



The University of Georgia

Mathematics Education Program

J. Wilson, EMAT 6600

## Ratio of Sines

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Goal: to show the relationship between  $\sin 72^\circ$  and  $\sin 36^\circ$

### Problem

Given that  $\varphi = \frac{1 + \sqrt{5}}{2}$  -- the Golden Ratio.

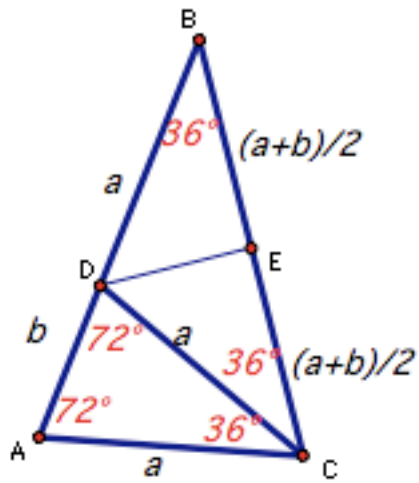
Show that

or alternatively,

$$\sin 72^\circ = \varphi \sin 36^\circ$$

$$\frac{\sin 72^\circ}{\sin 36^\circ} = \varphi$$

## Solution



$$\frac{\sin 72}{\sin 36} = \frac{2 \sin 36 \cos 36}{\sin 36} = 2 \cos 36 = 2 * \frac{\varphi}{2} \text{ (from Sublime triangle solution)} = \varphi$$

Alternatively,

$$\frac{a}{\sin 36} = \frac{a+b}{\sin 72} \text{ so } \frac{\sin 72}{\sin 36} = \frac{a+b}{a} = \varphi$$


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