

## SOME GEOMETRIC FORMULAS

Let  $ABC$  be a triangle with the sides  $a$ ,  $b$ , and  $c$ , and the angles  $\angle A$ ,  $\angle B$ ,  $\angle C$ . We denote by  $R$  and  $r$  respectively the radius of the circumscribed (inscribed) triangle.  $S$  is the area,  $p = a + b + c$  is the perimeter.

### 1. LAWS OF SIN AND COS

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R \text{ [Law of Sines]}$$

$$c^2 = a^2 + b^2 - 2ab \cos C \text{ [Law of Cosines]}$$

### 2. AREA

$$S = \sqrt{s(s-a)(s-b)(s-c)}, \quad s = \frac{p}{2} \text{ is the semi-perimeter [Heron's f-la]}$$

$$S = \frac{ah}{2} \text{ [h=height perpendicular to a]}$$

$$S = 2R^2 \sin A \sin B \sin C$$

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

$$S = \frac{pr}{2}$$

$$S = \frac{ab \sin C}{2}$$

$$S = \frac{a^2 \sin B \sin C}{2 \sin A}$$