

Landing Site Selection

Description: Teams of two students answer the question, “Can NASA land a spacecraft in a crater on the Moon?” by measuring the diameter of lunar craters. A written report is required of each team.

Performance Outcomes: Apply measurement skills to a relevant problem. Understand the difference between *physical properties* of interest and the *measurable quantities* from which one makes inferences about the physical properties. Prepare tabular and graphic representations and describe results in a written report, including a discussion of measurement uncertainty. Draw conclusions from measurements.

Measurements

Can NASA land a spacecraft in a crater on the Moon?

In order to answer this question, you must determine the size of a NASA spacecraft. The Apollo Program sent several spacecraft to the Moon, and more recently, NASA has landed spacecraft on Mars. Looking up the size of one of these landers is a good idea.

The second piece of data you will need to determine is how large lunar craters are. You will be introduced to various data sources to view craters on the Moon. Choose three potential landing sites. Make three distinct measurements of each crater. That is, find three distinctly separate images of the Moon and measure the craters you choose once on each image.

Record your measurements in your datasheet. A sample Excel spreadsheet is provided. You do not have to use the sample spreadsheet – you make create your own if you prefer. Use you measurements to calculate the actual diameter of the craters. *What information will you need to make this calculation?*

Report your results

Your report should include the following sections:

Introduction: Include background research you have done, the motivation for the project, and the question that you are attempting to answer.

Measurement strategy: Describe how you made your measurements. Identify the *physical property* you are interested in and the *measurable quantity*. Describe which units you used for each. Include in your report the images that were used in your measurements. Explain the calculation you made to go from the quantity you measured to the physical property.

Results: Make a table of your measurements. For each crater, list an identifier and the three measurements. Include an average value of your measurements for each crater. Finally, include your estimate of the uncertainty in your measurement. Provide a graphic representation of the data in the table.

Conclusion: Describe the conclusion you can make from your measurement. Include a discussion of the uncertainty in your measurements. Discuss how you could improve the process.