7.2 Laws of Sine

An Oblique triangle has either 3 acute angles or 2 acute angles and 1 obtuse angle. NO right angles!

Solving an oblique triangle: need to know length of 1 side along with:
1) 2 angles or
2) the other 2 sides or
3) 1 angle and 1 other side.

Knowing 3 angles of a triangle determines a family of similar triangles, that is, triangles that have the same shape but different sizes. 4 possibilities to consider:

case 1: 1 side and 2 angles (ASA or SAA)
case 2: 2 sides and the angle opposite one of them are known (SSA)
case 3: 2 sides and the included angle (SAS)
case 4: 3 sides are known (SSS)

The laws of sines is used to solve triangle for which case 1 or 2 holds. Cases 3 and 4 will use the laws of cosine in section 7.3

Laws of Sines:

Ex. 1 Use laws of sines to solve a SSA triangle given:
$\alpha = 40$, $\beta = 60$, $a = 4$

Ex. 2 Use laws of sines to solve an ASA triangle given:
$\alpha = 35$, $\beta = 15$, $c = 5$

Case 2 (SSA) - "ambiguous case" 2 sides and the angle opposite one of them are known. Can results in 1, 2 or no triangles.

* the key in determining the possible # of triangles, if any, that may be formed from the given info lies primarily with the height(h) and the fact that $h = \sin \alpha$. Quick examples on Pg. 543

Ex. 3 Using laws of sines to solve SSA triangle (one solution) given:
$a = 3, b = 2, \alpha = 40$

Ex. 4 Solve SSA triangle (2 solutions) given:
$a = 6, b = 8, \alpha = 35$

Ex. 5 Solve SSA triangle (no solution) given:
$a = 2, c = 1, \lambda = 50$