

QUADRATISCHE GLEICHUNGEN

Löse die folgenden Gleichungen nach x auf!

1. $x^2 - x + \frac{1}{4} = 0$

$$x = \frac{1}{2}$$

2. $x^2 + 3x + \frac{9}{4} = 0$

$$x = -\frac{3}{2}$$

3. $x^2 + 3x + 2 = 0$

$$x_1 = -1 \quad x_2 = -2$$

4. $x^2 - 3x + 2 = 0$

$$x_1 = 1 \quad x_2 = 2$$

5. $x^2 - x - 2 = 0$

$$x_1 = -1 \quad x_2 = 2$$

6. $x^2 + x - 2 = 0$

$$x_1 = 1 \quad x_2 = -2$$

7. $x^2 + 5x + 4 = 0$

$$x_1 = -1 \quad x_2 = -4$$

8. $x^2 - 5x + 4 = 0$

$$x_1 = 1 \quad x_2 = 4$$

9. $x^2 + 3x - 4 = 0$

$$x_1 = 1 \quad x_2 = -4$$

10. $x^2 - 3x - 4 = 0$

$$x_1 = -1 \quad x_2 = 4$$

11. $x^2 + 5x + 6 = 0$

$$x_1 = -2 \quad x_2 = -3$$

12. $x^2 - 5x + 6 = 0$

$$x_1 = 2 \quad x_2 = 3$$

13. $x^2 + x - 6 = 0$

$$x_1 = 2 \quad x_2 = -3$$

14. $x^2 - x - 6 = 0$

$$x_1 = -2 \quad x_2 = 3$$

15. $x^2 + 7x + 10 = 0$

$$x_1 = -2 \quad x_2 = -5$$

16. $x^2 - 7x + 10 = 0$

$$x_1 = 2 \quad x_2 = 5$$

17. $x^2 + 3x - 10 = 0$

$$x_1 = 2 \quad x_2 = -5$$

18. $x^2 - 3x - 10 = 0$

$$x_1 = -2 \quad x_2 = 5$$

19. $x^2 + 7x + 12 = 0$

$$x_1 = -3 \quad x_2 = -4$$

$$20. x^2 - 7x + 12 = 0$$

$$x_1 = 3 \quad x_2 = 4$$

$$21. x^2 + x + 12 = 0$$

$$x_1 = 3 \quad x_2 = -4$$

$$22. x^2 - x - 12 = 0$$

$$x_1 = -3 \quad x_2 = 4$$

$$23. x^2 + 9x + 20 = 0$$

$$x_1 = -4 \quad x_2 = -5$$

$$24. x^2 - 9x + 20 = 0$$

$$x_1 = 4 \quad x_2 = 5$$

$$25. x^2 + x - 20 = 0$$

$$x_1 = 4 \quad x_2 = -5$$

$$26. x^2 - x - 20 = 0$$

$$x_1 = -4 \quad x_2 = 5$$

$$27. x^2 - 5x - 24 = 0$$

$$x_1 = +8 \quad x_2 = -3$$

$$28. 6x^2 - x - 2 = 0$$

$$x_1 = +\frac{2}{3} \quad x_2 = -\frac{1}{2}$$

$$29. 15x^2 + 17x - 4 = 0$$

$$x_1 = +\frac{1}{5} \quad x_2 = -\frac{4}{3}$$

$$30. 8x^2 - 22x + 15 = 0$$

$$x_1 = +\frac{5}{4} \quad x_2 = +\frac{3}{2}$$

$$31. 10x^2 - 19x - 15 = 0$$

$$x_1 = +\frac{5}{2} \quad x_2 = -\frac{3}{5}$$

$$32. \frac{3}{4}x^2 - 9x + 24 = 0$$

$$x_1 = 8 \quad x_2 = 4$$

$$33. 2x^2 - \frac{9}{2}x + 1 = 0$$

$$x_1 = 2 \quad x_2 = \frac{1}{4}$$

