



The NASA Lunar Reconnaissance Orbiter (LRO), launched in 2009, will be able to see details on the lunar surface at much higher resolution than any previous lunar mapping mission. The images will have a resolution of about 0.7 meters per pixel. The map shows the area surrounding the Apollo 11 landing site where astronauts deployed experiments and walked around the landing site to gather rock and soil samples. The grid lines show a standard soccer field in comparison, with a distance between the white goal boundaries of 110 meters.

Problem 1 - Use a millimeter ruler and the information provided to determine the scale of the figure in meters per millimeter.

Problem 2 - Draw an overlay of 10 rows and 10 columns on the above figure at a location near the Apollo-11 landing area, with individual cells representing the individual LRO pixels.

Problem 3 - Will LRO be able to see: A) the Lunar Module 'LM' marked on the map? B) The discolorations (shown in yellow) of the lunar soil caused by the paths taken by the astronauts? C) Details on the LM?

Problem 1 - Use a millimeter ruler and the information provided to determine the scale of the figure in meters per millimeter.

Answer: A millimeter ruler placed along the long-edge of the figure would indicate that the distance between the vertical white goal lines is 153 millimeters. Since this corresponds to 110 meters on the actual field, the scale of this figure is $110 \text{ meters} / 153 \text{ mm} = 0.7 \text{ meters per millimeter}$. Alternately, students may measure the width of the green area which is 167 millimeters and corresponds to 120 meters.

Problem 2 - Draw an overlay of 10 rows and 10 columns on the above figure at a location near the Apollo-11 landing area, with individual cells representing the individual LRO pixels. Answer: The LRO pixels are 0.7 meters wide, so the students would have to draw a grid with rows and columns 1 millimeter wide.

Problem 3 - Will LRO be able to see: A) The Lunar Module 'LM' marked on the map? B) The discolorations (shown in yellow) of the lunar soil caused by the paths taken by the astronauts? C) Details on the LM?

Answer: Below is an example of the details seen by the LRO cameras at the Apollo 14 landing site!

