Project 3 Help

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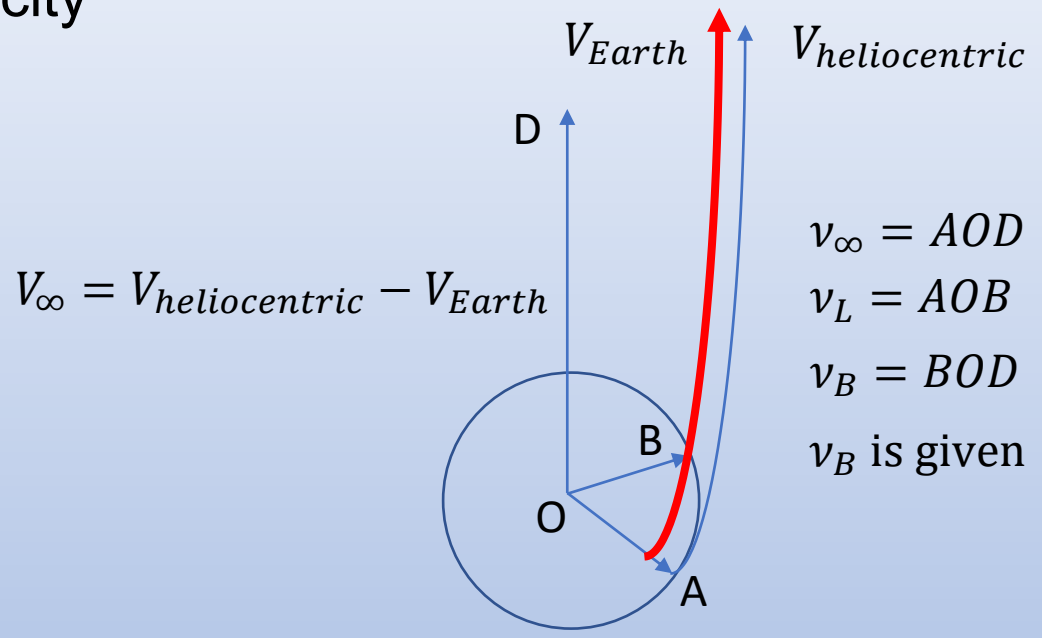
- V_∞ is a vector that is to be parallel to the Earth's velocity
- $E = \frac{V_\infty^2}{2} > 0$
  - i.e., hyperbolic trajectory
- $a = -\frac{\mu}{2E}$
- Note the trajectory starts from the Earth
  - That is, based on conservation of specific energy, the launch speed at B from the surface of the Earth can be calculated
  - $V_L = \sqrt{2\left(E + \frac{\mu}{r_E}\right)}$
- Position of the point at B on the trajectory
  - $r_L = r_E = \frac{p}{1+\epsilon cos(\nu_L)} = \frac{a(1-\epsilon^2)}{1+\epsilon cos(\nu_L)}$
- Equations are
  - $\epsilon^2 + \frac{r_L}{a}\epsilon cos(\nu_L) + \left(\frac{r_L}{a} - 1\right) = 0$
  - $\nu_L = \nu_\infty - \nu_B = acos\left(-\frac{1}{\epsilon}\right) - \nu_B$
- Solve the above for ϵ and ν_L



Observe under ideal conditions
A is the periapsis.
Since launch is taking place from B, which is not the desired location A, the actual orbit does not have a periapsis at the surface of the Earth