Appendix: Trigonometric Formulae

1. $\cos^2 A + \sin^2 A = 1$

2. sine formula: $\dfrac{a}{\operatorname{Sin} A} = \dfrac{b}{\operatorname{Sin} B} = \dfrac{c}{\operatorname{Sin} C}$

3. cosine formula: $a^2 = b^2 + c^2 - 2\,bc \cos A$

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. $\tan\,(A{+}B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$

10. $\tan\,(A{-}B) = \dfrac{\tan A - \tan B}{1 + \tan A \tan B}$

11. $\sin 2A = 2 \sin A \cos A$

12. $\sin 2A = \dfrac{2 \tan A}{1 + \tan^2 A}$

13. $\cos 2A = \dfrac{1 - \tan^2 A}{1 + \tan^2 A}$

14. $\tan 2A = \dfrac{2 \tan A}{1 - \tan^2 A}$

15. $\cos^2 A = \tfrac{1}{2}\,(1 + \cos 2A)$

16. $\sin^2 A = \tfrac{1}{2}\,(1 - \cos 2A)$

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. $\cos A + \cos B = 2 \cos \dfrac{A + B}{2} \cos \dfrac{A - B}{2}$

22. $\cos A - \cos B = -2 \sin \dfrac{A + B}{2} \sin \dfrac{A - B}{2}$

23. $\sin A + \sin B = 2 \sin \dfrac{A + B}{2} \cos \dfrac{A - B}{2}$

24. $\sin A - \sin B = 2 \cos \dfrac{A + B}{2} \sin \dfrac{A - B}{2}$

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.