Distance and Bearing between 2 Airplanes

The US Army defines the bearing from Point X to Point Y as the angle between a ray in the direction of north or south (whose origin is Point X) and Ray XY (the ray whose origin is Point X and which contains Point Y.) The bearing consists of 2 characters and 1 number - First, the character is either N (north) or S (south). Second is the angle value (in degrees). Third, the character represents the direction of the angle away from the reference ray - thus, either E (east) or W (west). The angle value will always be less than 90 degrees. For example, if Point Y is located exactly southeast of Point X, the bearing from Point X to Point Y is S 45° E.

A. Find the distance between the two planes after 5 hours. \((distance = rate \cdot time)\)

Plane A has travelled \((215\text{mph})(5\text{ hours}) = 1075\text{ miles}\)

Plane B has travelled \((275\text{mph})(5\text{ hours}) = 1375\text{ miles}\)

Distance \(d = \sqrt{(1075)^2 + (1375)^2} = 1745\text{ miles}\)

B. What is the Bearing from Plane B to Plane A after 5 hours? \(S \ldots W\)

Bearing \(= 180° - 45° - \arctan \left(\frac{1375}{1075}\right) = 135° - 51.981° = 83.0°\)

So the Bearing from Plane B to Plane A = \(S 83.0° W\)