3.1 Right Triangle

Legs of a right triangle: a, b
Hypotenuse: c
Altitude: h
Medians: m_a, m_b, m_c
Angles: α, β
Radius of circumscribed circle: R
Radius of inscribed circle: r
Area: S

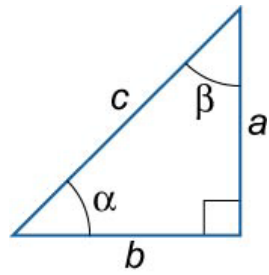

Figure 8.

156. $\alpha + \beta = 90°$

157. $\sin\alpha = \frac{a}{c} = \cos\beta$

158. $\cos\alpha = \frac{b}{c} = \sin\beta$

159. $\tan\alpha = \frac{a}{b} = \cot\beta$

160. $\cot\alpha = \frac{b}{a} = \tan\beta$

161. $\sec\alpha = \frac{c}{b} = \operatorname{cosec}\beta$

162. $\operatorname{cosec}\alpha = \frac{c}{a} = \sec\beta$

163. Pythagorean Theorem

$a^2 + b^2 = c^2$

164. $a^2 = fc$, $b^2 = gc$,

where f and c are projections of the legs a and b, respectively, onto the hypotenuse c.

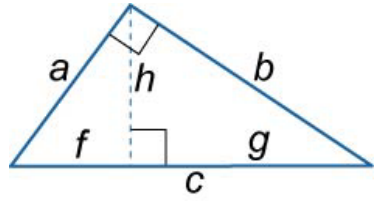

Figure 9.

165. $h^2 = fg$,
where h is the altitude from the right angle.

166. $m_a^2 = b^2 - \frac{a^2}{4}$, $m_b^2 = a^2 - \frac{b^2}{4}$,
where m_a and m_b are the medians to the legs a and b.

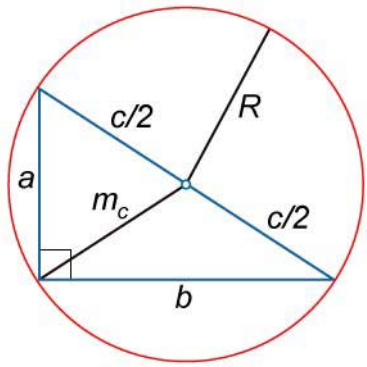

Figure 10.

167. $m_c = \frac{c}{2}$,
where m_c is the median to the hypotenuse c.

168. $R = \frac{c}{2} = m_c$

169. $r = \frac{a+b-c}{2} = \frac{ab}{a+b+c}$

170. $ab = ch$

171. $S = \frac{ab}{2} = \frac{ch}{2}$