

JSUNIL TUTORIAL

Factorize

$$(1) \quad ax^2 - by^2 + bx^2 - ay^2$$

$$(2) \quad x(a-3) + y(3-a)$$

$$(3) \quad (x-2y)^2 + 4x - 8y$$

$$(4) \quad (8.6)^2 - (1.6)^2$$

$$(5) \quad a^4 + 25b^4 - 10a^2b^2$$

$$(6) \quad x^2 - 7x + 12$$

$$(7) \quad 2x^2 + 9x + 10$$

$$(8) \quad 15x^2 - 26x + 8$$

$$(9) \quad x^2 - 10x + 24$$

$$(10) \quad 3 + 23x - 8x^2$$

$$(11) \quad x^3 - x$$

$$(12) \quad \sqrt{2}x^2 + 3x + \sqrt{2}$$

$$13. \sqrt{3}x^2 + 11x + 6\sqrt{3}$$

$$14. 2x^2 + 3\sqrt{5}x + 5$$

$$15. 7x^2 + 2\sqrt{14}x + 2$$

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Solution:

$$\begin{aligned} ① \quad & ax^2 + bx^2 - ay^2 - by^2 \\ &= x^2(a+b) - y^2(a+b) \\ &= (a+b)(\underline{x^2 - y^2}) \\ &= (a+b)(x+y)(x-y) \end{aligned}$$

$$\begin{aligned} 2. \quad & x(a-3) - y(a-3) \\ &= (x-y)(a-3) \end{aligned}$$

$$\begin{aligned} 3. \quad & (\underline{x-2y})^2 + 4(\underline{x-2y}) \\ &= (x-2y)[x-2y+4] \end{aligned}$$

$$\begin{aligned} 4. \quad & (8.6)^2 - (1.4)^2 \\ &= (8.6+1.4) \times (8.6-1.4) \\ &= 10 \times 7.2 = \underline{72} \end{aligned}$$

$$\begin{aligned} 5. \quad & (a^2)^2 + (5b^2)^2 - 2 \times a^2 \times 5b^2 \\ &= (a^2 - 5b^2)^2 \end{aligned}$$

$$\begin{aligned} 6. \quad & x^2 - 7x - 12 \qquad 12 \rightarrow 4 \times 3 \\ &= x^2 - (4x+3x) - 12 \qquad \exists (4+3) = 7 \\ &= x^2 - 4x - 3x - 12 \\ &= x(x-4) - 3(x-4) \\ &= (x-3)(x-4) \end{aligned}$$

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$$7. \quad 2x^2 + 9x + 10$$

$$= 2x^2 + 4x + 5x + 10$$

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

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

$$10 \times 2 = 20$$

$$\swarrow \quad \searrow$$
$$5 \times 4$$

$$\Rightarrow 5+4=9$$

$$8. \quad 15x^2 - 26x + 8$$

$$= 15x^2 - (6x + 20x) + 8$$

$$= \underline{15x^2 - 6x} - \underline{20x + 8}$$

$$= 3x(5x-2) - 4(5x-2)$$

$$= (3x-4)(5x-2)$$

$$15 \times 8 = 120$$

$$\swarrow \quad \searrow$$
$$6 \times 20$$

$$6+20=26$$

$$9. \quad x^2 - 10x + 24$$

$$\swarrow \quad \searrow$$
$$6+4=10$$
$$12-2=10$$

$$24$$

6	4
2	12

$$= x^2 - (6x + 4x) + 24$$

$$= x^2 - 6x - 4x + 24$$

$$= x(x-6) - 4(x-6)$$

$$= (x-6)(x-4)$$

$$10. \quad 3 + 23x - 8x^2$$

$$= 3 + 24x - 1x - 8x^2$$

$$= 3(1+8x) - x(1+8x)$$

$$= (3-x)(1+8x)$$

$$8 \times 3 = 24$$

$$\swarrow \quad \searrow$$
$$1 \times 24$$

$$\rightarrow \underline{24-1=23}$$

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$$\begin{aligned} \textcircled{11} \quad x^3 - x &= x(x^2 - 1) \\ &= x[(x)^2 - (1)^2] \\ &= x(x+1)(x-1) \end{aligned}$$

$$\begin{aligned} 12. \quad \sqrt{2}x^2 + 3x + \sqrt{2} \\ &= \sqrt{2}x^2 + 2x + 1x + \sqrt{2} \\ &= \sqrt{2}x^2 + \sqrt{2} \times \sqrt{2}x + 1x + \sqrt{2} \quad \begin{array}{l} \frac{\sqrt{2} \times \sqrt{2}}{2 \times 1} \\ \Rightarrow 2+1=\sqrt{3} \end{array} \\ &= \sqrt{2}x(x + \sqrt{2}) + 1(x + \sqrt{2}) \\ &= (\sqrt{2}x + 1)(x + \sqrt{2}) \end{aligned}$$

$$\begin{aligned} 13. \quad \sqrt{3}x^2 + 11x + 6\sqrt{3} \\ &= \sqrt{3}x^2 + 9x + 2x + 6\sqrt{3} \quad \begin{array}{l} 6 \times \sqrt{3} \times \sqrt{3} = 18 \\ 9+2=11 \quad \sqrt{9 \times 2} \\ \frac{9 \cdot 15}{7x^2 + 2\sqrt{14}x + 2} \\ = (\sqrt{7}x)^2 + 2 \times \sqrt{7}x \times \sqrt{2} + (\sqrt{2})^2 \\ = (\sqrt{7}x + \sqrt{2})^2 \end{array} \\ &= \sqrt{3}x^2 + \sqrt{3} \times \sqrt{3} \times 3x + 2x + 6\sqrt{3} \\ &= \sqrt{3}x(x + 3\sqrt{3}) + 2(x + 3\sqrt{3}) \\ &= 2(\sqrt{3}x + 2)(x + 3\sqrt{3}) \end{aligned}$$

$$\begin{aligned} 14. \quad 2x^2 + 3\sqrt{5}x + 5 \\ &= 2x^2 + 2\sqrt{5}x + \sqrt{5}x + \sqrt{5} \times \sqrt{5} \quad \begin{array}{l} 5 \times 2 = 10 \\ \frac{\sqrt{5} \times \sqrt{5} \times 2}{2\sqrt{5} + 1\sqrt{5}} \end{array} \\ &= 2x(x + \sqrt{5}) + \sqrt{5}(x + \sqrt{5}) \\ &= (2x + \sqrt{5})(x + \sqrt{5}) \end{aligned}$$

$$\begin{aligned} 15. \quad 7x^2 + 2\sqrt{14}x + 2 \\ &= 7x^2 + \sqrt{14}x + \sqrt{14}x + 2 \\ &= \sqrt{7} \times \sqrt{7}x^2 + \sqrt{7} \times \sqrt{2}x + \sqrt{7} \times \sqrt{2}x + \sqrt{2} \times \sqrt{2} \quad \begin{array}{l} 7 \times 2 \\ \sqrt{7} \times \sqrt{7} \times 2 \\ = \sqrt{7} \times \sqrt{7} \times \sqrt{2} \times \sqrt{2} \\ \sqrt{14} \times \sqrt{14} \end{array} \\ &= \sqrt{7}x(\sqrt{7}x + \sqrt{2}) + \sqrt{2}(\sqrt{7}x + \sqrt{2}) \\ &= (\sqrt{7}x + \sqrt{2})(\sqrt{7}x + \sqrt{2}) \end{aligned}$$