$$34. \frac{2}{3}x^2 - \frac{3}{2}x - 15 = 0$$

$$x_1 = 6 \quad x_2 = -\frac{15}{4}$$

$$35. x^2 - \frac{13}{2}x - 35 = 0$$

$$x_1 = 10 \quad x_2 = -\frac{7}{2}$$

$$36. \frac{1}{3}x^2 - \frac{7}{2}x - 6 = 0$$

$$x_1 = 12 \quad x_2 = -\frac{3}{2}$$

$$37. \frac{1}{7}x^2 - \frac{5}{2}x + 7 = 0$$

$$x_1 = 14 \quad x_2 = \frac{7}{2}$$

$$38. (3x - 2)^2 + 2x^2 = 5x(x + 3) - 17$$

$$x_1 = 1 \quad x_2 = \frac{7}{2}$$

$$39. (2x+5)^2 + 8x^2 = 5x(x+3) + 10$$

nincs megoldás

$$40. (3x-2)(2x+3) = (2x+1)^2 - (x-5)$$

$$x_1 = 2 \quad x_2 = -3$$

$$41. (4x-5)(5x-3) = (4x-3)^2 - 3(2x-1)$$

$$x_1 = 1 \quad x_2 = \frac{3}{4}$$

$$42. (2x-4)(2x+4) - 3 = (5x+4)^2 - 3(1-6x)$$

$$x_1 = -2 \quad x_2 = -\frac{16}{21}$$

$$43. (3x+6)^2 - 35 = (2x-1)^2 + 5(x^2 + 8x)$$

minden valós szám

$$44. (x+4)^2 + 2x^2 = 2x(x+4) + 20$$

$$x_1 = +2 \quad x_2 = -2$$

$$45. (x-5)^2 + 4x^2 - 20 = 2x(2x-5) + 6$$

$$x_1 = +1 \quad x_2 = -1$$

$$46. (x-3)^2 - 11x = 17(2-x)$$

$$x_1 = +5 \quad x_2 = -5$$

$$47. (x-4)^2 - 5x = 13(4-x)$$

$$x_1 = +6 \quad x_2 = -6$$

$$48. (x+5)^2 - 6 = 10(x+10)$$

$$x_1 = +9 \quad x_2 = -9$$

$$49. 3(x-2)^2 - 6(1-2x) = 0$$

nincs megoldás

$$50. (x-8)(x-4) + 4 = 12(6-x)$$

$$x_1 = +6 \quad x_2 = -6$$

$$51. 10 + 44x - 2x^2 = 10(x+1)^2$$

$$x_1 = 2 \quad x_2 = 0$$

$$52. 3x(3x+2) + 4x = 3x^2$$

$$x_1 = 0 \quad x_2 = -\frac{5}{3}$$

$$53. 8x(3-x) + 2x^2 = 3x$$

$$x_1 = 0 \quad x_2 = \frac{7}{2}$$

$$54. 5x^2 + 8x = 2x^2 - 7x$$

$$x_1 = 0 \quad x_2 = -5$$

$$55. 7x^2 + 5x = x^2 + 2x$$

$$x_1 = 0 \quad x_2 = -\frac{1}{2}$$

$$56. 25 + 80x - 40x^2 = 5(4x+5)$$

$$x_1 = 0 \quad x_2 = \frac{3}{2}$$

$$57. 10x^2 - 10(x-3) = 4x^2 - 8x + 30$$

$$x_1 = 0 \quad x_2 = \frac{1}{3}$$

58. $(2x-3)(2x+3)+45=(x+6)^2$

$x_1 = 0 \quad x_2 = 4$

59. $8x^2 - 16x + 36 = 9(x-2)^2$

$x_1 = 0 \quad x_2 = 20$

Bestimme ohne die Lösungen zu berechnen, wie viele Lösungen die folgenden quadratische Gleichungen haben?

