

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha;$$

$$\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha;$$

$$\cos 2\alpha = 1 - 2 \sin^2 \alpha; \quad \cos 2\alpha = 2 \cos^2 \alpha - 1;$$

$$\operatorname{tg} 2\alpha = \frac{2 \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha}.$$

Задача 3 Упростить выражение $\frac{\sin \alpha \cos \alpha}{1 - 2 \sin^2 \alpha}$.

$$\begin{aligned} \frac{\sin \alpha \cos \alpha}{1 - 2 \sin^2 \alpha} &= \frac{2 \sin \alpha \cos \alpha}{2(\sin^2 \alpha + \cos^2 \alpha - 2 \sin^2 \alpha)} = \\ &= \frac{\sin 2\alpha}{2(\cos^2 \alpha - \sin^2 \alpha)} = \frac{\sin 2\alpha}{2 \cos 2\alpha} = \frac{1}{2} \operatorname{tg} 2\alpha. \end{aligned}$$

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Вычислить, не используя калькулятор (500—502).

1) $2 \sin 15^\circ \cdot \cos 15^\circ;$ 2) $\cos^2 15^\circ - \sin^2 15^\circ;$

3) $\frac{2 \operatorname{tg} 15^\circ}{1 - \operatorname{tg}^2 15^\circ};$ 4) $(\cos 75^\circ - \sin 75^\circ)^2.$

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1) $2 \sin \frac{\pi}{8} \cdot \cos \frac{\pi}{8};$ 2) $\cos^2 \frac{\pi}{8} - \sin^2 \frac{\pi}{8};$

3) $\frac{2 \operatorname{tg} \frac{\pi}{8}}{1 - \operatorname{tg}^2 \frac{\pi}{8}};$ 4) $\frac{\sqrt{2}}{2} - \left(\cos \frac{\pi}{8} + \sin \frac{\pi}{8} \right)^2.$

α	0°	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°	360°
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0
$\cos \alpha$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\operatorname{tg} \alpha$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	-	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	-	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0
$\operatorname{ctg} \alpha$	-	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	-	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	-
α	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π