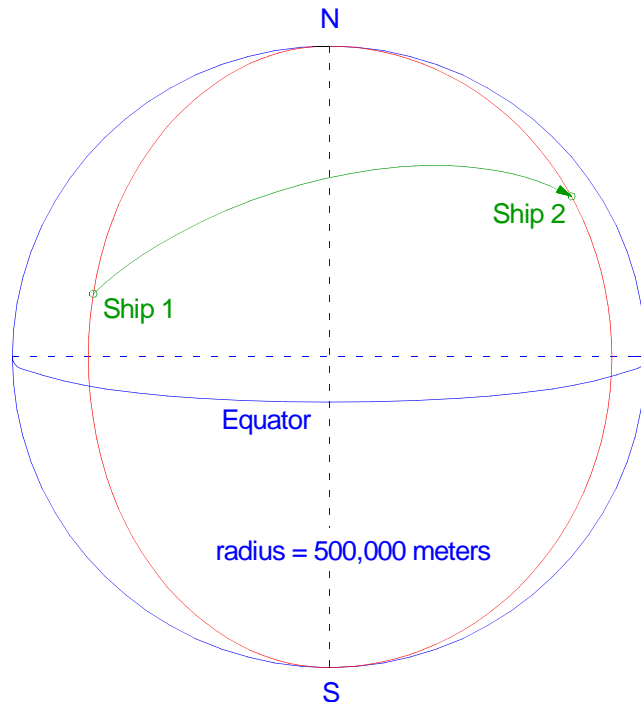


A few years ago, NASA discovered a new planetoid in the space just beyond Mars. After sending a multitude of probes, scientists were amazed to discover the planetoid was a perfectly smooth sphere with a radius of exactly 500,000 meters. Unable to determine the composition of the planetoid remotely, NASA decided to send a manned expedition to the planet. It was a two ship expedition; both were to land at the same time within a kilometer of each other.

Unfortunately that didn't happen quite as planned.

An orbiting satellite was able to determine the actual landing sites for both ships. The first, carrying the astronauts and their wheeled excursion vehicle, landed at $10^{\circ}30'41''$ North Lat, $20^{\circ}42'15''$ East Long. The second ship, containing scientific equipment and bulk of their supplies, landed at $37^{\circ}05'09''$ North Lat, $73^{\circ}22'03''$ East Long.

Undaunted, the intrepid astronauts immediately decided to drive the to the second ship as quickly as possible. NASA scientists determined the astronauts' suits would protect them from low temperatures up to a latitude of $42^{\circ}30'00''$ North. Assuming the astronauts drove along the route which represents the shortest distance, what maximum latitude would they pass through?



Bonus points: If they did travel the shortest distance and their vehicle speed averaged 20 kph, how long (to the nearest quarter hour) would it take for them to make the trip?