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In $\triangle ABC$ the following relationship holds:

$$3\sqrt{3}r^2 \leq F \leq \frac{3\sqrt{3}}{4}R^2$$

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Solution by Daniel Sitaru – Romania

$$F = rs \stackrel{\text{MITRINOVIC}}{\geq} r \cdot 3\sqrt{3}r = 3\sqrt{3}r^2$$
$$F = rs \stackrel{\text{EULER}}{\leq} \frac{R}{2} \cdot s \stackrel{\text{MITRINOVIC}}{\leq} \frac{R}{2} \cdot \frac{3\sqrt{3}}{2}R = \frac{3\sqrt{3}}{4}R^2$$

Equality holds for an equilateral triangle.