

$$a + b \cdot \sqrt{2} ; x \quad , \quad a, b \in \mathbb{Q}$$

binom  $(a_1 + b_1 \sqrt{2}) * (a_2 + b_2 \sqrt{2})$

$$a_1 \cdot a_2 + a_1 \cdot b_2 \sqrt{2} + a_2 \cdot b_1 \sqrt{2} + b_1 \sqrt{2} \cdot b_2 \sqrt{2}$$

$$\underbrace{(a_1 \cdot a_2 + 2 \cdot b_1 \cdot b_2)}_{\mathbb{Q} a_3} + \underbrace{(a_1 b_2 + a_2 b_1)}_{\mathbb{Q} b_3} \sqrt{2}$$

$\mathbb{Q} a_3$

+  $\mathbb{Q} b_3 \sqrt{2}$

$a_i, b_i \in \mathbb{Q}$

asso2:

$$[(a_1 + b_1 \sqrt{2}) * (a_2 + b_2 \sqrt{2})] * (a_3 + b_3 \sqrt{2})$$

$$(a_1 a_2 + a_1 b_2 \sqrt{2} + a_2 b_1 \sqrt{2} + 2 \cdot b_1 b_2) * (a_3 + b_3 \sqrt{2})$$

$$a_1 a_2 a_3 + a_1 a_3 b_2 \sqrt{2} + a_2 a_3 b_1 \sqrt{2} + 2 a_3 b_1 b_2$$

$$a_1 a_2 b_3 \sqrt{2} + 2 \cdot a_1 b_2 b_3 + 2 \cdot a_2 b_1 b_3 + 2 \cdot b_1 b_2 b_3 \sqrt{2}$$

Konun :  $(a_1 + b_1 \sqrt{2}) (a_2 + b_2 \sqrt{2}) = (a_2 + b_2 \sqrt{2}) (a_1 + b_1 \sqrt{2})$

neutral :  $(a + b \sqrt{2}) \vee (1_a + 1_b \sqrt{2}) = a + b \sqrt{2}$

$$\underbrace{(a \cdot 1_a + 2 \cdot b \cdot 1_b)}_a + \underbrace{(1_a \cdot b + 1_b \cdot a)}_b \sqrt{2}$$

$$a \cdot 1_a + 2b \cdot 1_b = a \quad \wedge \quad 1_a \cdot b + 1_b \cdot a = b$$

$$1_a = \frac{a - 2b \cdot 1_b}{a}$$

$$\frac{a - 2b \cdot 1_b}{a} \cdot b + \frac{1_b a^2}{a} = 6$$

$$\begin{array}{r} 1 - b \\ - \frac{2b}{a} \\ \hline \end{array}$$

$$\Rightarrow (1 + 0 \cdot \sqrt{2})$$