

Suggestions for Using the Law of Cosines When Given SAS and SSS

Given SAS, first use the Law of Cosines to determine the third side. Then use the Law of Sines to find the two unknown angles. Find the angle opposite the shorter of the two given sides first because we know that angle must be acute. (It can't be obtuse, because the angle opposite the larger given side would have to be even larger making it obtuse also and a triangle can't have two obtuse angles.) This avoids the possibility of having to consider two answers for the angles.

Example: Solve $\triangle ABC$, given $a = 5.0$, $c = 8.0$, and $\beta = 77^\circ$

Solution: $b \approx 8.4$, $\alpha = 35^\circ$, and $\gamma = 68^\circ$.

Given SSS, first use the Law of Cosines to find the largest angle, which is the angle opposite the largest side. This guarantees that the other two angles are acute and avoids the possibility of having to consider two answers for an angle.

Example: Solve $\triangle ABC$, given $a = 90$, $b = 70$, and $c = 40$.

Solution: $\alpha = 107^\circ$, $\beta = 48^\circ$, and $\gamma = 25^\circ$.