SECTION FOUR: CERTAIN TRIGONOMETRIC THEOREMS IN TRIANGLES

1. LAW OF COSINES: The law of cosines provides a means of completely solving any triangle whenever you know either two sides and the included angle or three sides.

In triangle ABC,
\[ a^2 = b^2 + c^2 - 2bc \cos(A) \]
\[ b^2 = a^2 + c^2 - 2ac \cos(B) \]
\[ c^2 = a^2 + b^2 - 2ab \cos(C) \]

2. LAW OF SINES: This law is the assertion that the sine of an angle in a triangle is proportional to the length of the side opposite to it.

\[ \frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)} = 2r \]

3. LAW OF TANGENTS:

In triangle ABC, (b>c)
\[ \frac{b + c}{b - c} = \frac{\tan \left(\frac{B + C}{2}\right)}{\tan \left(\frac{B - C}{2}\right)} \]