

**Formula Page – MHF 4U1**

$$m = \text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} \quad a^{-n} = \left(\frac{1}{a}\right)^n \quad \text{or} \quad \frac{1}{a^n} \quad x^{\frac{a}{b}} = \sqrt[b]{x^a} \quad \text{or} \quad (\sqrt[b]{x})^a$$

Growth/decay formula:  $A_f = A_o (\text{base})^{\frac{t}{i}}$  where  $A_f = \text{end}$   $A_o = \text{original}$

Logarithms properties Basic: a)  $\log_b 1 = 0$  Operational: a)  $\log_a x^r = r \log_a (x)$   
 b)  $\log_b b = 1$  b)  $\log_a xw = \log_a x + \log_a w$   
 c)  $\log_b b^x = x$  c)  $\log_a \left(\frac{x}{w}\right) = \log_a x - \log_a w$   
 d)  $b^{\log_b x} = x$

Formulii that make use of logarithms:  $M = \log\left(\frac{I}{I_o}\right)$   $L = 10 \log\left(\frac{I}{I_o}\right)$   $pH = -\log[H^+]$

Arc angle formula  $\theta = \frac{a}{r}$  where  $\theta = \text{angle in radians}$   $a = \text{arc length}$

Radian/Degrees conversion formulas  $360^\circ = 2\pi \text{ rad}$  or  $180^\circ = \pi \text{ rad}$

Exact trigonometric ratios for common angles.

$x^\circ$	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
Sin x	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
Cos x	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
Tan x	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	-

Co-function relationship  $\sin\left(\frac{\pi}{2} - x\right) = \cos x$  and  $\cos\left(\frac{\pi}{2} - x\right) = \sin x$

Supplemental relationship  $\sin \theta^\circ = \sin(\pi - \theta^\circ)$  and  $\cos \theta^\circ = -\cos(\pi - \theta^\circ)$

Positional relationship  $\sin(-x) = -\sin x$  and  $\cos(-x) = \cos x$

Compound formulas  $\cos(x + y) = \cos x \cos y - \sin x \sin y$   $\sin(x + y) = \sin x \cos y + \cos x \sin y$   
 $\cos(x - y) = \cos x \cos y + \sin x \sin y$   $\sin(x - y) = \sin x \cos y - \cos x \sin y$

Double angle formulas  $\sin(2x) = 2 \sin x \cos x$   $\cos(2x) = \cos^2 x - \sin^2 x$   
 $= 2 \cos^2 x - 1$   $\tan(2x) = \frac{2 \tan x}{1 - \tan^2 x}$   
 $= 1 - 2 \sin^2 x$

Quotient Identities  $\tan \theta = \frac{\sin \theta}{\cos \theta}$   $\tan^2 \theta = \frac{\sin^2 \theta}{\cos^2 \theta}$

Reciprocal identities  $\csc \theta = \frac{1}{\sin \theta}$   $\sec \theta = \frac{1}{\cos \theta}$   $\cot \theta = \frac{1}{\tan \theta}$

Pythagorean identities  $\cos^2 x + \sin^2 x = 1$  or  $\cos^2 x = 1 - \sin^2 x$  or  $\sin^2 x = 1 - \cos^2 x$