2.2 The Sine Law
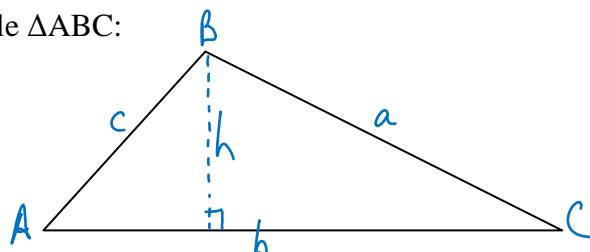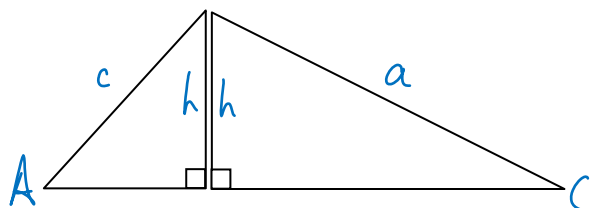
Start with any triangle ΔABC:

If we drop a perpendicular and create two separate triangles:

Using the sine ratios: $\sin A = \dfrac{h}{c}$ & $\sin C = \dfrac{h}{a}$

$$c \sin A = h \qquad\qquad a \sin C = h$$

. . . since *h* is the same in both triangles, therefore:

$$\therefore \quad \frac{c \sin A}{ac} = \frac{a \sin C}{ac} \quad \longrightarrow \quad \frac{\sin A}{a} = \frac{\sin C}{c}$$

We could have placed angles A, B and C in any position, so we could have derived:

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

The Sine Law (for any ΔABC) $\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$
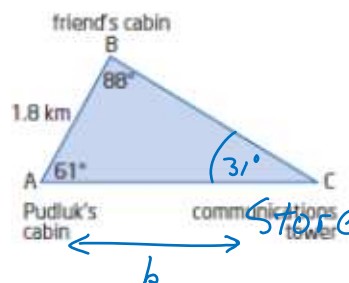
where __a__ is opposite ∠A

   __b__ is opposite ∠B

   __c__ is opposite ∠C

use any 2 to cross multiply

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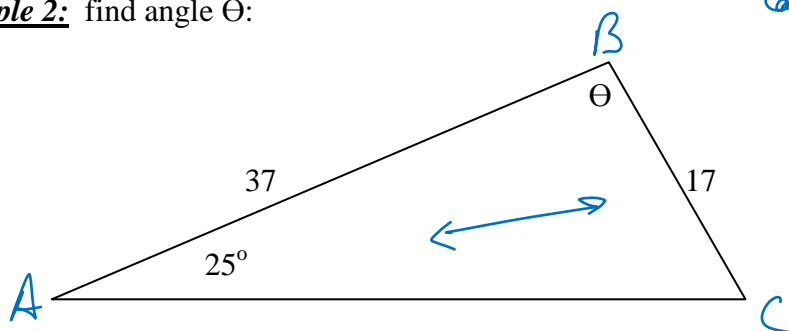
Example 1: p.102 - find and unknown side length
Determine the distance from Pudluk's cabin to the store, to the
nearest tenth of a kilometer.

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

$$\frac{Sin\ 31°}{1.8} = \frac{Sin\ 88°}{b}$$

$$b = \frac{1.8\ Sin\ 88°}{Sin\ 31°} = \underline{3.5\ km}$$

Example 2: find angle Θ:

Need to know opposite
side & angle

$$\frac{Sin\ A}{a} = \frac{Sin\ C}{c}$$

$$\frac{Sin\ 25°}{17} = \frac{Sin\ C}{37}$$

$$\frac{37\ Sin\ 25°}{17} = Sin\ C$$

$$\therefore C = 67°$$

$$\begin{array}{c} 67 \\ 25 \\ 92 \end{array}$$

$$\therefore \Theta = 88°$$

Assignment: p. 108 # 1-3, 5, 10, 15,