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.
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.