60. $2x^2 - 3x + 1 = 0$

2

61. $3x^2 + 2x - 1 = 0$

2

62. $4x^2 - 8x + 5 = 0$

0

63. $8x^2 - 2x - 3 = 0$

2

64. $2x^2 - 8x + 8 = 0$

1

65. $6x^2 - 10x + 5 = 0$

0

66. $6x^2 - 8x + 3 = 0$

0

67. $2x^2 - 12x + 18 = 0$

1

Zerlege die nachstehenden Ausdrücke in Linearfaktoren!

68. $x^2 - 12x + 32$

$(x-8)(x-4)$

69. $3x^2 - 24x + 45$

$3(x-5)(x-3)$

70. $2x^2 - 8x - 24$

$2(x-6)(x+2)$

71. $x^2 - 2x - 35$

$(x-7)(x+5)$

72. $-4x^2 - 12x + 160$

$-4(x-5)(x+8)$

73. $x^2 + x - 6$

$(x-2)(x+3)$

74. $2x^2 + 14x + 20$

$2(x+2)(x+5)$

75. $3x^2 + 21x + 18$

$3(x+1)(x+6)$

Kürze die folgenden Brüche!

$$76. \frac{x^2 - 5x + 6}{x^2 - 4x + 4}$$

$$77. \frac{3x^2 + 7x - 10}{x^2 - 3x + 2}$$

$$78. \frac{2x^2 - 3x - 2}{3x^2 + x - 14}$$

Löse die folgenden Gleichungen nach x auf!

$$79. \frac{2x-2}{x-3} - \frac{6x+4}{x+3} = \frac{3x+2}{x^2-9} \quad x_1 = 4 \quad x_2 = -\frac{1}{4}$$

$$80. \frac{4x-9}{x-2} - \frac{3x+1}{x+2} = \frac{2x-1}{x^2-4} \quad x_1 = 3 \quad x_2 = -5$$

$$81. \frac{6x+4}{x+4} - \frac{x-2}{x-4} = \frac{7x-2}{x^2-16} \quad x_1 = 6 \quad x_2 = -\frac{1}{5}$$

$$82. \frac{4x+1}{2x-3} = \frac{6x+4}{4x^2-9} - \frac{12x+3}{2x+3} \quad x_1 = 1 \quad x_2 = -\frac{5}{16}$$

$$83. \frac{10x+1}{3x+1} - \frac{3x-1}{3x-1} = \frac{30x+10}{9x^2-1} \quad x_1 = 2 \quad x_2 = -\frac{5}{21}$$

Löse die folgenden Gleichungen nach x auf!

$$84. x^4 - 13x^2 + 36 = 0 \quad 3; -3; 2; -2$$

$$85. x^4 - 17x^2 + 16 = 0 \quad 4; -4; 1; -1$$

$$86. x^4 - 3x^2 - 4 = 0 \quad 2; -2$$

$$87. x^6 - 7x^3 - 8 = 0 \quad 2; -1$$

$$88. x^6 + 35x^3 + 216 = 0 \quad -2; -3$$

$$89. x^6 + 26x^3 - 27 = 0 \quad 1; -3$$

$$90. (x^2 + x)^2 - 18(x^2 + x) + 72 = 0 \quad -4; -3; 2; 3$$

$$91. (x^2 - 3x)^2 - 50(x^2 - 3x) + 400 = 0 \quad -5; -2; 5; 8$$

$$92. 3(x-2)^4 + 15(x-2)^2 - 108 = 0 \quad x_1 = 4 \quad x_2 = 0$$

$$93. (x^2 - 3x + 2)^2 - 18(x^2 - 3x + 2) + 72 = 0 \quad -2; -1; 4; 5$$

$$94. (x^2 + 2x - 16)^2 - 7(x^2 + 2x - 16) - 8 = 0 \quad -6; -5; 3; 4$$

$$95. (x^2 + 2x - 5)^2 - 13(x^2 + 2x - 5) + 30 = 0 \quad -5; -4; 2; 3$$

$$96. (6x^2 - 7x)^2 - 2(6x^2 - 7x) - 3 = 0 \quad -\frac{1}{3}; \frac{1}{6}; 1; \frac{3}{2}$$

$$97. 4(x^2 - 10x + 26)^2 - 24(x^2 - 10x + 24) - 28 = 0 \quad 3; 5; 7$$

$$98. (x^2 + 3x - 21)^2 + 4(x^2 + 3x - 20) - 81 = 0 \quad -7; -5; 2; 4$$

Löse die folgenden Ungleichungen nach x auf!

