

# 解三角形

## 余弦定理

$$\begin{aligned}c^2 &= a^2 + b^2 - 2ab \cos C \\a^2 &= b^2 + c^2 - 2bc \cos A \\b^2 &= c^2 + a^2 - 2ca \cos B\end{aligned}$$

$$\begin{aligned}\cos A &= (b^2 + c^2 - a^2) / 2bc \\ \cos B &= (c^2 + a^2 - b^2) / 2ca \\ \cos C &= (a^2 + b^2 - c^2) / 2ab\end{aligned}$$

$$\begin{aligned}a &= b \cos C + c \cos B \\ b &= a \cos C + c \cos A \\ c &= a \cos B + b \cos A\end{aligned}$$

## 正弦定理

$$a / \sin A = b / \sin B = c / \sin C = k = 2R$$

$$\begin{aligned}1/2 ab \sin C &= 1/2 ac \sin B \\ b \sin C / \sin B \sin C &= c \sin B / \sin B \sin C\end{aligned}$$

$$\begin{aligned}a &= k \cdot \sin A \\ b &= k \cdot \sin B \\ c &= k \cdot \sin C\end{aligned}$$

$$a : b : c = \sin A : \sin B : \sin C$$

$$k = (a + b) / (\sin A + \sin B) = (a + c) / (\sin A + \sin C) = (b + c) / (\sin B + \sin C) = (a + b + c) / (\sin A + \sin B + \sin C)$$

$$\begin{aligned}\sin A &= a / k \\ \sin B &= b / k \\ \sin C &= c / k\end{aligned}$$

## 面积

$$S = 1/2 ab \sin C = 1/2 ac \sin B = 1/2 bc \sin A$$