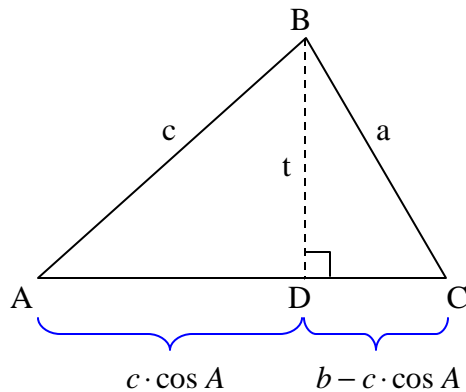


ATURAN COSINUS

Gambar 1



Perhatikan gambar 1 di samping:

Pada $\triangle ABD$

$$\cos A = \frac{AD}{c} \quad \Rightarrow AD = c \cdot \cos A$$

$$\sin A = \frac{t}{c} \quad \Rightarrow t = c \cdot \sin A$$

$$\Rightarrow t^2 = c^2 \cdot \sin^2 A$$

$$\Rightarrow t^2 = c^2 \cdot (1 - \cos^2 A)$$

Pada $\triangle BCD$

$$t^2 = a^2 - (b - c \cdot \cos A)^2 \quad \text{dalil Pythagoras}$$

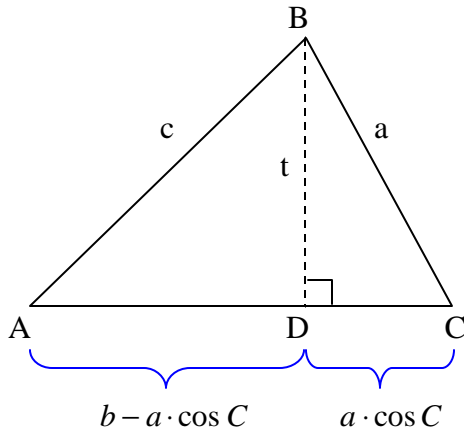
Sehingga

$$c^2 \cdot (1 - \cos^2 A) = a^2 - (b - c \cdot \cos A)^2$$

$$\Rightarrow c^2 - c^2 \cos^2 A = a^2 - b^2 + 2bc \cdot \cos A - c^2 \cos^2 A$$

$$\Rightarrow a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

Gambar 2



Perhatikan gambar 2 di samping:

Pada ΔBCD

$$\cos C = \frac{CD}{a} \quad \Rightarrow CD = a \cdot \cos C$$

$$\sin C = \frac{t}{a} \quad \Rightarrow t = a \cdot \sin C$$

$$\Rightarrow t^2 = a^2 \cdot \sin^2 C$$

$$\Rightarrow t^2 = a^2 \cdot (1 - \cos^2 C)$$

Pada ΔABD

$$t^2 = c^2 - (b - a \cdot \cos C)^2 \quad \text{dalil Pythagoras}$$

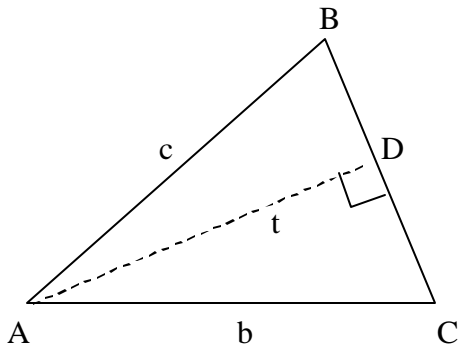
Sehingga

$$a^2 \cdot (1 - \cos^2 C) = c^2 - (b - a \cdot \cos C)^2$$

$$\Rightarrow a^2 - a^2 \cos^2 C = c^2 - b^2 + 2ab \cdot \cos C - a^2 \cos^2 C$$

$$\Rightarrow c^2 = a^2 + b^2 - 2ab \cdot \cos C$$

Gambar 3



Perhatikan gambar 3 di samping:

Pada $\triangle ABD$

$$\cos B = \frac{BD}{c} \Rightarrow BD = c \cdot \cos B$$

$$\sin B = \frac{t}{c} \Rightarrow t = c \cdot \sin B$$

$$\Rightarrow t^2 = c^2 \cdot \sin^2 B$$

$$\Rightarrow t^2 = c^2 \cdot (1 - \cos^2 B)$$

Pada $\triangle ABC$

$$t^2 = b^2 - (a - c \cdot \cos B)^2 \quad \text{dalil Pythagoras}$$

Sehingga

$$\begin{aligned} c^2 \cdot (1 - \cos^2 B) &= b^2 - (a - c \cdot \cos B)^2 \\ \Rightarrow c^2 - c^2 \cos^2 B &= b^2 - a^2 + 2ac \cdot \cos B - c^2 \cos^2 B \\ \Rightarrow & b^2 = a^2 + c^2 - 2ac \cdot \cos B \end{aligned}$$

Jadi diperoleh Aturan Cosinus

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cdot \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cdot \cos C$$