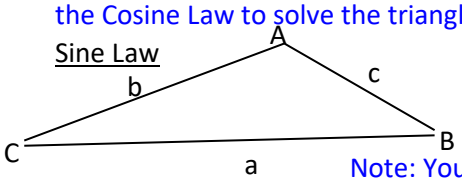
Sine Law and Cosine Law (For Oblique Triangles)

If you do not have a Right-Angle triangle (if the triangle is oblique), you must either use the Sine Law or the Cosine Law to solve the triangle.

Sine Law

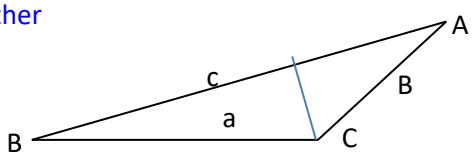


$$\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC} \quad \text{OR} \quad \frac{sinA}{a} = \frac{sinB}{b} = \frac{sinC}{c}$$

Note: You need 1 full ratio and 1 other piece of information to use the Sine Law.

Remember: side labels and corresponding angle labels stay together

Let's develop the Sine Law for the following triangle: (pg. 284)



Let's say that the only knowledge we have is for SOH...we need a 90 degree angle.

You don't need to write out the proof – it is in your textbook.

Example 1:

In $\Delta PQR, P = 105°, p = 26cm, and\ r = 15cm$. Solve the triangle.

Cosine Law

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$

Or to Find an Angle:

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos B =$$

$$\cos C =$$

Note: To use Cosine Law, you need either:

- 2 sides and the angle between the sides OR
- all 3 sides

What Math property do you think was used to create the Cosine Law? (Proof: Textbook page 286-287)

Example 2: In ΔEFD, e = 6.7 cm, d = 18.8 cm, and F = 42 degrees. Solve the triangle.

Example 3: Airport X is due East of Airport Y. An aircraft is $23°$ North of due West and 240 km from airport Y. The angle of elevation from Airport X to the aircraft is $14°$. How far apart are airport X and Airport Y? Round your answer to the nearest tenth of a kilometre.