

Простейшие показательные уравнения

■ **Примеры** Решите уравнения:

№1

$$8^{-2-x} = 512$$

№2

$$6^{4x-10} = \frac{1}{36}$$

№3

$$\left(\frac{1}{2}\right)^{4x-14} = \frac{1}{64}$$

№4

$$\left(\frac{1}{6}\right)^{1-x} = 216$$

№5

$$36^{x-7} = \frac{1}{6}$$

№6

$$\left(\frac{1}{4}\right)^{x+4} = 256^x$$

№7

$$5^{3+x} = 125^{2x}$$

№8

$$9^{5+2x} = 0,81 \cdot 10^{5+2x}$$

▪ **Решение (примеры)**

Простейшие показательные уравнения

№1

$$8^{-2-x} = 512$$

$$(2^3)^{-2-x} = 2^9$$

$$2^{3(-2-x)} = 2^9$$

$$3(-2-x) = 9$$

$$-6 - 3x = 9$$

$$-3x = 9 + 6$$

$$-3x = 15$$

$$x = 15 : (-3)$$

$$\underline{x = -5}$$

Ответ: -5.

№2

$$6^{4x-10} = \frac{1}{36}$$

$$6^{4x-10} = 6^{-2}$$

$$4x - 10 = -2$$

$$4x = -2 + 10$$

$$4x = 8$$

$$\underline{x = 2}$$

Ответ: 2.

№3

$$\left(\frac{1}{2}\right)^{4x-14} = \frac{1}{64}$$

$$\left(\frac{1}{2}\right)^{4x-14} = \left(\frac{1}{2}\right)^6$$

$$4x - 14 = 6$$

$$4x = 6 + 14$$

$$4x = 20$$

$$\underline{x = 5}$$

Ответ: 5.

№4

$$\left(\frac{1}{6}\right)^{1-x} = 216$$

$$(6^{-1})^{1-x} = 6^3$$

$$6^{-1+x} = 6^3$$

$$-1 + x = 3$$

$$x = 3 + 1$$

$$\underline{x = 4}$$

Ответ: 4.

№5

$$36^{x-7} = \frac{1}{6}$$

$$(6^2)^{x-7} = 6^{-1}$$

$$6^{2(x-7)} = 6^{-1}$$

$$2(x-7) = -1$$

$$2x - 14 = -1$$

$$2x = -1 + 14$$

$$2x = 13$$

$$\underline{x = 6,5}$$

Ответ: 6,5.

№6

$$\left(\frac{1}{4}\right)^{x+4} = 256^x$$

$$(4^{-1})^{x+4} = 4^{4x}$$

$$4^{-x-4} = 4^{4x}$$

$$-x - 4 = 4x$$

$$-4 = 4x + x$$

$$5x = -4$$

$$x = -\frac{4}{5}$$

$$\underline{x = -0,8}$$

Ответ: -0,8.

№7

$$5^{3+x} = 125^{2x}$$

$$5^{3+x} = 5^{3 \cdot 2x}$$

$$3 + x = 6x$$

$$3 = 6x - x$$

$$5x = 3$$

$$x = \frac{3}{5}$$

$$\underline{x = 0,6}$$

Ответ: 0,6.

№8

$$9^{5+2x} = 0,81 \cdot 10^{5+2x}$$

$$\frac{9^{5+2x}}{10^{5+2x}} = 0,81$$

$$\left(\frac{9}{10}\right)^{5+2x} = 0,9^2$$

$$(0,9)^{5+2x} = 0,9^2$$

$$5 + 2x = 2$$

$$2x = 2 - 5$$

$$2x = -3$$

$$\underline{x = -1,5}$$

Ответ: -1,5.

Вариант 1

Решите уравнения:

№1. $4^{-1-x} = 64$

№2. $5^{-3-x} = 125$

№3. $3^{3x-7} = \frac{1}{81}$

№4. $\left(\frac{1}{3}\right)^{x-5} = 81^x$

№5. $\left(\frac{1}{3}\right)^{x-7} = \frac{1}{81}$

№6. $7^{1-x} = 49^{2x}$

№7. $\left(\frac{1}{9}\right)^{-2-x} = 9$

№8. $7^{1-2x} = 3,5 \cdot 2^{1-2x}$

№9. $7^{3-x} = 1,96 \cdot 5^{3-x}$

Вариант 2

Решите уравнения:

№1. $32^{x-3} = \frac{1}{2}$

№2. $49^{x-7} = \frac{1}{7}$

№3. $\left(\frac{1}{14}\right)^{x-3} = 14^x$

№4. $7^{3x-14} = \frac{1}{49}$

№5. $4^{7+2x} = 64^x$

№6. $\left(\frac{1}{4}\right)^{x-6} = \frac{1}{64}$

№7. $\left(\frac{1}{9}\right)^{-5-x} = 729$

№8. $3^{1-3x} = 1,5 \cdot 2^{1-3x}$

№9. $5^{3+x} = 6,25 \cdot 2^{3+x}$

▪ **Ответы (тест)** Простейшие показательные уравнения

	№1	№2	№3	№4	№5	№6	№7	№8	№9
Вар.1	-4	-6	1	1	11	0,2	-1	0	1
Вар.2	2,8	6,5	1,5	4	7	9	-2	0	-1

▪ **Решение (тест)** Простейшие показательные уравнения

Вариант 1

№1.

