

1. Решите простейшее тригонометрическое неравенство $\sin x \geq 1$.

- 1) $\frac{\pi}{2} + 2\pi k$ 2) $\frac{\pi}{3} + 2\pi k$ 3) $\frac{\pi}{4} + 2\pi k$ 4) $-\frac{\pi}{2} + 2\pi k$ 5) $\frac{\pi}{2} + \pi k$ 6) $\frac{\pi}{4} + \pi k$

2. Решите простейшее тригонометрическое неравенство $\sin x \leq -1$.

- 1) $\frac{\pi}{2} + 2\pi k$ 2) $-\frac{\pi}{4} + 2\pi k$ 3) $\frac{\pi}{4} + 2\pi k$ 4) $-\frac{\pi}{2} + 2\pi k$ 5) $\frac{\pi}{2} + \pi k$ 6) $-\frac{\pi}{2} + \pi k$

3. Решите простейшее тригонометрическое неравенство $\sin x > \frac{1}{2}$.

- 1) $\bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{3} + 2\pi k; \frac{5\pi}{6} + 2\pi k \right)$ 2) $\bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k \right)$
3) $\bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k \right)$ 4) $\bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k \right]$
5) $\bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k \right]$ 6) $\bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{6} + \pi k; \frac{5\pi}{6} + \pi k \right)$

4. Решите простейшее тригонометрическое неравенство $2 \sin x \geq -\sqrt{3}$.

- 1) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + 2\pi k; \frac{4\pi}{3} + 2\pi k \right)$ 2) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{2} + 2\pi k; \frac{4\pi}{3} + 2\pi k \right]$
3) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{6} + 2\pi k; \frac{4\pi}{3} + 2\pi k \right]$ 4) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + 2\pi k; \frac{4\pi}{3} + 2\pi k \right)$
5) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + 2\pi k; \frac{4\pi}{3} + 2\pi k \right]$ 6) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + 2\pi k; \frac{4\pi}{3} + 2\pi k \right]$

5. Решите простейшее тригонометрическое неравенство $\sin 2x \leq \frac{\sqrt{2}}{2}$.

- 1) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{5\pi}{8} + \pi k; \frac{\pi}{8} + \pi k \right]$ 2) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{5\pi}{8} + \pi k; \frac{\pi}{8} + \pi k \right)$
3) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{5\pi}{8} + \pi k; \frac{\pi}{8} + \pi k \right]$ 4) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{5\pi}{8} + \pi k; \frac{\pi}{8} + \pi k \right)$
5) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{3\pi}{8} + \pi k; \frac{\pi}{8} + \pi k \right]$ 6) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{5\pi}{8} + \pi k; \frac{3\pi}{8} + \pi k \right]$

6. Решите простейшее тригонометрическое неравенство $\sin \frac{x}{2} < -\frac{1}{2}$.

- 1) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{5\pi}{3} + 4\pi k; -\frac{\pi}{3} + 4\pi k \right)$ 2) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{5\pi}{3} + \pi k; -\frac{\pi}{3} + \pi k \right)$
3) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{5\pi}{3} + 2\pi k; -\frac{\pi}{3} + 2\pi k \right)$ 4) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{5\pi}{3} + 4\pi k; -\frac{\pi}{3} + 4\pi k \right]$
5) $\bigcup_{k \in \mathbb{Z}} \left[-\frac{5\pi}{3} + 4\pi k; -\frac{\pi}{3} + 4\pi k \right]$ 6) $\bigcup_{k \in \mathbb{Z}} \left(-\frac{5\pi}{3} + 4\pi k; -\frac{\pi}{3} + 4\pi k \right)$

7. Решите простейшее тригонометрическое неравенство $\cos x \geq 1$.

$$1) 2\pi k \quad 2) \frac{\pi}{2} + 2\pi k \quad 3) 4\pi k \quad 4) \frac{\pi}{2} + \pi k \quad 5) \pi k \quad 6) -\frac{\pi}{2} + 2\pi k$$

8. Решите простейшее тригонометрическое неравенство $\cos x < 1$.

