Trig

■ Basic identities (J11B pps 32-43)

[1] π rad $= 180^o$

[2] $s = r\,\theta$

[3] $\sin\theta = \frac{y}{r}$ $\qquad \csc\theta = \frac{1}{\sin\theta}$

$\cos\theta = \frac{x}{r}$ $\qquad \sec\theta = \frac{1}{\cos\theta}$

$\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta}$ $\qquad \cot\theta = \frac{1}{\tan\theta}$

[4] $\sin^2\theta + \cos^2\theta = 1$

[5] $-1 \le \sin\theta \le 1$ $\qquad -1 \le \cos\theta \le 1$

[6] $\tan^2\theta + 1 = \sec^2\theta$

[7] $1 + \cot^2\theta = \csc^2\theta$

[8] $\sin(\theta + 2n\pi) = \sin\theta$

$\cos(\theta + 2n\pi) = \cos\theta$

$\tan(\theta + n\pi) = \tan\theta$

[9] $\sin(-\theta) = -\sin\theta$

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

$\tan(-\theta) = -\tan\theta$

[10] $\sin(\frac{\pi}{2} - \theta) = \cos\theta$ $\qquad \sin(\frac{\pi}{2} + \theta) = \cos\theta$

$\cos(\frac{\pi}{2} - \theta) = \sin\theta$ $\qquad \cos(\frac{\pi}{2} + \theta) = -\sin\theta$

$\tan(\frac{\pi}{2} - \theta) = \frac{1}{\tan\theta}$ $\qquad \tan(\frac{\pi}{2} + \theta) = -\frac{1}{\tan\theta}$

[11] $\sin(\pi - \theta) = \sin\theta$ $\qquad \sin(\pi + \theta) = -\sin\theta$

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

$\tan(\pi - \theta) = -\tan\theta$ $\qquad \tan(\pi + \theta) = \tan\theta$

■ Addition formulae & their consequences (J11B pps 51-59)

[12] $\cos(x + y) = \cos x \cos y - \sin x \sin y$

[13] $\cos(x - y) = \cos x \cos y + \sin x \sin y$

[14] $\sin(x + y) = \sin x \cos y + \cos x \sin y$

[15] $\sin(x - y) = \sin x \cos y - \cos x \sin y$

[16] $\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$

[17] $\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$

■ Double angle formulae

[18] $\sin 2x = 2 \sin x \cos x$

[19] $\cos 2x = \cos^2 x - \sin^2 x$

[20] $\cos 2x = 2 \cos^2 x - 1$

[21] $\cos 2x = 1 - 2 \sin^2 x$

[22] $\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$

■ Half angle formulae

[23] $\cos^2 \frac{x}{2} = \frac{1}{2}(1 + \cos x)$

[24] $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

[25] $\sin^2 \frac{x}{2} = \frac{1}{2}(1 - \cos x)$

[26] $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$

[27] $\tan^2 \frac{x}{2} = \frac{1 - \cos x}{1 + \cos x}$

■ Product angle formulae

[28] $\sin x \cos y = \frac{1}{2}[\sin(x + y) + \sin(x - y)]$

[29] $\cos x \cos y = \frac{1}{2}[\cos(x + y) + \cos(x - y)]$

[30] $\sin x \sin y = \frac{1}{2}[\cos(x - y) - \cos(x + y)]$