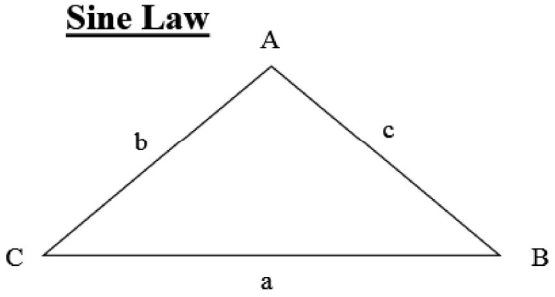
Pre-Calculus 11 Sine Law

To solve an oblique triangle (a triangle which is not a right triangle), we use either Sine Law or Cosine Law.

Sine Law

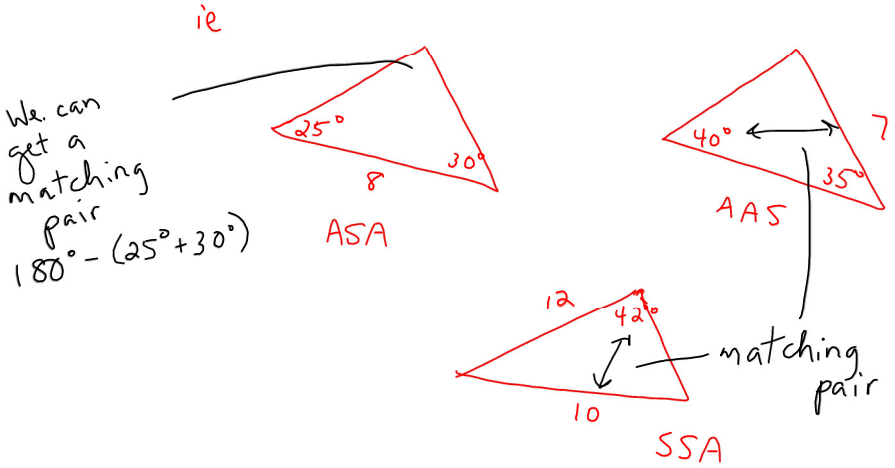


For any ΔABC,

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

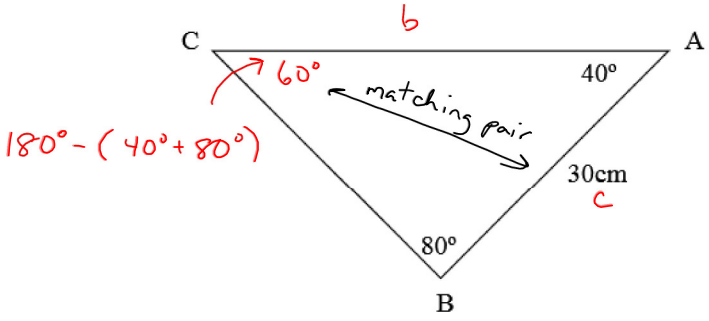
The Sine Law is used in either of the two possible cases:

1. Two angles and any side (AAS or ASA)
2. Two sides and an angle opposite one of them (SSA)



Examples of AAS or ASA

1. In ΔABC find AC



$180° - (40° + 80°)$

$\frac{c}{\sin C} = \frac{b}{\sin B}$

$\frac{30}{\sin 60°} = \frac{b}{\sin 80°}$

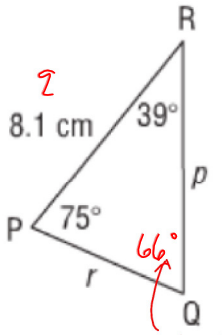
$30 \cdot \sin 80° = b \sin 60°$

$\frac{30 \sin 80°}{\sin 60°} = b$

$34.115 = b$

$\therefore AC = 34.115 cm$

2. In ΔPQR, determine the length of QR to the nearest tenth of a centimetre.



$180° - (75° + 39°)$

$\frac{q}{\sin Q} = \frac{p}{\sin P}$

$\frac{8.1}{\sin 66°} = \frac{p}{\sin 75°}$

cross-multiply

$8.1 \sin 75° = p \sin 66°$

divide to isolate p

$\frac{8.1 \sin 75°}{\sin 66°} = p$

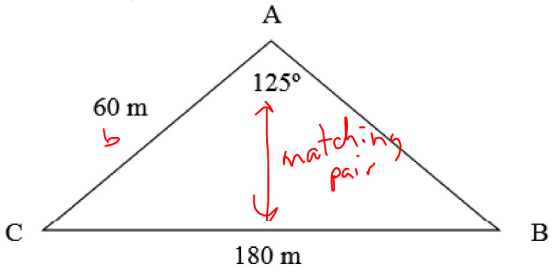
use calc only in last step.

$8.56 = p$

$\therefore p = 8.6 cm$

Examples of SSA (Angle is opposite one of the sides)

1. In ΔABC, find $\angle B$



$\frac{a}{\sin A} = \frac{b}{\sin B}$

$\frac{180}{\sin 125°} \times \frac{60}{\sin B}$

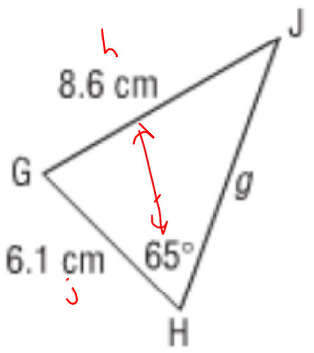
$180 \sin B = 60 \sin 125°$

$\sin B = \frac{60 \sin 125°}{180}$

$B = \sin^{-1}\left(\frac{60 \sin 125°}{180}\right)$ or $B = \sin^{-1}(\text{ans})$

$B = 15.846°$

2. In ΔGHJ, determine the measure of $\angle G$ to nearest degree.



① Find $\angle J$ first, not enough info to find $\angle G$ yet

$\frac{8.6}{\sin 65°} = \frac{6.1}{\sin J}$

$8.6 \sin J = 6.1 \sin 65°$

$\sin J = \frac{6.1 \sin 65°}{8.6}$

$J = \sin^{-1}(\text{ans})$

$J = 40°$

② Find $\angle G$

$\angle G = 180° - (65° + 40°)$

$= 75°$

Assignment: Pg. 478; 3i, 4ii, 5a, 9a,13 Checkpoint pg, 461