$$99. 3x^2 - 8x \leq 2x^2 - 5x + 4 \quad [-1; 4]$$

$$100. 4x^2 - 2x \leq 5x^2 + 3x - 14 \quad]-\infty; -7] \cup [2; \infty[$$

$$101. 5x^2 - x - 10 \geq 2x^2 + 6x - 20 \quad \text{minden valós szám}$$

$$102. 2x^2 - 2x > 3x^2 + 2x - 6 \quad [-6; 2]$$

$$103. 4x^2 - x \geq 3x^2 + 2x - 28 \quad \text{minden valós szám}$$

$$104. 5x^2 + 2x + 16 < 6x^2 + 8x \quad]-\infty; -8] \cup [2; \infty[$$

$$105. 3x^2 - 2x + 4 < 2x^2 + 2x - 1 \quad \text{nincs megoldás}$$

$$106. 2x^2 + 7x + 30 > 5x^2 - 2x \quad [-2; 5]$$

$$107. 5x^2 - x \geq 3x^2 + 7x + 10 \quad]-\infty; -1] \cup [5; \infty[$$

$$108. 5x^2 + 2x - 15 < 4x^2 + 4x \quad [-3; 5]$$

$$109. 8x^2 + 6x + 12 < 5x^2 + 2x \quad \text{nincs megoldás}$$

$$110. 4x^2 + 7x + 6 \geq x^2 + 5x \quad \text{minden valós szám}$$

$$111. 3x^2 + 6x - 9 > 0 \quad]-\infty; -3[\cup]1; \infty[$$

112. $x^2 + 5x - 4 > -2x^2 + 2x + 2$] $-\infty$; -2 [\cup] 1 ; ∞ [$$
113. $-2x^2 - 4x + 30 \geq 0$] -5 ; 3 [$$
114. $6x^2 - x + 1 \leq 2x^2 - 6x - 9$ nincs megoldás
115. $3(x - 2)^2 - 2x \geq (3x + 1)^2 + 5x - 20$
116. $-2x^2 + 16x - 32 \geq 0$
117. $-3x^2 + 5x + 4 < -x^2 - 3x + 4$
118. $3x^2 - x \leq 0$
119. $-2x^2 + 5x + 3 < 0$
120. $-4x^2 + 2x \geq 0$
121. $-x^2 + 2x + 3 < 0$
122. $3x^2 - 2x + 1 \leq 0$

Löse die folgenden Gleichungen nach x auf!

123. $\sqrt{2x - 5} + 2 = x - 2$ $x = 7$
124. $\sqrt{3x + 4} - 3 = 2x - 7$ $x = 4$
125. $2x - 3 = \sqrt{19 - 2x} + 4$ $x = 5$
126. $4x + 2 = \sqrt{9 - 5x} - 1$ $x = 0$
127. $6x - \sqrt{12 - 3x} = 3$ $x = 1$
128. $5x - \sqrt{3x - 2} = 8$ $x = 2$
129. $4\sqrt{2 - x} = 2x + 12$
130. $3\sqrt{5x + 6} = 5x + 2$
131. $2x - 3 = 3\sqrt{10 - 3x}$
132. $2x + 3 = 5\sqrt{2x - 3}$
133. $\sqrt{2x - 1} = x - 2$
134. $3x - 8 = 2\sqrt{8 - x}$
135. $3\sqrt{10 - x} = 2x - 6$