$$1) \mathbb{R} \setminus \{\pi k\} \quad 2) \mathbb{R} \setminus \left\{ \frac{\pi k}{2} \right\} \quad 3) \mathbb{R} \setminus \{2\pi k\} \quad 4) \mathbb{R} \setminus \left\{ \frac{\pi k}{3} \right\} \quad 5) \mathbb{R} \setminus \left\{ \frac{\pi k}{6} \right\}$$

$$6) \mathbb{R} \setminus \left\{ \frac{2\pi k}{3} \right\}$$

9. Решите простейшее тригонометрическое неравенство $2 \cos x > 1$.

$$1) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + 2\pi k; \frac{\pi}{3} + 2\pi k \right] \quad 2) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + \pi k; \frac{\pi}{3} + \pi k \right)$$

$$3) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + 2\pi k; \frac{\pi}{3} + 2\pi k \right) \quad 4) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + \pi k; \frac{\pi}{3} + \pi k \right)$$

$$5) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + 2\pi k; \frac{\pi}{3} + 2\pi k \right) \quad 6) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + 2\pi k; \frac{\pi}{3} + 2\pi k \right)$$

10. Решите простейшее тригонометрическое неравенство $\cos \frac{x}{3} < \frac{\sqrt{3}}{2}$.

$$1) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{2} + 6\pi k; \frac{11\pi}{2} + 6\pi k \right) \quad 2) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{2} + 6\pi k; \frac{11\pi}{2} + 6\pi k \right)$$

$$3) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{2} + 2\pi k; \frac{11\pi}{2} + 2\pi k \right) \quad 4) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{2} + \pi k; \frac{11\pi}{2} + \pi k \right)$$

$$5) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{2} + 6\pi k; \frac{11\pi}{2} + 6\pi k \right] \quad 6) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{2} + 6\pi k; \frac{11\pi}{2} + 6\pi k \right]$$

11. Решите простейшее тригонометрическое неравенство $\cos 3x < -\frac{1}{2}$.

$$1) \bigcup_{k \in \mathbb{Z}} \left[\frac{2\pi}{9} + \frac{2\pi k}{3}; \frac{4\pi}{9} + \frac{2\pi k}{3} \right). \quad 2) \bigcup_{k \in \mathbb{Z}} \left(\frac{2\pi}{9} + \frac{2\pi k}{3}; \frac{4\pi}{9} + \frac{2\pi k}{3} \right].$$

$$3) \bigcup_{k \in \mathbb{Z}} \left(\frac{2\pi}{9} + \frac{\pi k}{3}; \frac{4\pi}{9} + \frac{\pi k}{3} \right). \quad 4) \bigcup_{k \in \mathbb{Z}} \left(\frac{2\pi}{9} + \frac{2\pi k}{3}; \frac{4\pi}{9} + \frac{2\pi k}{3} \right)$$

$$5) \bigcup_{k \in \mathbb{Z}} \left[\frac{2\pi}{9} + \frac{2\pi k}{3}; \frac{4\pi}{9} + \frac{2\pi k}{3} \right]. \quad 6) \bigcup_{k \in \mathbb{Z}} \left(\frac{2\pi}{9} + \frac{4\pi k}{3}; \frac{4\pi}{9} + \frac{4\pi k}{3} \right).$$

12. Решите простейшее тригонометрическое неравенство $\operatorname{tg} x > 1$.

$$1) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{4} + \pi k; \frac{\pi}{2} + \pi k \right) \quad 2) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{4} + \pi k; \frac{\pi}{2} + \pi k \right] \quad 3) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{4} + \pi k; \frac{\pi}{2} + \pi k \right]$$

$$4) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{4} + 2\pi k; \frac{\pi}{2} + 2\pi k \right) \quad 5) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{4} + \pi k; \frac{\pi}{2} + \pi k \right) \quad 6) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{4} + 4\pi k; \frac{\pi}{2} + 4\pi k \right)$$

13. Решите простейшее тригонометрическое неравенство $\operatorname{tg} x \geq -\sqrt{3}$.

