

1. A plane starts in Ignorance, USA has a heading of $N 56^\circ W$ towards Math Town, USA it follows this heading for 600 miles. The plane then changes its heading and it travels the 1000 mile journey to the town of Enlightenment, USA.

ASSUME Enlightenment, USA is DUE WEST of Ignorance, USA.

All of these facts are necessary to answer the questions about this scenario

BUT the most important fact to start with is

Fact 1: ASSUME Enlightenment, USA is DUE WEST of Ignorance, USA.

west!

Enlightenment



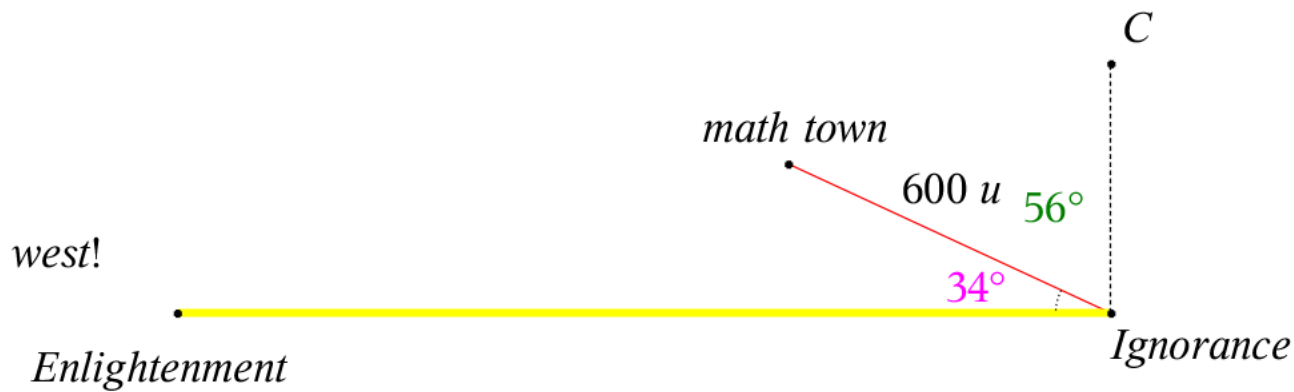
Ignorance

Without this fact, we can't really
get far in the problem at all!

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Fact 2: A plane starts in Ignorance, USA has a heading of $N 56^\circ W$ towards Math Town, USA



