**Harold’s**

**Trigonometry and Hyperbolic Parent Functions**

**Cheat Sheet**

AKA Library of Functions

15 September 2025

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| **Table of Contents:**   1. Trigonometry 2. Inverse Trigonometry 3. Hyperbolic 4. Inverse Hyperbolic 5. Graphing Tips |
| **Trigonometry Functions** |
| Exact Trig Values |
| **Hyperbolic Functions** |
| Hyperbolic Trigonometric Functions | Brilliant Math & Science Wiki |

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| **Trigonometry** | | | | |
| **Sine** |  | https://encrypted-tbn2.google.com/images?q=tbn:ANd9GcS59mgvINMaLHQP_n6aBU7KCWCmfX28XZe-isPA8Wz2FAErtgvi | | Domain: (∞, ∞) with T = 2π/|b|  Range: [1, 1]  Inverse Function:  Restrictions: None  Odd/Even: Odd  General Form: |
| **Cosine** |  | https://encrypted-tbn0.google.com/images?q=tbn:ANd9GcTvW1VjiQQ_UHPBC7jeckN7puS4LQrJmZoF5LkYeq7Yj7S3_TtG | | Domain: (∞, ∞) with T = 2π/|b|  Range: [1, 1]  Inverse Function:  Restrictions: None  Odd/Even: Even  General Form: |
| **Tangent** |  | https://encrypted-tbn1.google.com/images?q=tbn:ANd9GcQGpcj4cHM6jdEtlClniUWqaMiuxhwh6GllnQAVFm8cvuirt21w | | Domain: (∞, ∞) except for  Range: (∞, ∞)  Inverse Function:  Restrictions: Asymptotes at  Odd/Even: Odd  General Form: |
| **Cosecant** |  | http://www.regentsprep.org/Regents/math/algtrig/ATT7/otherg2.gif | | Domain: (∞, ∞) except for  Range: (∞, -1] [1, ∞)  Inverse Function:  Restrictions: Range is bounded  Odd/Even: Odd  General Form: |
| **Secant** |  | http://www.regentsprep.org/Regents/math/algtrig/ATT7/otherg7.gif | | Domain: (∞, ∞) except for  Range: (∞,1] [1, ∞)  Inverse Function:  Restrictions: Range is bounded  Odd/Even: Even  General Form: |
| **Cotangent** |  | http://www.regentsprep.org/Regents/math/algtrig/ATT7/otherg94.gif | | Domain: (∞, ∞) except for  Range: (∞, ∞)  Inverse Function:  Restrictions: Asymptotes at x =  Odd/Even: Odd  General Form: |
| **Arcsine** |  | http://www.phengkimving.com/calc_of_one_real_var/06_the_trig_func_and_their_inv/06_02_the_inv_trig_func/06_02_01_the_inv_trig_func_files/image028.gif | | Domain: [1, 1]  Range: or Quadrants I & IV  Inverse Function:  Restrictions: Range & Domain are bounded  Odd/Even: Odd  General Form: |
| **Arccosine** |  | http://www.phengkimving.com/calc_of_one_real_var/06_the_trig_func_and_their_inv/06_02_the_inv_trig_func/06_02_01_the_inv_trig_func_files/image046.gif | | Domain: [1, 1]  Range: or Quadrants I & II  Inverse Function:  Restrictions: Range & Domain are bounded  Odd/Even: None  General Form: |
| **Arctangent** |  | http://www.phengkimving.com/calc_of_one_real_var/06_the_trig_func_and_their_inv/06_02_the_inv_trig_func/06_02_01_the_inv_trig_func_files/image063.gif | | Domain: (∞, ∞)  Range: or Quadrants I & IV  Inverse Function:  Restrictions: Range is bounded  Odd/Even: Odd  General Form: |
| **Arccosecant** |  | http://www.phengkimving.com/calc_of_one_real_var/06_the_trig_func_and_their_inv/06_02_the_inv_trig_func/06_02_01_the_inv_trig_func_files/image117.gif | | Domain: (∞,1] [1, ∞)  Range: or Quadrants I & IV  Inverse Function:  Restrictions: Range & Domain are bounded  Odd/Even: Odd  General Form: |
| **Arcsecant** |  | http://www.phengkimving.com/calc_of_one_real_var/06_the_trig_func_and_their_inv/06_02_the_inv_trig_func/06_02_01_the_inv_trig_func_files/image099.gif | | Domain: (∞,1] [1, ∞)  Range: ( or Quadrants I & II  Inverse Function:  Restrictions: Range & Domain are bounded  Odd/Even: Neither  General Form: |
| **Arccotangent** |  | http://www.phengkimving.com/calc_of_one_real_var/06_the_trig_func_and_their_inv/06_02_the_inv_trig_func/06_02_01_the_inv_trig_func_files/image081.gif | | Domain: (∞, ∞)  Range: or Quadrants I & II  Inverse Function:  Restrictions: Range is bounded  Odd/Even: Neither  General Form: |
| **Hyperbolics** | | | | |
| **Hyperbolic Sine** |  | | http://www.efunda.com/math/hyperbolic/images/sinh_plot.gif | Domain: (∞, ∞)  Range: (∞, ∞)  Inverse Function:  Restrictions: None  Odd/Even: Odd  General Form: |
| **Hyperbolic Cosine** |  | | http://www.efunda.com/math/hyperbolic/images/cosh_plot.gif | Domain: (∞, ∞)  Range: [1, ∞)  Inverse Function:  Restrictions: None  Odd/Even: Even  General Form: |
| **Hyperbolic Tangent** |  | | http://mathworld.wolfram.com/images/interactive/TanhReal.gif | Domain: (∞, ∞)  Range: (1, 1)  Inverse Function:  Restrictions: Asymptotes at  Odd/Even: Odd  General Form: |
| **Hyperbolic Cosecant** |  | | http://www.efunda.com/math/hyperbolic/images/csch_plot.gif | Domain: (∞, 0) (0, ∞)  Range: (∞, 0] [0, ∞)  Inverse Function:  Restrictions: Asymptotes at  Odd/Even: Odd  General Form: |
| **Hyperbolic Secant** |  | | http://mathworld.wolfram.com/images/interactive/SechReal.gif | Domain: (∞, ∞)  Range: (0, 1]  Inverse Function:  Restrictions: Asymptote at  Odd/Even: Even  General Form: |
| **Hyperbolic Cotangent** |  | | http://www.efunda.com/math/hyperbolic/images/coth_plot.gif | Domain: (∞, 0) (0, ∞)  Range: (∞, 1) (1, ∞)  Inverse Function:  Restrictions: Asymptotes at  Odd/Even: Odd  General Form: |
| **Hyperbolic Arcsine** |  | | http://www.efunda.com/math/hyperbolic/images/arcsinh_plot.gif | Domain: (∞, ∞)  Range: (∞, ∞)  Inverse Function:  Restrictions: None  Odd/Even: Odd  General Form: |
| **Hyperbolic Arccosine** |  | | http://www.efunda.com/math/hyperbolic/images/arccosh_plot.gif | Domain: [1, ∞)  Range: [0, ∞)  Inverse Function:  Restrictions:  Odd/Even: Neither  General Form: |
| **Hyperbolic Arctangent** |  | | http://www.efunda.com/math/hyperbolic/images/arctanh_plot.gif | Domain: (1, 1)  Range: (∞, ∞)  Inverse Function:  Restrictions: Asymptotes at  Odd/Even: Odd  General Form: |
| **Hyperbolic Arccosecant** |  | | http://www.efunda.com/math/hyperbolic/images/arccsch_plot.gif | Domain: (∞, 0) (0, ∞)  Range: (∞, 0] [0, ∞)  Inverse Function:  Restrictions: Asymptotes at  Odd/Even: Odd  General Form: |
| **Hyperbolic Arcsecant** |  | | http://www.efunda.com/math/hyperbolic/images/arcsech_plot.gif | Domain: (0, 1]  Range: [0, ∞)  Inverse Function:  Restrictions:  Odd/Even: Neither  General Form: |
| **Hyperbolic Arccotangent** |  | | http://www.efunda.com/math/hyperbolic/images/arccoth_plot.gif | Domain:  Range:  Inverse Function:  Restrictions: Asymptotes at  Odd/Even: Odd  General Form: |

