
The following formulae will be useful when integrating Trigonometric functions. Taken from the MF15 formula sheet for JC.

1 Addition Formulae

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

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

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

2 Double Angle Formulae

$$\sin 2A \equiv 2 \sin A \cos A$$

$$\cos 2A \equiv \cos^2 A - \sin^2 A \equiv 2 \cos^2 A - 1 \equiv 1 - 2 \sin^2 A$$

$$\tan 2A \equiv \frac{2 \tan A}{1 - \tan^2 A}$$

Remark: The second identity is useful for integrating $\sin^2 x$ and $\cos^2 x$.

3 Factor Formulae

$$\sin P + \sin Q \equiv 2 \sin \frac{1}{2}(P + Q) \cos \frac{1}{2}(P - Q)$$

$$\sin P - \sin Q \equiv 2 \cos \frac{1}{2}(P + Q) \sin \frac{1}{2}(P - Q)$$

$$\cos P + \cos Q \equiv 2 \cos \frac{1}{2}(P + Q) \cos \frac{1}{2}(P - Q)$$

$$\cos P - \cos Q \equiv -2 \sin \frac{1}{2}(P + Q) \sin \frac{1}{2}(P - Q)$$

Remark: The factor formulae are useful for integrating $\sin nx \cos mx$, $\sin nx \sin mx$, etc.