Step 1) draw a vertical perpendicular to segment EI from point I

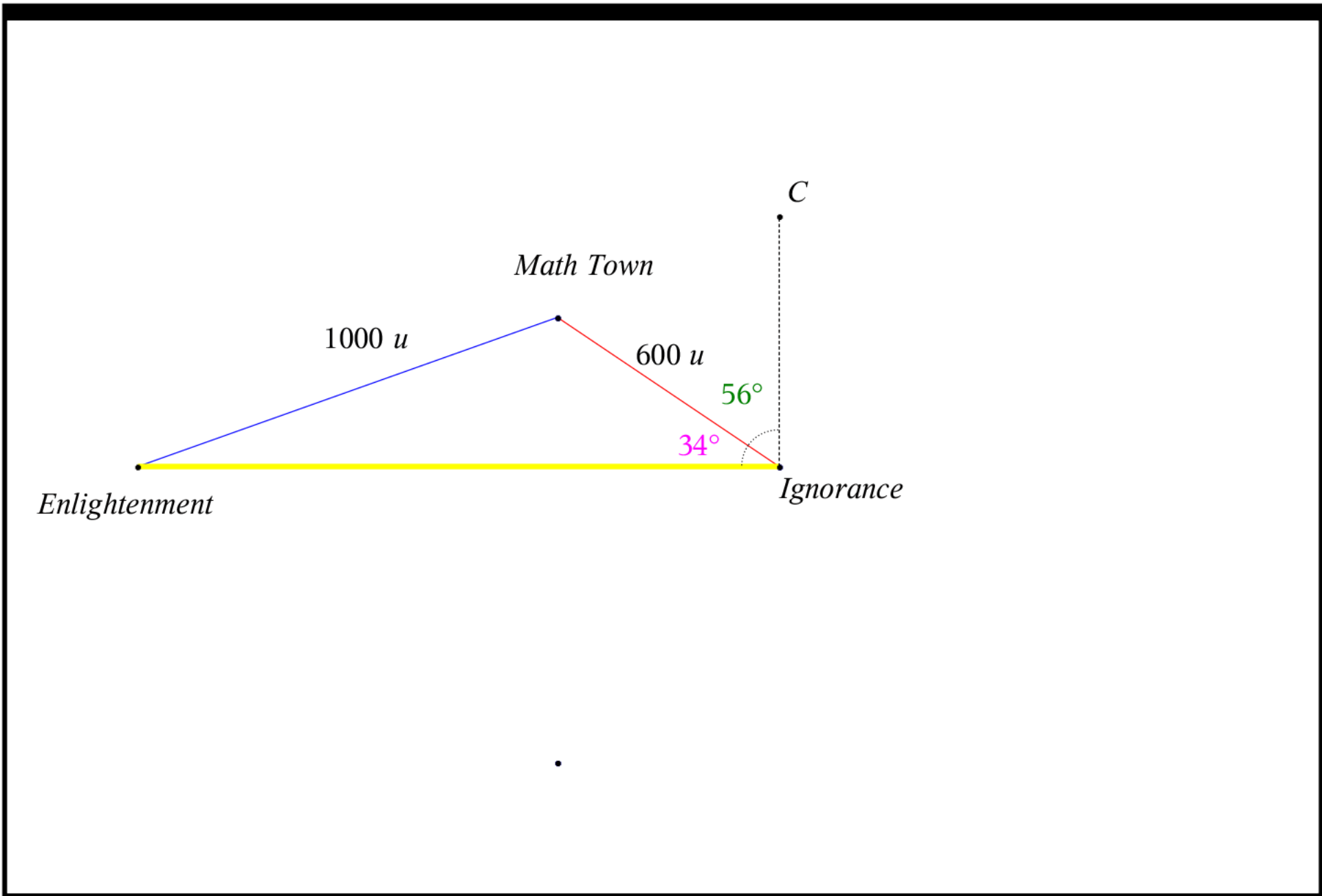
Step 2) draw a vector with a magnitude of 600 and heading of N 56° W

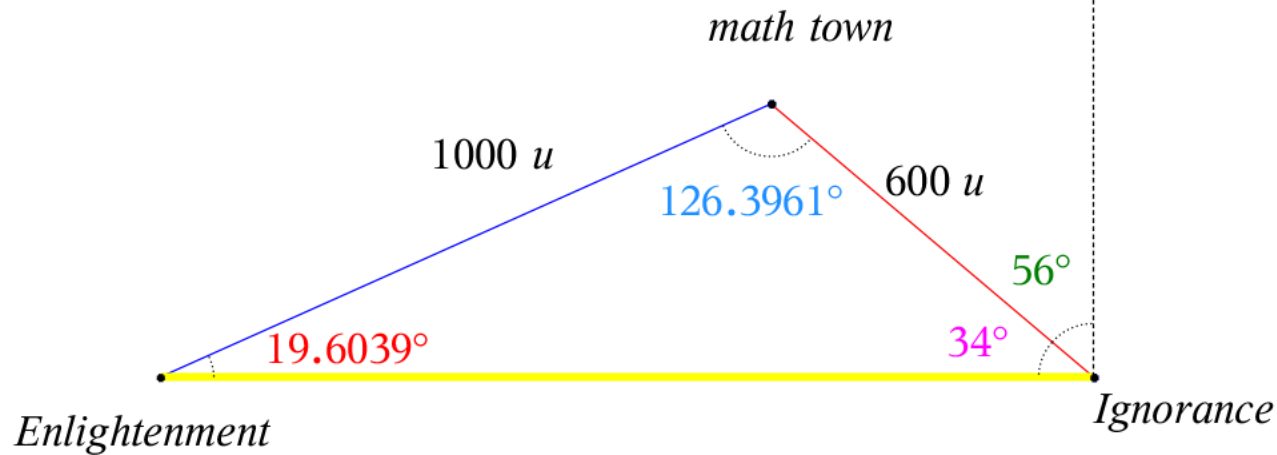
NOTE: This vector also creates an angle on the interior of the triangle
 $90 - 56 = 34$