**Graphing Tips**

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| **The Six Trig “Levers”** | ***y = a sin (b (x - h)) + k*** | **Graphing Tips** | **Notes** |
| 1. Move up/down ↕ | k (Vertical translation) |  | If then x-axis is replaced by -axis |
| 1. Move left/right ↔ | h (Phase shift) | ‘+‘ shifts right |  |
| 1. Stretch up/down ↕ | a (Amplitude) |  | a is NOT peak-to-peak on y-axis |
| 1. Stretch left/right ↔ | b (Frequency 2) |  | T = peak-to-peak on -axis  for |
| 1. Flip about y-axis ⭯ | b → b | → | Even Function: |
| 1. Flip about x-axis ⭮ | a → a | → | Odd Function: |

**See Also:**

* [Harold’s Algebraic, Transcendental, and Conic Parent Functions Cheat Sheet](https://www.toomey.org/tutor/harolds_cheat_sheets/Harolds_Parent_Functions_Algebraic_Conics_Cheat_Sheet.pdf)
* [Harold’s Trigonometry & Hyperbolic Parent Functions Cheat Sheet](https://www.toomey.org/tutor/harolds_cheat_sheets/Harolds_Parent_Functions_Trig_Cheat_Sheet.pdf)
* [Harold’s Polar Parent Functions Cheat Sheet](https://www.toomey.org/tutor/harolds_cheat_sheets/Harolds_Parent_Functions_Polar_Cheat_Sheet.pdf)