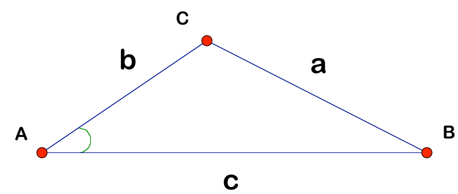
Theorem 68. Let R be the radius of circumscribed circle in the $\triangle ABC$. Then,

$$R=\frac{abc}{4S}$$

Proof: $2R=\frac{a}{\sin\angle A} \quad =\frac{abc}{bc\cdot\sin\angle A}=$



$$=\frac{\frac{1}{2}abc}{\frac{1}{2}bc\cdot\sin\angle A}=\frac{abc}{2S}$$

Hide Objects

Hide Caption

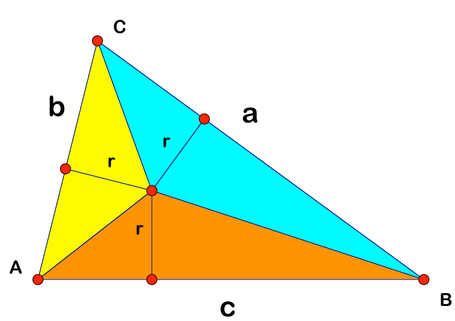
Hide Caption

Theorem 69. Let r be the radius of inscribed circle in the $\triangle ABC$. Then,

$$r=\frac{S}{p}$$

Hide Path Objects

Show Circle



The sum of the areas of the small triangles is S and could be written as

$$S=\frac{1}{2}ra+\frac{1}{2}rb+\frac{1}{2}rc=rp$$

Theorem 70. If a shape A is similar to a shape B with coefficient k, then

$$\text{Area}(A)=k^2\text{Area}(B).$$

Proof: Only for triangles and quadrilaterals. Just put k in the formulas. If B is a triangle with a base b and altitude h, then the corresponding side of A is kb and the corresponding altitude is kh. Then

$\text{Area}(B)=\frac{1}{2}hb$ and $\text{Area}(A)=k^2\frac{1}{2}hb$