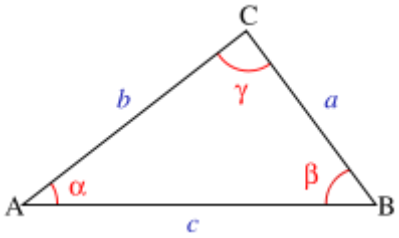
Answer on Question #54209, Physics / Computational Physics

Two cars head in different directions. Car 1 averages 47.3 miles/hr on a direction of 225 degrees true, while car 2 averages 64.2 miles/ hr. After 2.50 hours it is known that they are 232 miles apart. Find the direction (bearing that car 2 was headed, assuming that it was between 090 degrees true and 180 degrees true

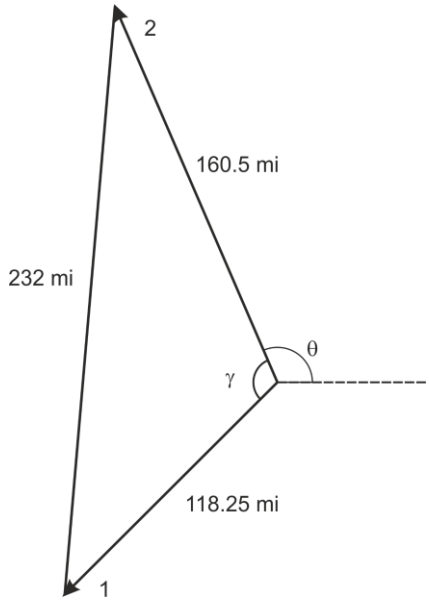
Solution:

I give the formula for the Law of Cosines and use it to find the missing angle.

$$c^2 = a^2 + b^2 - 2ab\cos\gamma$$



In our notations:



$$a = 47.3 * 2.50 = 118.25 \text{ miles}$$
$$b = 64.2 * 2.50 = 160.5 \text{ miles}$$
$$c = 232 \text{ miles}$$

Thus,

$$\cos\gamma = \frac{a^2 + b^2 - c^2}{2ab} = \frac{118.25^2 + 160.5^2 - 232^2}{2 * 118.5 * 160.5} = -0.37$$

$$\gamma = \cos^{-1}(-0.37) = 111.7°$$

$$\theta = 225° - 111.7° = 113.3°$$

Answer: $113.3°$