$$1) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + \pi k; \frac{\pi}{2} + \pi k \right). \quad 2) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + \pi k; \frac{\pi}{2} + \pi k \right].$$

$$3) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + 4\pi k; \frac{\pi}{2} + 4\pi k \right). \quad 4) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + 2\pi k; \frac{\pi}{2} + 2\pi k \right).$$

$$5) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + \pi k; \frac{\pi}{2} + \pi k \right]. \quad 6) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + \pi k; \frac{\pi}{2} + \pi k \right)$$

14. Решите простейшее тригонометрическое неравенство $\operatorname{tg} 4x < 1$.

$$1) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{8} + \frac{\pi k}{4}; \frac{\pi}{16} + \frac{\pi k}{4} \right) \quad 2) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{8} + \frac{\pi k}{4}; \frac{\pi}{16} + \frac{\pi k}{4} \right)$$

$$3) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{8} + \frac{\pi k}{4}; \frac{\pi}{16} + \frac{\pi k}{4} \right] \quad 4) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{8} + \frac{\pi k}{4}; \frac{\pi}{8} + \frac{\pi k}{4} \right)$$

$$5) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{8} + \frac{\pi k}{4}; \frac{\pi}{16} + \frac{\pi k}{4} \right] \quad 6) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{8} + \frac{\pi k}{4}; \frac{\pi}{8} + \frac{\pi k}{4} \right]$$

15. Решите простейшее тригонометрическое неравенство $\operatorname{tg} \frac{x}{4} \leq -\frac{\sqrt{3}}{3}$.

$$1) \bigcup_{k \in \mathbb{Z}} \left(-2\pi + 4\pi k; -\frac{2\pi}{3} + 4\pi k \right) \quad 2) \bigcup_{k \in \mathbb{Z}} \left[-2\pi + 4\pi k; -\frac{2\pi}{3} + 4\pi k \right)$$

$$3) \bigcup_{k \in \mathbb{Z}} \left(-2\pi + \pi k; -\frac{2\pi}{3} + \pi k \right] \quad 4) \bigcup_{k \in \mathbb{Z}} \left(-2\pi + 4\pi k; -\frac{2\pi}{3} + 4\pi k \right]$$

$$5) \bigcup_{k \in \mathbb{Z}} \left(-2\pi + 2\pi k; -\frac{2\pi}{3} + 2\pi k \right] \quad 6) \bigcup_{k \in \mathbb{Z}} \left[-2\pi + 4\pi k; -\frac{2\pi}{3} + 4\pi k \right]$$

16. Решите простейшее тригонометрическое неравенство $3 \operatorname{tg} \frac{2x}{3} \geq \sqrt{3}$.

$$1) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{4} + \frac{3\pi k}{2}; \frac{3\pi}{4} + \frac{3\pi k}{2} \right) \quad 2) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{4} + \frac{5\pi k}{2}; \frac{3\pi}{4} + \frac{5\pi k}{2} \right)$$

$$3) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{4} + \frac{3\pi k}{2}; \frac{3\pi}{4} + \frac{3\pi k}{2} \right] \quad 4) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{4} + \frac{3\pi k}{2}; \frac{3\pi}{4} + \frac{3\pi k}{2} \right]$$

$$5) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{4} + \frac{\pi k}{2}; \frac{3\pi}{4} + \frac{\pi k}{2} \right) \quad 6) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{4} + \frac{3\pi k}{2}; \frac{3\pi}{4} + \frac{3\pi k}{2} \right)$$

17. Решите простейшее тригонометрическое неравенство $3 \operatorname{tg} \frac{3x}{2} \leq -\sqrt{3}$.

