 360 amin x (1 deg/60 amin) = **60 deg.**

Problem 3 - Convert the following area measures in square-degrees into their equivalent measures in square arcminutes (amin²): A) 1.0 deg²; B) 0.25 deg²

Answer; A) 1.0 deg² x (60 amin/1 deg) x (60 amin/1 deg) = **3600 amin².** B) 0.25 deg² x (60 amin/1 deg) x (60 amin/1 deg) = 0.25 x 3600 = **900 amin².**

Problem 4 - See the image below which has been pixelized to the grid resolution. How well did your version match the image on the right?

Problem 5 - Why can't the human eye see any craters on the Moon? Answer: The human eye can only see details 1 arcminute across and this is too low a resolution to see even the largest craters.