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Fact 3: The plane then changes its heading and it travels the 1000 mile journey to the town of Enlightenment, USA.

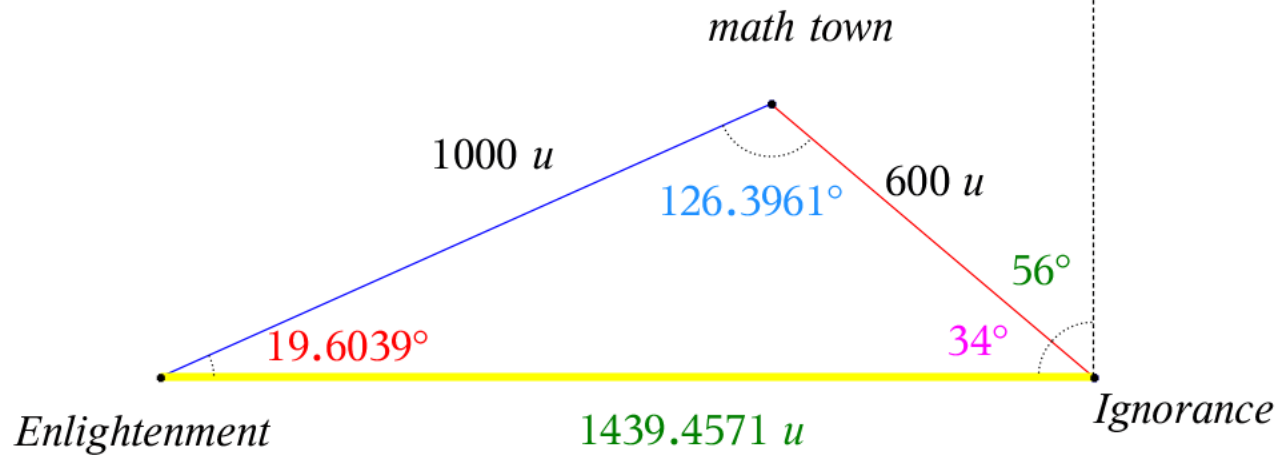




Now we can solve the SSA triangle

$$\frac{\sin(34)}{1000} = \frac{\sin E}{600} \text{ leads to } \sin E = \frac{600 \cdot \sin(34)}{1000} \quad m\angle E = \sin^{-1}\left(\frac{600 \cdot \sin(34)}{1000}\right) \approx 19.6039$$