$$1) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + \frac{2\pi k}{3}; -\frac{\pi}{9} + \frac{2\pi k}{3} \right) \quad 2) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + \frac{2\pi k}{3}; -\frac{\pi}{9} + \frac{2\pi k}{3} \right)$$

$$3) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + \frac{2\pi k}{3}; -\frac{\pi}{9} + \frac{2\pi k}{3} \right] \quad 4) \bigcup_{k \in \mathbb{Z}} \left[-\frac{\pi}{3} + \frac{2\pi k}{3}; -\frac{\pi}{9} + \frac{2\pi k}{3} \right)$$

$$5) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + \frac{\pi k}{3}; -\frac{\pi}{9} + \frac{\pi k}{3} \right] \quad 6) \bigcup_{k \in \mathbb{Z}} \left(-\frac{\pi}{3} + \frac{4\pi k}{3}; -\frac{\pi}{9} + \frac{4\pi k}{3} \right]$$

18. Решите простейшее тригонометрическое неравенство $\operatorname{ctg} x > \frac{\sqrt{3}}{3}$.

$$\begin{array}{lll}
 1) \bigcup_{k \in \mathbb{Z}} \left[\pi k; \frac{\pi}{3} + \pi k \right] & 2) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{\pi}{3} + \pi k \right) & 3) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{\pi}{3} + 2\pi k \right) \\
 4) \bigcup_{k \in \mathbb{Z}} \left[\pi k; \frac{\pi}{3} + \pi k \right) & 5) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{\pi}{3} + \pi k \right] & 6) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{\pi}{3} + 2\pi k \right]
 \end{array}$$

19. Решите простейшее тригонометрическое неравенство $\operatorname{ctg} x \geq -\sqrt{3}$.

$$\begin{array}{lll}
 1) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{\pi}{3} + \pi k \right]. & 2) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{\pi}{6} + \pi k \right]. & 3) \bigcup_{k \in \mathbb{Z}} \left[\pi k; \frac{5\pi}{6} + \pi k \right) \\
 4) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{5\pi}{6} + \pi k \right] & 5) \bigcup_{k \in \mathbb{Z}} \left[\pi k; \frac{5\pi}{6} + \pi k \right]. & 6) \bigcup_{k \in \mathbb{Z}} \left(\pi k; \frac{5\pi}{6} + \pi k \right).
 \end{array}$$

20. Решите простейшее тригонометрическое неравенство $\operatorname{ctg} 2x \leq 1$.

$$\begin{array}{lll}
 1) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{8} + \frac{\pi k}{2}; \frac{\pi}{2} + \frac{\pi k}{2} \right) & 2) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{8} + \frac{\pi k}{2}; \frac{\pi}{2} + \frac{\pi k}{2} \right] & 3) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{8} + \frac{\pi k}{2}; \frac{\pi}{2} + \frac{\pi k}{2} \right) \\
 4) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{8} + \frac{\pi k}{6}; \frac{\pi}{2} + \frac{\pi k}{6} \right) & 5) \bigcup_{k \in \mathbb{Z}} \left[\frac{\pi}{8} + \frac{\pi k}{4}; \frac{\pi}{2} + \frac{\pi k}{4} \right) & 6) \bigcup_{k \in \mathbb{Z}} \left(\frac{\pi}{8} + \frac{\pi k}{2}; \frac{\pi}{2} + \frac{\pi k}{2} \right]
 \end{array}$$

21. Решите простейшее тригонометрическое неравенство $\operatorname{ctg} \frac{x}{3} < -1$.

$$\begin{array}{ll}
 1) \bigcup_{k \in \mathbb{Z}} \left[\frac{9\pi}{4} + 3\pi k; 3\pi + 3\pi k \right) & 2) \bigcup_{k \in \mathbb{Z}} \left(\frac{9\pi}{4} + 3\pi k; 3\pi + 3\pi k \right] \\
 3) \bigcup_{k \in \mathbb{Z}} \left[\frac{9\pi}{4} + 3\pi k; 3\pi + 3\pi k \right] & 4) \bigcup_{k \in \mathbb{Z}} \left(\frac{9\pi}{4} + 2\pi k; 3\pi + 2\pi k \right) \\
 5) \bigcup_{k \in \mathbb{Z}} \left(\frac{9\pi}{4} + 3\pi k; 3\pi + 3\pi k \right) & 6) \bigcup_{k \in \mathbb{Z}} \left(\frac{9\pi}{4} + \pi k; 3\pi + \pi k \right)
 \end{array}$$