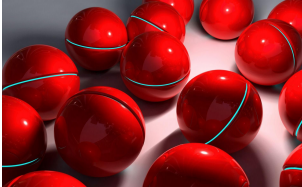


Перемножалка



$$1) (x^2 - 3x)(x - 1)(x - 2) = 24$$

$$2) (x^2 - 5x)(x + 3)(x - 8) + 108 = 0$$

$$3) (x + 4)^2(x + 10)(x - 2) + 243 = 0$$

$$4) x(x + 3)(x + 5)(x + 8) + 56 = 0$$

$$5) (x - 3)(x - 4)(x - 5)(x - 6) = 1680$$

$$6) (x - 2)(x - 3)^2(x - 4) = 20$$

$$7) (x - 4)(x - 3)(x - 2)(x - 1) = 24$$

$$(x - 3)(x - 4)(x - 5)(x - 6) = 1680;$$

$$(x^2 - 9x + 20)(x^2 - 9x + 18) = 1680;$$

$$y = x^2 - 9x;$$

$$(y + 20)(y + 18) = 1680;$$

$$y^2 + 38y + 360 - 1680 = 0;$$

$$y^2 + 38y - 1320 = 0;$$

$$D^* = 19^2 + 1320 = 361 + 1320 = 1681; D^* > 0; VD^* = 41$$

$$y_1 = -19 - 41 = -60;$$

$$y_2 = -19 + 41 = 22;$$

$$x^2 - 9x + 60 = 0$$

$$D = 81 - 240 = -159; D < 0$$

no solutions

$$x^2 - 9x - 22 = 0$$

$$x_1 = 11$$

$$x_2 = -2$$

Answer: 11; -2

$$(x - 2)(x - 3)^2(x - 4) = 20$$

$$(x - 2)(x - 3)(x - 3)(x - 4) = 20$$

$$(x^2 - 6x + 9)(x^2 - 6x + 8) = 20$$

$$y = x^2 - 6x$$

$$(y + 9)(y + 8) = 20$$

$$y^2 + 17y + 52 = 0$$

$$y_1 = -13$$

$$y_2 = -4$$

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

$$D^* = 9 - 13 = -4; D^* < 0$$

no solutions

$$x^2 - 6x + 4 = 0$$

$$D^* = 9 - 4 = 5; D^* > 0;$$

$$x_1 = 3 - \sqrt{5}$$

$$x_2 = 3 + \sqrt{5}$$

Answer: $3 + \sqrt{5}; 3 - \sqrt{5}$

$$(x^2 - 3x)(x - 1)(x - 2) = 24$$

$$7) (x - 4)(x - 3)(x - 2)(x - 1) = 24$$

$$(x - 1)(x - 2) = x^2 - 3x + 2$$

$$(x^2 - 3x)(x^2 - 3x + 2) = 24$$

$$x^2 - 3x = y$$

$$y(y + 2) = 24$$

$$y^2 + 2y - 24 = 0$$

$$y_1 = -6$$

$$y_2 = 4$$

$$x^2 - 3x = -6$$

$$x^2 - 3x + 6 = 0$$

$$x^2 - 3x + 6 = 0$$

$$D = 9 - 4 \cdot 6 = 9 - 24 = -15; D < 0$$

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

$$x_1 = 4$$

$$x_2 = -1$$

Answer: 4; -1

$$(x - 4)(x - 3)(x - 2)(x - 1) = 24$$

$$(x - 4)(x - 1) = x^2 - 5x + 4$$

$$(x - 3)(x - 2) = x^2 - 5x + 6$$

$$y = x^2 - 5x + 4$$

$$y(y + 2) = 24$$

$$y^2 + 2y - 24 = 0$$

$$y_1 = -6$$

$$y_2 = 4$$

$$x^2 - 5x + 4 = -6$$

$$x^2 - 5x + 10 = 0$$

$$D = 25 - 40 = -15; D < 0$$

$$x^2 - 5x + 4 = 4$$

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

$$x(x - 5) = 0$$

$$x_1 = 0$$

$$x_2 = 5$$

Answer: 0; 5

$$(x^2 - 5x)(x + 3)(x - 8) + 108 = 0$$

$$(x^2 - 5x)(x^2 - 8x + 3x - 24) = -108$$

$$(x^2 - 5x)(x^2 - 5x - 24) + 108 = 0$$

$$y = x^2 - 5x$$

$$y(y - 24) + 108 = 0$$

$$y^2 - 24y + 108 = 0$$

$$D^* = (24/2)^2 - 108 = 144 - 108 = 36; D^* > 0; VD^* = 6;$$

$$y_1 = -b/2 - VD^*/a = (12 - 6)/1 = 6;$$

$$y_2 = (12 + 6)/1 = 18;$$

$$x^2 - 5x = 6$$

$$x^2 - 5x - 6 = 0$$

$$D = 25 + 24 = 49; D > 0; VD = 7$$

$$x_1 = (5 - 7)/2 = -1$$

$$x_2 = (5 + 7)/2 = 6$$

Answer: -1; 6; $(5 - \sqrt{97})/2$; $(5 + \sqrt{97})/2$

$$x^2 - 5x = 18$$

$$x^2 - 5x - 18 = 0$$

$$D = 25 + 72 = 97; D > 0;$$

$$x_3 = (5 - \sqrt{97})/2$$

$$x_4 = (5 + \sqrt{97})/2$$

Answer: -1; 6; $(5 - \sqrt{97})/2$; $(5 + \sqrt{97})/2$

$$(x + 4)^2(x + 10)(x - 2) + 243 = 0;$$

$$(x^2 + 8x + 16)(x^2 + 8x - 20) + 243 = 0;$$

$$y = x^2 + 8x;$$

$$(y + 16)(y - 20) + 243 = 0;$$

$$y^2 - 4y - 320 + 243 = 0;$$

$$y^2 - 4y - 77 = 0;$$

$$y_1 = 11;$$

$$y_2 = -7;$$

$$x^2 + 8x = 11$$

$$x^2 + 8x - 11 = 0$$

$$D = 64 + 44 = 108; D > 0;$$

$$x_1 = (-8 - \sqrt{108})/2 = (-8 - \sqrt{4 \cdot 3 \cdot 9})/2 = (-8 - 6\sqrt{3})/2 = -4 - 3\sqrt{3}$$

$$x_2 = (-8 + \sqrt{108})/2 = (-8 + \sqrt{4 \cdot 3 \cdot 9})/2 = (-8 + 6\sqrt{3})/2 = -4 + 3\sqrt{3}$$

$$x^2 + 8x = -7$$

$$x^2 + 8x + 7 = 0$$

$$x_3 = -7$$

$$x_4 = -1$$

Answer: $-4 - 3\sqrt{3}$; $-4 + 3\sqrt{3}$; -7; -1

$$x(x + 3)(x + 5)(x + 8) + 56 = 0$$

$$(x^2 + 8x)(x^2 + 8x + 15) + 56 = 0$$

$$y = x^2 + 8x$$

$$y(y + 15) + 56 = 0$$

$$y^2 + 15y + 56 = 0$$

$$y_1 = -7$$

$$y_2 = -8$$

$$x^2 + 8x = -7$$

$$x^2 + 8x + 7 = 0$$

$$x_1 = -7$$

$$x_2 = -1$$

$$x^2 + 8x = -8$$

$$x^2 + 8x + 8 = 0$$

$$D = 16 - 8 = 8; D > 0;$$

$$x_3 = -4 - \sqrt{8}$$

$$x_4 = -4 + \sqrt{8}$$

Answer: $-4 - \sqrt{8}$; $-4 + \sqrt{8}$; -7; -1