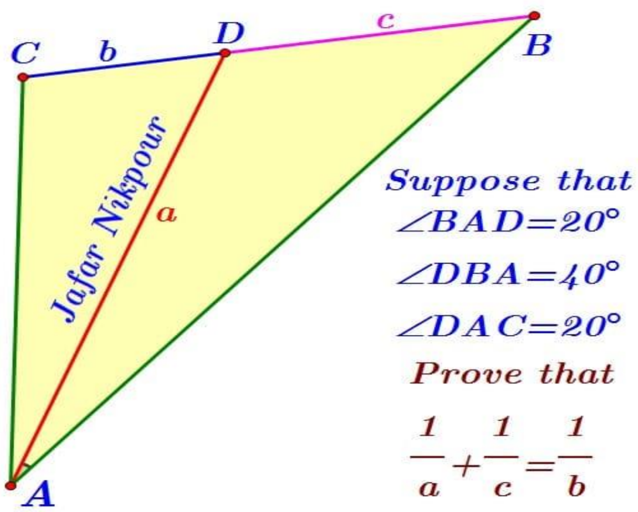
ROMANIAN MATHEMATICAL MAGAZINE



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Solution by Daniel Sitaru-Romania

$$m(\sphericalangle ABD)=180^\circ-40^\circ-20^\circ=120^\circ,\ m(\sphericalangle ADC)=180^\circ-120^\circ=60^\circ$$

In ΔADC:

$$\frac{a}{\sin 100^\circ}=\frac{b}{\sin 20^\circ}\Rightarrow b=\frac{a\sin 20^\circ}{\sin 100^\circ}$$

In ΔADB:

$$\frac{c}{\sin 20^\circ}=\frac{a}{\sin 40^\circ}\Rightarrow c=\frac{a\sin 20^\circ}{\sin 40^\circ}$$

$$\frac{1}{a}+\frac{1}{c}=\frac{1}{b}\Leftrightarrow\frac{1}{a}+\frac{1}{\frac{a\sin 20^\circ}{\sin 100^\circ}}=\frac{1}{\frac{a\sin 20^\circ}{\sin 40^\circ}}\Leftrightarrow \sin 20^\circ+\sin 40^\circ=\sin 100^\circ\Leftrightarrow$$

$$\Leftrightarrow 2\sin\frac{20^\circ+40^\circ}{2}\cos\frac{20^\circ-40^\circ}{2}=\sin(90^\circ+10^\circ)\Leftrightarrow$$

$$\Leftrightarrow 2\sin 30^\circ\cos 10^\circ=\sin 90^\circ\cos 10^\circ+\sin 10^\circ\cos 90^\circ\Leftrightarrow$$

$$\Leftrightarrow 2\cdot\frac{1}{2}\cos 10^\circ=1\cdot\cos 10^\circ+\sin 10^\circ\cdot 0\Leftrightarrow\cos 10^\circ=\cos 10^\circ$$