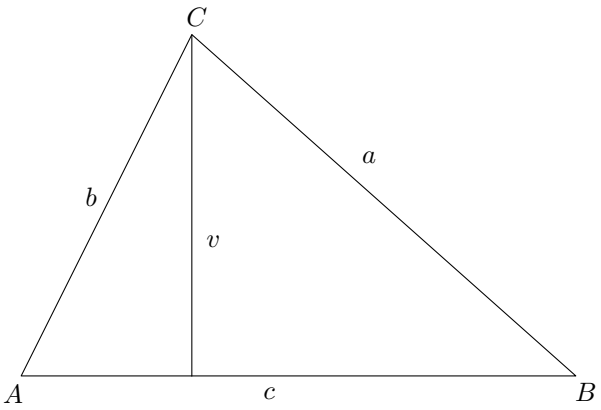
HÉRÓNŮV VZOREC



$S = \frac{c \cdot v}{2}$ $\quad v = ?$ $\quad \sin\alpha = \frac{v}{b}$, tj. $v = b \cdot \sin\alpha$

$S = \frac{1}{2} bc \cdot \sin\alpha = \frac{1}{2} bc\sqrt{1 - \cos^2\alpha}$

$\cos\alpha = ?$ $\quad a^2 = b^2 + c^2 - 2bc\cos\alpha$, tj. $\cos\alpha = \frac{b^2 + c^2 - a^2}{2bc}$

$$S = \frac{1}{2} bc\sqrt{1 - \cos^2\alpha} = \frac{1}{2} bc\sqrt{1 - \left(\frac{b^2 + c^2 - a^2}{2bc}\right)^2} = \frac{1}{2} bc \cdot \frac{1}{2bc} \cdot \sqrt{4b^2c^2 - \left(b^2 + c^2 - a^2\right)^2}$$

$$S = \frac{1}{4} \cdot \sqrt{4b^2c^2 - \left(b^2 + c^2 - a^2\right)^2}$$

$4b^2c^2 - \left(b^2 + c^2 - a^2\right)^2 = \left[2bc + \left(b^2 + c^2 - a^2\right)\right] \cdot \left[2bc - \left(b^2 + c^2 - a^2\right)\right] = \left[(b+c)^2 - a^2\right] \cdot \left[a^2 - (b-c)^2\right] =$
$= (a+b+c) \cdot (b+c-a) \cdot (a+c-b) \cdot (a+b-c)$

$$S = \frac{1}{4} \cdot \sqrt{(a+b+c) \cdot (b+c-a) \cdot (a+c-b) \cdot (a+b-c)}$$

$$s = \frac{a+b+c}{2} \qquad s - a = \frac{b+c-a}{2} \qquad s - b = \frac{a+c-b}{2} \qquad s - c = \frac{a+b-c}{2}$$

$$S = \sqrt{s \cdot (s-a) \cdot (s-b) \cdot (s-c)}$$