

ОСНОВНЫЕ ТРИГОНОМЕТРИЧЕСКИЕ ФОРМУЛЫ

$$1. \sin^2 \alpha + \cos^2 \alpha = 1 \quad 2. \operatorname{tg}^2 \alpha + 1 = \frac{1}{\cos^2 \alpha}$$

$$3. \operatorname{ctg}^2 \alpha + 1 = \frac{1}{\sin^2 \alpha} \quad 4. \operatorname{tg} x \cdot \operatorname{ctg} x = 1$$

$$5. \sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \sin \beta \cdot \cos \alpha$$

$$6. \sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \sin \beta \cdot \cos \alpha$$

$$7. \cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$8. \cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$9. \operatorname{tg}(\alpha - \beta) = \frac{\operatorname{tg} \alpha - \operatorname{tg} \beta}{1 + \operatorname{tg} \alpha \cdot \operatorname{tg} \beta} \quad 10. \operatorname{tg}(\alpha + \beta) = \frac{\operatorname{tg} \alpha + \operatorname{tg} \beta}{1 - \operatorname{tg} \alpha \cdot \operatorname{tg} \beta}$$

$$11. \sin 2\alpha = 2 \sin \alpha \cdot \cos \alpha \quad 12. \operatorname{tg} 2\alpha = \frac{2 \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha}$$

$$13. \cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha = 2 \cos^2 \alpha - 1 = 1 - 2 \sin^2 \alpha$$

$$14. 1 + \cos 2\alpha = 2 \cos^2 \alpha \quad 15. 1 - \cos 2\alpha = 2 \sin^2 \alpha$$

$$16. \cos^2 \alpha = \frac{1 + \cos 2\alpha}{2} \quad 17. \sin^2 \alpha = \frac{1 - \cos 2\alpha}{2}$$

$$18. \sin \alpha - \sin \beta = 2 \sin \frac{\alpha - \beta}{2} \cos \frac{\alpha + \beta}{2}$$

$$19. \sin \alpha + \sin \beta = 2 \sin \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$$

$$20. \cos \alpha + \cos \beta = 2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$$

$$21. \cos \alpha - \cos \beta = -2 \sin \frac{\alpha - \beta}{2} \sin \frac{\alpha + \beta}{2}$$

$$22. \sin \alpha \cdot \cos \beta = \frac{1}{2} (\sin(\alpha - \beta) + \sin(\alpha + \beta))$$

$$23. \sin \alpha \cdot \sin \beta = \frac{1}{2} (\cos(\alpha - \beta) - \cos(\alpha + \beta))$$

$$24. \cos \alpha \cdot \cos \beta = \frac{1}{2} (\cos(\alpha - \beta) + \cos(\alpha + \beta))$$

$$25. \left| \cos \frac{\alpha}{2} \right| = \sqrt{\frac{1 + \cos \alpha}{2}} \quad 26. \left| \sin \frac{\alpha}{2} \right| = \sqrt{\frac{1 - \cos \alpha}{2}}$$

$$27. \left| \operatorname{tg} \frac{\alpha}{2} \right| = \sqrt{\frac{1 - \cos \alpha}{1 + \cos \alpha}}$$

$$28. \sin 2\alpha = \frac{2 \operatorname{tg} \alpha}{1 + \operatorname{tg}^2 \alpha} \quad 29. \cos 2\alpha = \frac{1 - \operatorname{tg}^2 \alpha}{1 + \operatorname{tg}^2 \alpha}$$

30.

$$a \cdot \cos x + b \cdot \sin x = \sqrt{a^2 + b^2} \sin(x + \varphi), \quad \sin \varphi = \frac{a}{\sqrt{a^2 + b^2}}, \cos \varphi = \frac{b}{\sqrt{a^2 + b^2}}$$