

根号をふくむ式のいろいろな計算(2)

根号をふくむ式と乗法公式

- 根号をふくむ多項式同士の乗法では**乗法公式**が利用できることも
- 式を**展開**する際、根号のついた数に注意
- 2乗によって**根号が外せる**場合、**根号の中を整理**できる場合
- 乗法公式
 - [1] $(x + a)(x + b) = x^2 + (a + b)x + ab$
 - [2] $(x + a)^2 = x^2 + 2ax + a^2$
 - [3] $(x - a)^2 = x^2 - 2ax + a^2$
 - [4] $(x + a)(x - a) = x^2 - a^2$

<例> [1] $(\sqrt{2} + 2)(\sqrt{2} + 3) = (\sqrt{2})^2 + (2 + 3)\sqrt{2} + 2 \times 3$
 $= 2 + 5\sqrt{2} + 6$
 $= 8 + 5\sqrt{2}$

[2] $(\sqrt{2} + 2)^2 = (\sqrt{2})^2 + 2 \times \sqrt{2} \times 2 + 2^2$
 $= 2 + 4\sqrt{2} + 4$
 $= 6 + 4\sqrt{2}$

[4] $(\sqrt{2} + 4)(\sqrt{2} - 4) = (\sqrt{2})^2 - 4^2$
 $= 2 - 16$
 $= -14$

<確認問題>

次の計算をせよ。

(1) $(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})$
 $(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3}) = (\sqrt{2})^2 - (\sqrt{3})^2$
 $= 2 - 3$
 $= -1$

(5) $(\sqrt{5} + 2)(\sqrt{5} - 2)$
 $(\sqrt{5} + 2)(\sqrt{5} - 2) = (\sqrt{5})^2 - 2^2$
 $= 5 - 4$
 $= 1$

(2) $(\sqrt{6} - \sqrt{3})^2$
 $(\sqrt{6} - \sqrt{3})^2 = (\sqrt{6})^2 - 2 \times \sqrt{6} \times \sqrt{3} + (\sqrt{3})^2$
 $= 6 - 6\sqrt{2} + 3$
 $= 9 - 6\sqrt{2}$

(6) $(2\sqrt{3} + 1)(2\sqrt{3} + 5)$
 $(2\sqrt{3} + 1)(2\sqrt{3} + 5) = (2\sqrt{3})^2 + (1 + 5) \times 2\sqrt{3} + 1 \times 5$
 $= 12 + 12\sqrt{3} + 5$
 $= 17 + 12\sqrt{3}$

(3) $(\sqrt{2} + 5)^2$
 $(\sqrt{2} + 5)^2 = (\sqrt{2})^2 + 2 \times \sqrt{2} \times 5 + 5^2$
 $= 2 + 10\sqrt{2} + 25$
 $= 27 + 10\sqrt{2}$

(7) $(3\sqrt{2} + 1)^2$
 $(3\sqrt{2} + 1)^2 = (3\sqrt{2})^2 + 2 \times 3\sqrt{2} \times 1 + 1^2$
 $= 18 + 6\sqrt{2} + 1$
 $= 19 + 6\sqrt{2}$

(4) $(\sqrt{5} + 3)(\sqrt{5} - 8)$
 $(\sqrt{5} + 3)(\sqrt{5} - 8) = (\sqrt{5})^2 + (3 - 8)\sqrt{5} - 3 \times 8$
 $= 5 - 5\sqrt{5} - 24$
 $= -19 - 5\sqrt{5}$

(8) $(3\sqrt{3} - 1)^2$
 $(3\sqrt{3} - 1)^2 = (3\sqrt{3})^2 - 2 \times 3\sqrt{3} \times 1 + 1^2$
 $= 27 - 6\sqrt{3} + 1$
 $= 28 - 6\sqrt{3}$