This leads to angle M = $180 - (19.6039 + 34) \approx 126.3961$

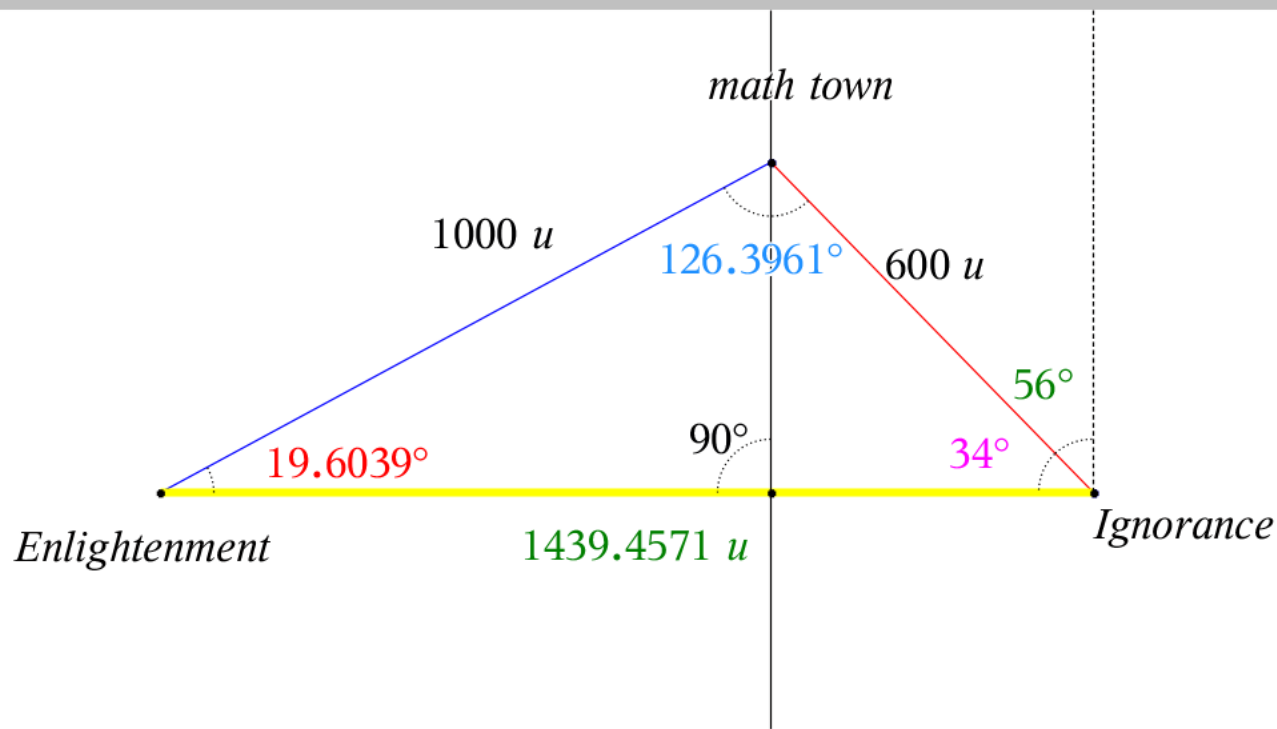


Now we can solve the SSA triangle

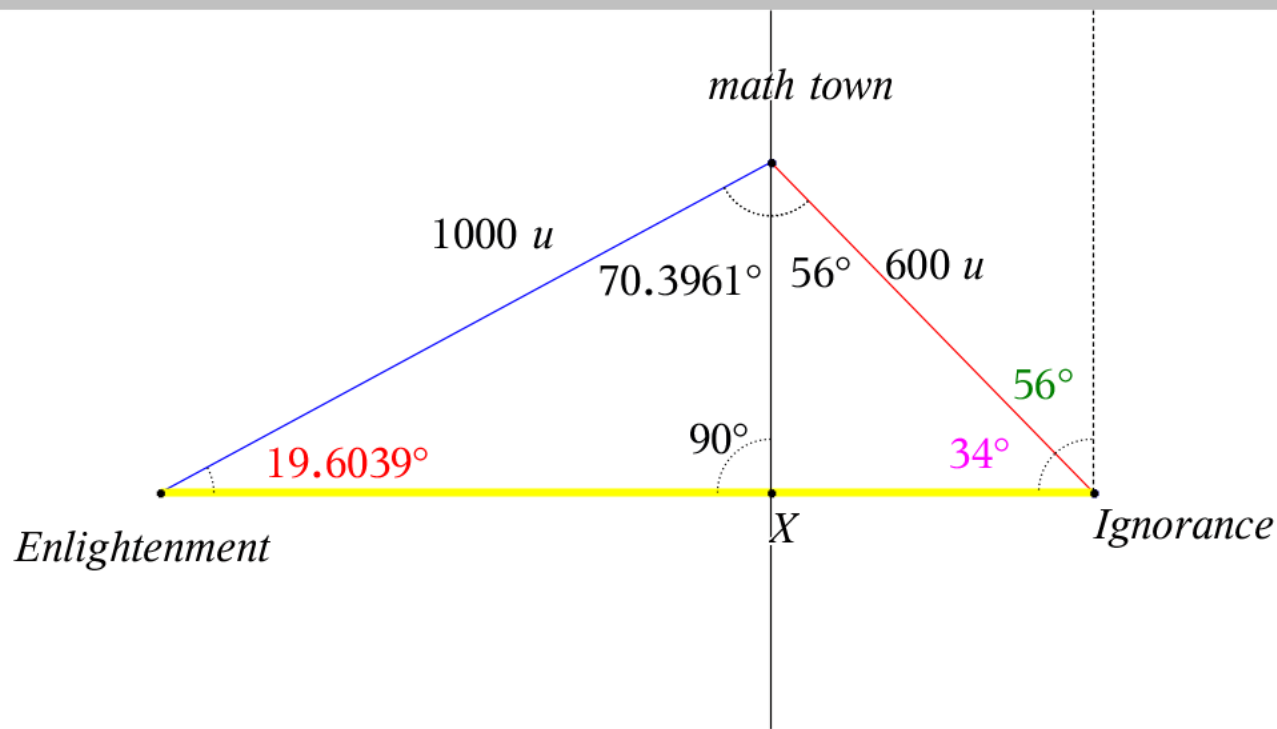
$$\frac{EI}{\sin(126.3961)} = \frac{1000}{\sin(34)} \text{ leads to } EI = \frac{1000 \cdot \sin(126.3961)}{\sin(34)} \approx 1439.46$$

OR

$$EI = \sqrt{1000^2 + 600^2 - 2 \cdot 1000 \cdot 600 \cdot \cos(126.3961)} \approx 1439.46$$



