

两角之和与差

1. Prove  $\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$

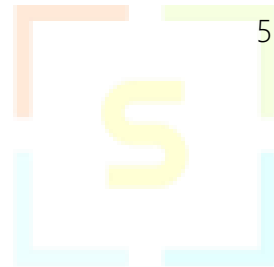
4. Prove  $\cos 3\alpha = 4\cos^3 \alpha - 3\cos \alpha$

2. Prove  $\tan 3\theta - \tan 2\theta - \tan \theta = \tan 3\theta \tan 2\theta \tan \theta$

5. Prove  $\tan \frac{\alpha}{2} = \frac{1 - \cos \alpha + \sin \alpha}{1 + \cos \alpha + \sin \alpha}$

3. Prove  $\sin 3\alpha = 3\sin \alpha - \sin^3 \alpha$

6. Prove  $\sin^4 x = \frac{3}{8} - \frac{1}{2} \cos 2x + \frac{1}{4} \cos 4x$



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7. Prove  $\sin \alpha = \frac{2 \tan \frac{\alpha}{2}}{1 + \tan^2 \frac{\alpha}{2}}$

10. Given  $\theta = \frac{b}{a}$ , prove  $a \cos 2\theta + b \sin 2\theta = a$

8. Prove  $\cos \alpha = \frac{1 - \tan^2 \frac{\alpha}{2}}{1 + \tan^2 \frac{\alpha}{2}}$

11.  $\sin(x + y) \sin(x - y) = \sin^2 x - \sin^2 y$

9. Prove  $\tan \alpha = \frac{2 \tan \frac{\alpha}{2}}{1 - \tan^2 \frac{\alpha}{2}}$

12. Given  $\sin x \cdot \cos y = a$ ,  $\cos x \cdot \sin y = b$ , solve the problems below in terms of a and b

a.  $\sin(x + y) + \sin(x - y)$



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b.  $\sin(x + y) - \sin(x - y)$

14. Prove  $\tan^2\left(\frac{\pi}{4} + \theta\right) = \frac{1 + \sin 2\theta}{1 - \sin 2\theta}$

c.  $\sin(x + y) \sin(x - y)$

15. If  $A + B = 45^\circ$ , prove  $(1 + \tan A)(1 - \tan B) = 2$

13. Prove  $\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} = 2$

16. Calculate  $\tan 75^\circ - \tan 15^\circ$



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17. Given  $\sin \alpha + \sin \beta = a$ ,  $\cos \alpha + \cos \beta = b$ , show  $\cos(\alpha - \beta)$  in terms of  $a$  and  $b$

c. Prove  $\tan^3 \alpha = 5 \tan \alpha + 2$

18. Given  $\tan \alpha$  and  $\tan \beta$  is the root for equation  $t^2 - 2t - 1 = 0$ , find

a.  $\tan(\alpha + \beta)$

19.  $\alpha$  and  $\beta$  are acute angle, given  $\cos(\alpha + \beta) = -\frac{11}{14}$ ,  $\cos \alpha = \frac{1}{7}$ , find  $\beta$

b.  $\tan^2 \alpha + \tan^2 \beta$

20. Prove  $\sin^{2\theta} + \sin^2\left(\theta + \frac{2\pi}{3}\right) + \sin^2\left(\theta + \frac{4\pi}{3}\right) = \frac{3}{2}$

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