



FORMULAS YOU MUST KNOW

$$\sin(\pi - \theta) = \sin \theta$$

$$\sin(\pi + \theta) = -\sin \theta$$

$$\sin(-\theta) = -\sin \theta \quad (\text{odd})$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$R = \sqrt{a^2 + b^2}, \quad \tan \phi = \frac{b}{a} \quad (\text{check quadrant of } \phi)$$

$$\cos(\pi - \theta) = -\cos \theta$$

$$\cos(\pi + \theta) = -\cos \theta$$

$$\cos(-\theta) = \cos \theta \quad (\text{even})$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$a \sin x + b \cos x = R \sin(x + \phi), \quad R \cos$$

KEY METHODS

- The exact value table is not in the IB formula booklet. Memorise it for Paper 1.
- Sine row pattern: $\frac{\sqrt{0}}{2}, \frac{\sqrt{1}}{2}, \frac{\sqrt{2}}{2}, \frac{\sqrt{3}}{2}, \frac{\sqrt{4}}{2}$. Cosine is the reverse. $\tan = \sin / \cos$.
- $\sin 210^\circ$: Q3 $\Rightarrow$ only Tan is +, so $\sin 210^\circ = -\sin 30^\circ = -\frac{1}{2}$. ASTC first, then reference angle.
- Use the $\cos 2\theta$ form that matches the equation: $\sin^2$ present $\Rightarrow$ use $1 - 2\sin^2 \theta$; $\cos^2$ present $\Rightarrow$ use $2\cos^2 \theta - 1$.
- The "R-formula" / auxiliary angle form is not listed in the IB AA HL syllabus. The correct IB approach is to derive it via the compound angle formula (AHL 3.10). The derivation and method are examinable; the formula itself is not given.
- Extended interval $0 \leq x \leq 4\pi$: find all solutions in $[0, 2\pi]$, then add 2π to each for the second cycle.
- $\tan$ and $\cot$ both have period π but swapped asymptotes/zeros: $\tan$ has VAs at $\frac{\pi}{2} + n\pi$ and zeros at $n\pi$; $\cot$ is the opposite.

EXAM TRAPS TO AVOID

- $\csc \theta = 1 / \sin \theta$, NOT $1 / \cos \theta$. This is one of the most common single-mark losses in trig.
- All three formulas require θ in radians. Convert degrees first: $\theta_{\text{rad}} = \theta_{\text{deg}} \times \frac{\pi}{180}$.
- The general solution for $\tan \theta = k$ adds π , not 2π : $\theta = \arctan k + n\pi$. Adding 2π misses every other solution.
- In $\cos(A + B) = \cos A \cos B - \sin A \sin B$ the sign is minus despite the + in the argument. Writing + here is one of the most common HL errors.
- If $\sin \theta = k$ with $|k| > 1$, you must write "no solution since $|\sin \theta| \leq 1$ " — not just discard it. Omitting this loses the R1 mark.
- $a \sin(bx + c)$ vs $a \sin(b(x + c))$: the phase shift is $-c/b$ in the first form and $-c$ in the second. Factor before reading the shift.
- In the ambiguous SSA case, always test $B' = 180^\circ - B$. Finding only one angle and stopping loses half the marks.