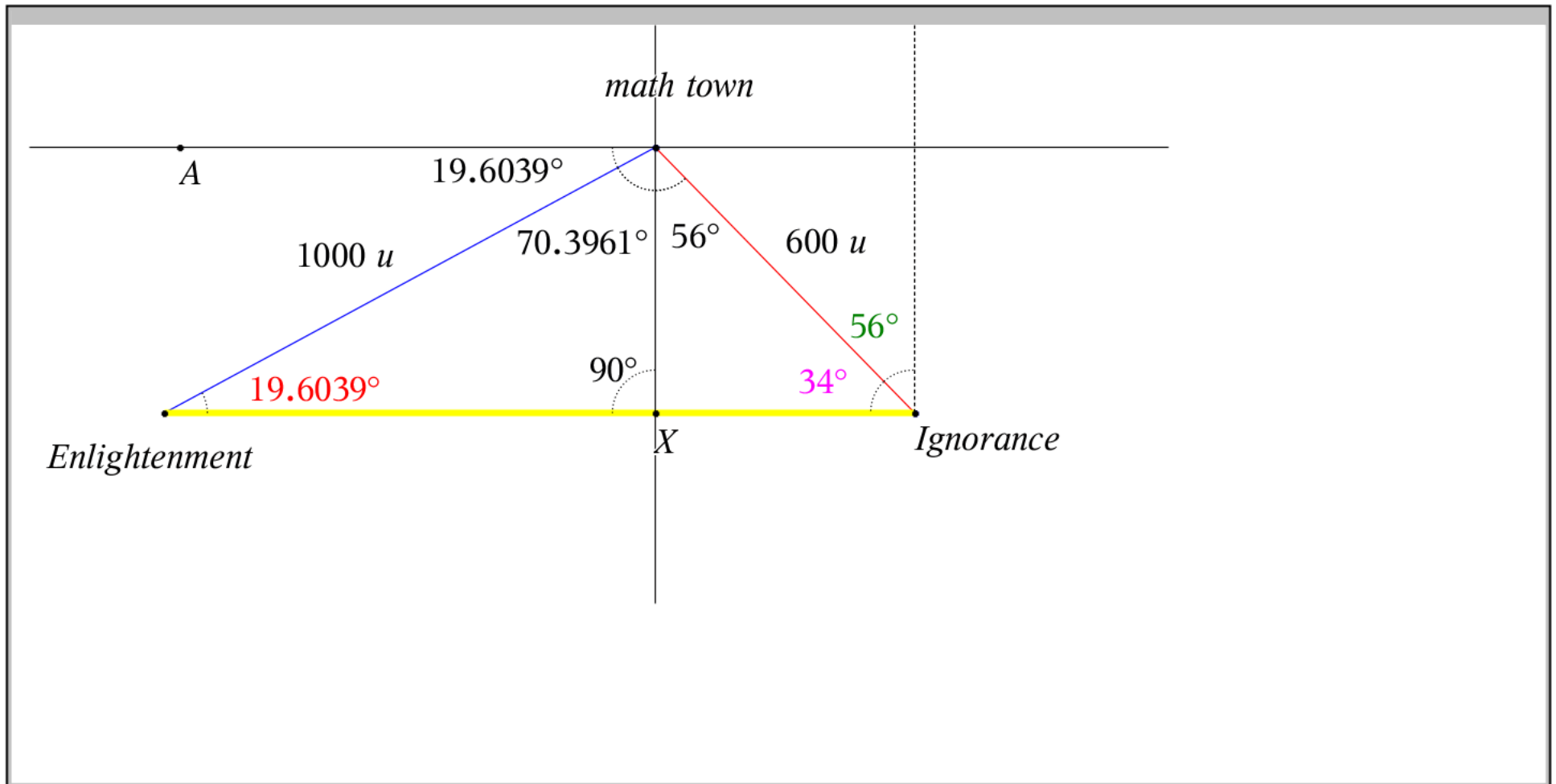
To determine heading from Math Town to Enlightenment we must construct a perpendicular through M



