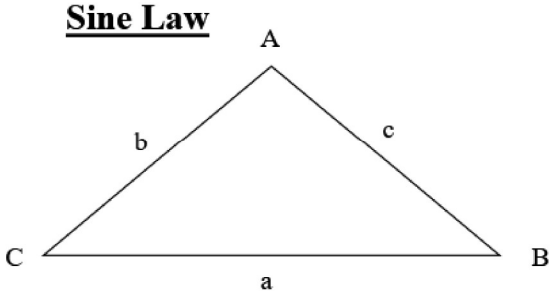
Lesson 4 Sine Law

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

Sine Law

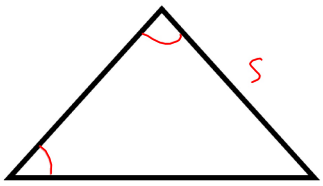


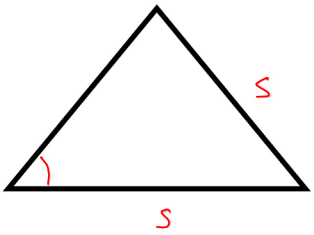
For any ΔABC,

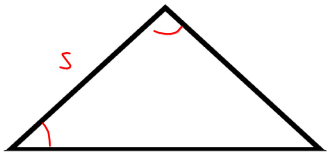
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

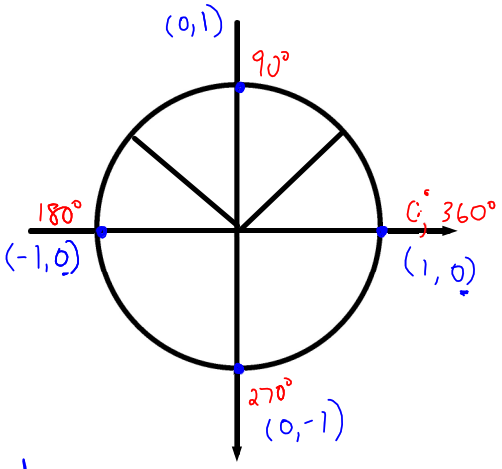
The Sine Law is used in either of the two possible cases:

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









$(x, y) \rightarrow (\cos\theta, \sin\theta)$

g) $\sin\theta = 0$ ← y-coord

$\theta = 0°, 180°, 360°$

h) $\cos\theta = 0$ ← x-coord

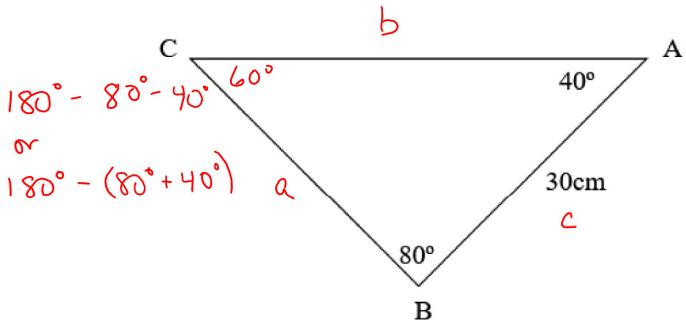
$\theta = 90°, 270°$

i) $\tan\theta = 0$ $\left(\frac{y}{x}\right)$

$\theta = 0°, 180°, 360°$

Examples of AAS or ASA

1. Solve for b.



$180° - 80° - 40°$
or
$180° - (80° + 40°)$

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

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

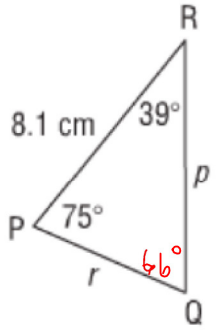
$30 \sin 80° = b \sin 60°$

$\frac{30 \sin 80°}{\sin 60°} = b$

$34.115\text{cm} = b$

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

ASA



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

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

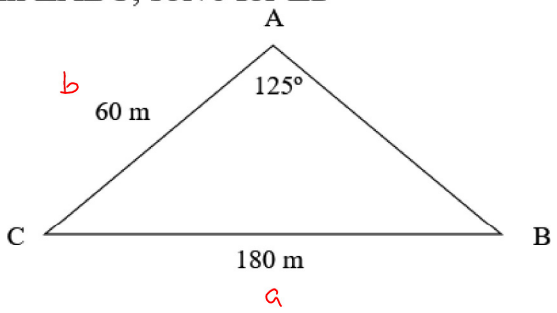
$(8.1) \sin 75° = \sin 66° \cdot p$

$\frac{(8.1) \sin 75°}{\sin 66°} = p$

$p = 8.6\text{ cm}$

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

1. In ΔABC, solve for $\angle B$



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

$\frac{180}{\sin 125^\circ} = \frac{60}{\sin B}$

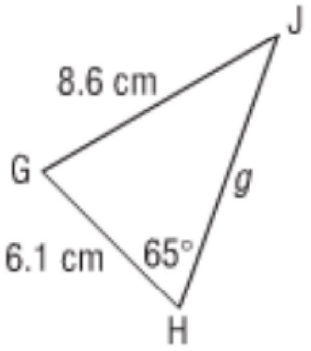
$180 \sin B = 60 \sin 125^\circ$

$\sin B = \frac{60 \sin 125^\circ}{180}$

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

$B = 15.846^\circ$

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



$\frac{8.6}{\sin 65^\circ} = \frac{6.1}{\sin J}$ or $\frac{\sin 65^\circ}{8.6} = \frac{\sin J}{6.1}$

$(8.6)\sin J = (6.1)\sin 65^\circ$

$\sin J = \frac{(6.1)\sin 65^\circ}{(8.6)}$

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

$J = 40^\circ$

$G = 180^\circ - (65^\circ + 40^\circ)$

$= 75^\circ$

pg. 144
#6a, c, f, h, n

7