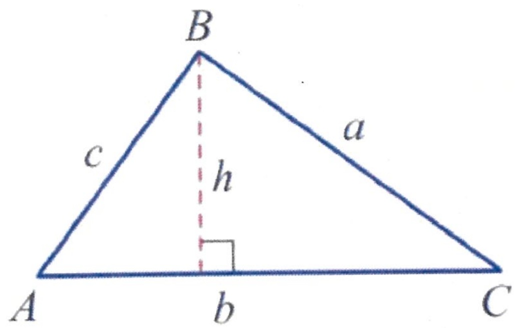
AREA OF A TRIANGLE



We can see in this triangle that $\frac{h}{a} = \sin C$, so $h = a \sin C$.

$\therefore A = \frac{1}{2}bh$ becomes $$A = \frac{1}{2}ba \sin C.$$

Introduction to reciprocal trigonometric ratios

Apart from *sin, cos* and *tan*, there exist 3 other trigonometric ratios, namely:

$sec\,\theta = \frac{1}{cos\,\theta}$ "secant"

$csc\,\theta = \frac{1}{sin\,\theta}$ "cosecant" (also sometimes abbreviated "*cosec*")

$cot\,\theta = \frac{1}{tan\,\theta}$ "cotangent" (also sometimes abbreviated "*cotan*")

Because they are reciprocal values of the trigonometric ratios *sin, cos* and *tan*, they are called "**reciprocal trigonometric ratios**".
These reciprocal trigonometric ratios are rarely used, except for shortening long expressions (particularly in the topic of differentiation (Y11 Maths Advanced)).

Prove the equality $\dfrac{1+\cot\theta}{1+\tan\theta} = \cot\theta$.

$$\text{Left Hand Side} = \frac{1+\frac{\cos\theta}{\sin\theta}}{1+\frac{\sin\theta}{\cos\theta}}$$

$$LHS = \frac{\frac{\sin\theta+\cos\theta}{\sin\theta}}{\frac{\cos\theta+\sin\theta}{\cos\theta}} = \left(\frac{\sin\theta+\cos\theta}{\sin\theta}\right) \div \left(\frac{\cos\theta+\sin\theta}{\cos\theta}\right)$$

$$LHS = \left(\frac{\cancel{\sin\theta+\cos\theta}}{\sin\theta}\right) \times \left(\frac{\cos\theta}{\cancel{\cos\theta+\sin\theta}}\right)$$

$$\therefore\ LHS = \frac{\cos\theta}{\sin\theta} = \text{cotan}\,\theta$$