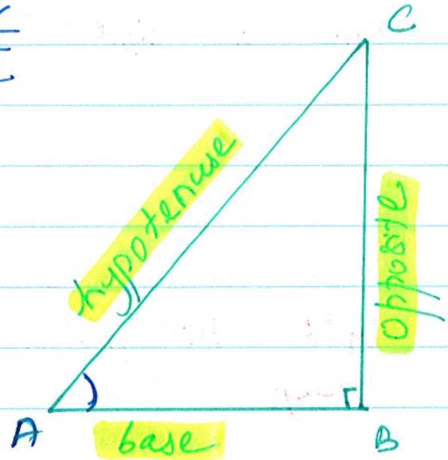
The trigonometric ratios of the angle A is right triangle ABC as given below :

(1) $\sin A = \dfrac{\text{opposite}}{\text{hypotenuse}} = \dfrac{BC}{AC}$

(2) $\text{Cosine } A = \dfrac{\text{base}}{\text{hypotenuse}} = \dfrac{AB}{AC}$

(3) $\text{tangent } A = \dfrac{\text{opposite}}{\text{base}} = \dfrac{BC}{AB}$



(4) $\text{Cosecant } A = \dfrac{1}{\sin A}$

(5) $\text{Secant } A = \dfrac{1}{\text{Cosine } A}$

(6) $\text{Cotangent } A = \dfrac{1}{\text{tangent } A}$

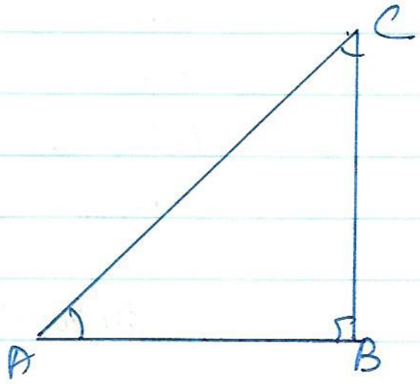
(i) $\tan A = \dfrac{\sin A}{\cos A}$

(ii) $\cot A = \dfrac{\cos A}{\sin A}$

$\angle A$	0°	30°	45°	60°	90°
sin A	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos A	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan A	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
cosec A	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec A	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
cot A	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

Trigonometric Ratios of Complementary Angles

Since $\angle C = 90 - \angle A$



$\therefore \sin(90-A) = \cos A \quad | \quad \cos(90-A) = \sin A$

$\tan(90-A) = \cot A \quad | \quad \cot(90-A) = \tan A$

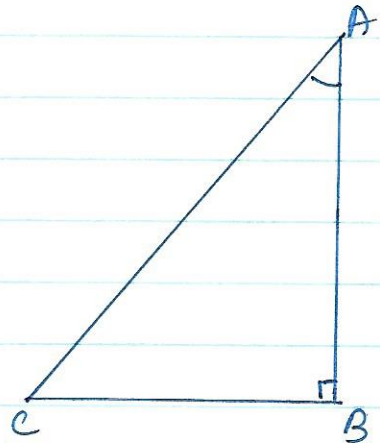
$\sec(90-A) = \operatorname{cosec} A \quad | \quad \operatorname{cosec}(90-A) = \sec A$

$\tan 0^\circ = 0 = \cot 90^\circ$

$\sec 0^\circ = 1 = \operatorname{cosec} 90^\circ$

Trigonometric identities

In ΔABC, $AB^2 + BC^2 = AC^2$



(i) $\dfrac{AB^2}{AC^2} + \dfrac{BC^2}{AC^2} = \dfrac{AC^2}{AC^2}$

$\left(\dfrac{AB}{AC}\right)^2 + \left(\dfrac{BC}{AC}\right)^2 = \left(\dfrac{AC}{AC}\right)^2$

$(\cos A)^2 + (\sin A)^2 = 1$, $\boxed{\cos^2 A + \sin^2 A = 1}$

(ii) $\dfrac{AB^2}{AB^2} + \dfrac{BC^2}{AB^2} = \dfrac{AC^2}{AB^2}$

$\left(\dfrac{AB}{AB}\right)^2 + \left(\dfrac{BC}{AB}\right)^2 = \left(\dfrac{AC}{AB}\right)^2$ $\boxed{1 + \tan^2 A = \sec^2 A}$

(iii) $\dfrac{AB^2}{BC^2} + \dfrac{BC^2}{BC^2} = \dfrac{AC^2}{BC^2}$

$\left(\dfrac{AB}{BC}\right)^2 + \left(\dfrac{BC}{BC}\right)^2 = \left(\dfrac{AC}{BC}\right)^2$ $\boxed{\cot^2 A + 1 = \operatorname{cosec}^2 A}$

Mathematics - class IX
(Algebraic Identity)

An identity is an equality which is true for all values of the variable

Some important identities are:

(i) $(a+b)^2 = a^2+ab+b^2$

(ii) $(a-b)^2 = a^2-2ab+b^2$

(iii) $a^2-b^2 = (a+b)(a-b)$

(iv) $a^3+b^3 = (a+b)(a^2-ab+b^2)$

(v) $a^3-b^3 = (a-b)(a^2+ab+b^2)$

(vi) $(a+b)^3 = a^3+b^3+3ab(a+b)$

(vii) $(a-b)^3 = a^3-b^3-3ab(a-b)$

(viii) $a^4+a^2b^2+b^4 = (a^2+ab+b^2)(a^2-ab+b^2)$

(ix) $a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

Special case: if $a+b+c=0$, then $a^3+b^3+c^3 = 3ab$.