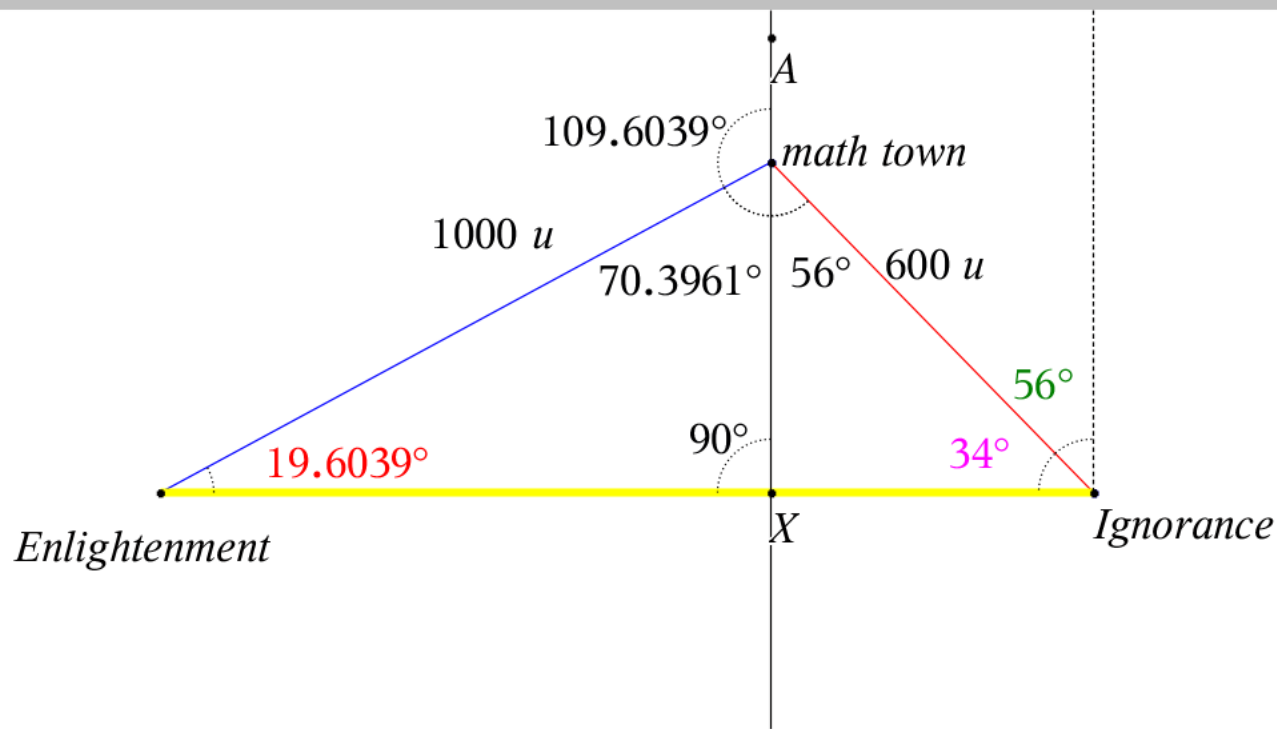
The easiest heading to find from the triangle is related to the angle EMX

