Additional Topics in Trigonometry

8.1 Oblique Triangles and the Law of Sines

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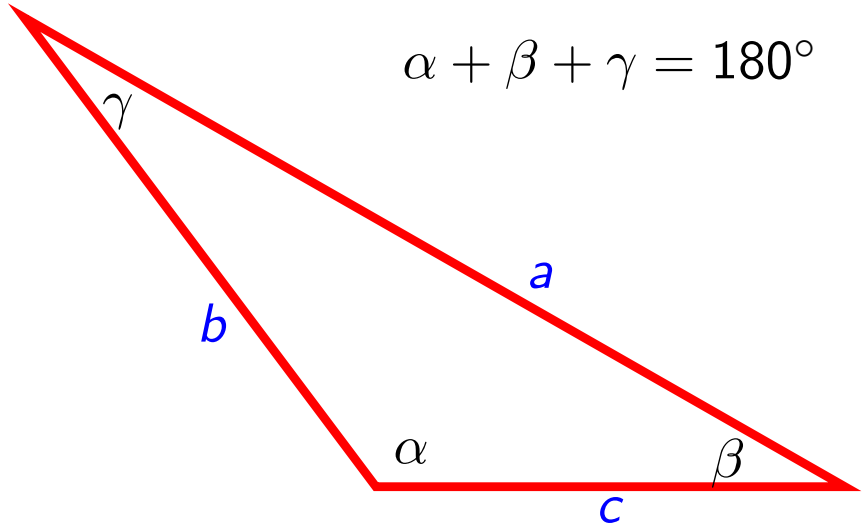
Oblique Triangles and the Law of Sines

Oblique Triangle:



The Law of Sines

For a triangle with sides a, b, and c and opposite angles α, β and γ, the following is true:

$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

In order to solve an oblique triangle, we need to know the length of one side and one of the following three

- two angles
- one angle and another side
- the other two sides

Two Angles and One Side

Example

Solve the triangle $\beta = 75°$, $\gamma = 60°$, $b = 25$ in.

Example

Solve the triangle $\gamma = 100°$, $\beta = 40°$, $a = 16$ ft.

Two Sides and One Angle

This case is ambiguous, because the given information by itself can represent one triangle, two triangles or no triangle at all.

- If the angle given is acute then the possibilities are
  - no triangle
  - one triangle
  - two triangles
- If the angle given is obtuse then the possibilities are
  - no triangle
  - one triangle

Example

Solve the triangle $b = 30$, $c = 20$, $\beta = 70°$.

Example

Solve the triangle $a = 13$, $b = 26$, $\alpha = 120°$.