

Trigonometric Functions: worked examples

HSC Mathematics Extension 1

These examples show assessable skills, not an official HSC topic weighting or prediction. The 2024 NSW syllabuses have their first HSC examination in 2027; students sitting the 2026 HSC continue under the applicable 2017 syllabus.

Worked example 1 | 1 marks

Catalog reference: ext1_nsb_2025_q12b_ii_exact_tangent | seed 41001 | mapping ext1-t3-2

Exact tangent value

Hence find the exact value of $2 \tan(15^\circ)$.

(a) Give the exact value. [1 mark]

Answer: $2(2 - \sqrt{3})$

Half Angle Identity: Apply the identity to twice the stated angle.

Worked example 2 | 3 marks

Catalog reference: ext1_cssa25_auxiliary_angle_max_equation | seed 41001 | mapping ext1-t3-1

Auxiliary-angle equation

Solve $2\cos(\pi/8)\sin x - 2\sin(\pi/8)\cos x = 2$ for $0 \leq x \leq 2\pi$.

(a) Give the exact solution. [3 marks]

Answer: $\pi/2 + (\pi/8)$

Auxiliary Angle: $\pi/8$

Trig Equation: $\pi/2$

Angle Solution: $\pi/2 + (\pi/8)$

Worked example 3 | 1 marks

Catalog reference: ext1_nsb_2025_q12b_i_t_formula_identity | seed 41001 | mapping ext1-t3-2

Tangent half-angle identity

Use t-formulae to show $(1 - \cos(3\theta))/\sin(3\theta) = \tan(3\theta/2)$.

(a) Prove the identity using $t = \tan(3\theta/2)$. [1 mark]

Answer: $\tan((3\theta)/2)$

Tangent Half Angle: Replace sine and cosine using t.

Simplify Identity: The quotient becomes $(2t^2)/(2t) = t$.

Source and methodology

Examples are deterministic curriq catalog generations from existing QDSL archetypes at the published fixed seed. The generator copies only student-facing prompts, mark allocations, topic mappings, display tables or options, checked answers and marking-path results into this resource.

Official syllabus source:

<https://curriculum.nsw.edu.au/learning-areas/mathematics/mathematics-extension-1-11-12-2024/overview/course>

Teacher verification note: check the mathematics, notation, permitted technology and syllabus fit for your cohort before classroom or assessment use.