Appendix: Trigonometric Formulae

It will be assumed that these formulae are established in the order listed here. In deriving any formula, use may be made of formulae that precede it.

1. $\cos^2 A + \sin^2 A = 1$
2. sine formula: $\frac{a}{\text{Sin } A} = \frac{b}{\text{Sin } B} = \frac{c}{\text{Sin } C}$
3. cosine formula: $a^2 = b^2 + c^2 - 2bc \cos A$
4. $\cos (A-B) = \cos A \cos B + \sin A \sin B$
5. $\cos (A+B) = \cos A \cos B - \sin A \sin B$
6. $\cos 2A = \cos^2 A - \sin^2 A$
7. $\sin (A+B) = \sin A \cos B + \cos A \sin B$
8. $\sin (A-B) = \sin A \cos B - \cos A \sin B$
9. $\tan (A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$
10. $\tan (A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$
11. $\sin 2A = 2 \sin A \cos A$
12. $\sin 2A = \frac{2 \tan A}{1 + \tan^2 A}$
13. $\cos 2A = \frac{1 - \tan^2 A}{1 + \tan^2 A}$
14. $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$
15. $\cos^2 A = \frac{1}{2}(1 + \cos 2A)$
16. $\sin^2 A = \frac{1}{2}(1 - \cos 2A)$
17. $2 \cos A \cos B = \cos (A+B) + \cos (A-B)$
18. $2 \sin A \cos B = \sin (A+B) + \sin (A-B)$
19. $2 \sin A \sin B = \cos (A-B) - \cos (A+B)$
20. $2 \cos A \sin B = \sin (A+B) - \sin (A-B)$
21. $\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2}$
22. $\cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$
23. $\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2}$
24. $\sin A - \sin B = 2 \cos \frac{A+B}{2} \sin \frac{A-B}{2}$