

MATH AND SCIENCE @ WORK





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LUNAR SURFACE INSTRUMENTATION: Part II

Background

This problem builds from the *Math and Science* @ *Work Lunar Surface Instrumentation* problem. You should complete the Lunar Surface Instrumentation problem first, in order to better understand the importance of extrahabitat activities (EHA) during long-duration human missions to the surface of the Moon and other planetary bodies.

Problem

On the TI-Nspire[™] handheld, open the document *Instrumentation2*. Read through the problem set-up and complete the questions embedded within the document.

A. Sketch the instrument locations with the origin at the airlock. To sketch this on TI-Nspire page 1.13, use the vector tool to draw vectors to each instrument and the measurement tool to show the location of each vector.

- B. Using the sketch from Question A and the provided information:
 - I. Determine the instruments' locations (x, y) from the airlock.
 - II. Determine the astronaut's displacement (using unit-vector notation) from the airlock when she is standing at each instrument.

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- C. Subject to the constraints, determine the total distance the astronaut would walk for each of the two EHA approaches to service the instruments.
 - I. Utilizing a lunar surface transporter to carry all equipment.
 - II. Carrying loads to each instrument without use of lunar surface transporter.
- D. Subject to the constraints, determine the time (in minutes) it would take for the astronaut to travel and service the instruments for each of the two EHA approaches.
 - I. Utilizing a lunar surface transporter to carry all equipment.
 - II. Carrying loads to each instrument without use of lunar surface transporter.
- E. Explain which approach is more efficient in terms of:
 - I. The distance the astronaut walks.
 - II. The amount of reserve time remaining in the astronaut's life support system when she arrives back at the airlock.