S 70.3961° W or 70.3961° west of south

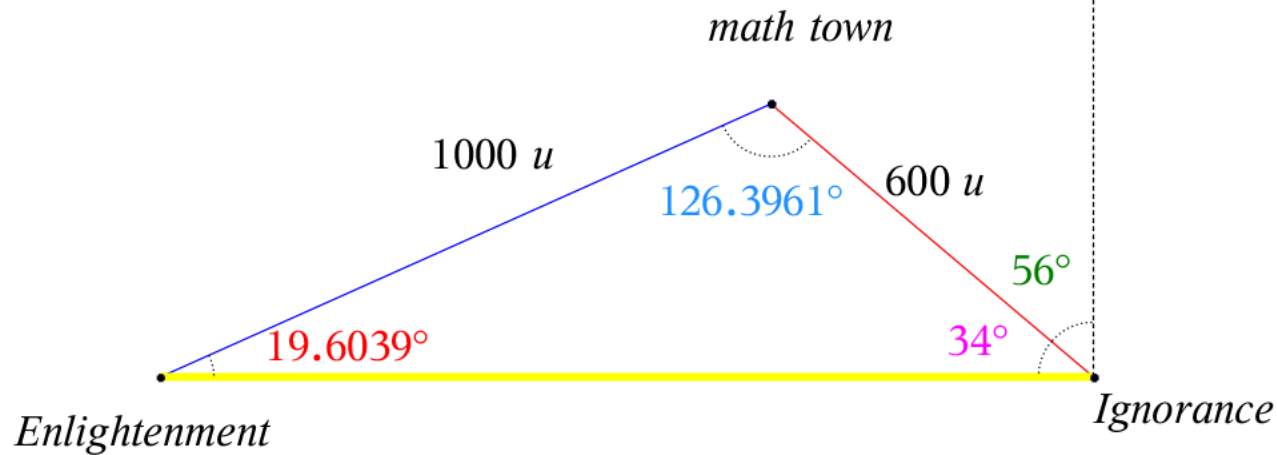
These also give us a bearing of 250.3961 or N 250.3961° E or S 289.6039° E



If we construct a parallel to EI we can get another heading
 The easiest heading to find from the triangle is related to the angle EMX
 19.6039° south of west



Another heading to find from the triangle is related to the angle AME
 N 109.6039° W or 109.6039° west of north
 These also give us a bearing of 250.3961 or N 250.3961° E



supplement to angle E 160.3961

sum of angle MIE and supplement to angle E 194.3961

Fortunately for us,
there is ONLY one path to Enlightenment from Ignorance through Math Town