$$4^{-1-x} = 64$$

$$4^{-1-x} = 4^3$$

$$-1-x = 3$$

$$-x = 3+1$$

$$-x = 4$$

$$\underline{x = -4}$$

№2.

$$5^{-3-x} = 125$$

$$5^{-3-x} = 5^3$$

$$-3-x = 3$$

$$-x = 3+3$$

$$-x = 6$$

$$\underline{x = -6}$$

№3.

$$3^{3x-7} = \frac{1}{81}$$

$$3^{3x-7} = 3^{-4}$$

$$3x-7 = -4$$

$$3x = -4+7$$

$$3x = 3$$

$$\underline{x = 1}$$

№4.

$$\left(\frac{1}{3}\right)^{x-5} = 81^x$$

$$(3^{-1})^{x-5} = 3^{4x}$$

$$-x+5 = 4x$$

$$5 = 4x+x$$

$$5x = 5$$

$$\underline{x = 1}$$

№5.

$$\left(\frac{1}{3}\right)^{x-7} = \frac{1}{81}$$

$$\left(\frac{1}{3}\right)^{x-7} = \left(\frac{1}{3}\right)^4$$

$$x-7 = 4$$

$$x = 4+7$$

$$\underline{x = 11}$$

№6.

$$7^{1-x} = 49^{2x}$$

$$7^{1-x} = 7^{2 \cdot 2x}$$

$$1-x = 4x$$

$$1 = 4x+x$$

$$5x = 1$$

$$x = \frac{1}{5}$$

$$\underline{x = 0,2}$$

№7.

$$\left(\frac{1}{9}\right)^{-2-x} = 9$$

$$(9^{-1})^{-2-x} = 9$$

$$9^{-(-2-x)} = 9^1$$

$$2+x = 1$$

$$x = 1-2$$

$$\underline{x = -1}$$

№8.

$$7^{1-2x} = 3,5 \cdot 2^{1-2x}$$

$$\frac{7^{1-2x}}{2^{1-2x}} = 3,5$$

$$\left(\frac{7}{2}\right)^{1-2x} = 3,5$$

$$(3,5)^{1-2x} = 3,5^1$$

$$1-2x = 1$$

$$-2x = 0$$

$$\underline{x = 0}$$

№9.

$$7^{3-x} = 1,96 \cdot 5^{3-x}$$

$$\frac{7^{3-x}}{5^{3-x}} = 1,96$$

$$\left(\frac{7}{5}\right)^{3-x} = 1,4^2$$

$$(1,4)^{3-x} = 1,4^2$$

$$3-x = 2$$

$$3-2 = x$$

$$\underline{x = 1}$$

Вариант 2

№1.

$$32^{x-3} = \frac{1}{2}$$

$$(2^5)^{x-3} = 2^{-1}$$

$$5x - 15 = -1$$

$$5x = -1 + 15$$

$$5x = 14$$

$$10x = 28$$

$$\underline{x = 2,8}$$

№2.

$$49^{x-7} = \frac{1}{7}$$

$$(7^2)^{x-7} = 7^{-1}$$

$$7^{2x-14} = 7^{-1}$$

$$2x - 14 = -1$$

$$2x = 13$$

$$\underline{x = 6,5}$$

№3.

$$\left(\frac{1}{14}\right)^{x-3} = 14^x$$

$$(14^{-1})^{x-3} = 14^x$$

$$-x + 3 = x$$

$$3 = x + x$$

$$2x = 3$$

$$\underline{x = 1,5}$$

№4.

$$7^{3x-14} = \frac{1}{49}$$

$$7^{3x-14} = 7^{-2}$$

$$3x - 14 = -2$$

$$3x = -2 + 14$$

$$3x = 12$$

$$\underline{x = 4}$$

№5.

$$4^{7+2x} = 64^x$$

$$4^{7+2x} = 4^{3x}$$

$$7 + 2x = 3x$$

$$7 = 3x - 2x$$

$$\underline{x = 7}$$

№6.

$$\left(\frac{1}{4}\right)^{x-6} = \frac{1}{64}$$

$$\left(\frac{1}{4}\right)^{x-6} = \left(\frac{1}{4}\right)^3$$

$$x - 6 = 3$$

$$x = 3 + 6$$

$$\underline{x = 9}$$

№7.

$$\left(\frac{1}{9}\right)^{-5-x} = 729$$

$$(9^{-1})^{-5-x} = 9^3$$

$$9^{5+x} = 9^3$$

$$5 + x = 3$$

$$x = 3 - 5$$

$$\underline{x = -2}$$

№8.

$$3^{1-3x} = 1,5 \cdot 2^{1-3x}$$

$$\frac{3^{1-3x}}{2^{1-3x}} = 1,5$$

$$\left(\frac{3}{2}\right)^{1-3x} = \left(\frac{3}{2}\right)^1$$

$$1 - 3x = 1$$

$$-3x = 0$$

$$\underline{x = 0}$$

№9.

$$5^{3+x} = 6,25 \cdot 2^{3+x}$$

$$\frac{5^{3+x}}{2^{3+x}} = 6 \frac{1}{4}$$

$$\left(\frac{5}{2}\right)^{3+x} = \frac{25}{4}$$

$$\left(\frac{5}{2}\right)^{3+x} = \left(\frac{5}{2}\right)^2$$

$$3 + x = 2$$

$$x = 2 - 3$$

$$\underline{x = -1}$$