

JSUNIL TUTORIAL

Factorize

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

17. $10\sqrt{2}x^2 + 3x - 9\sqrt{2}$

18. $x^2 + 7\sqrt{3} + 30$

19. $x^2 + 6\sqrt{2}x + 10$

20. $x^2 - 2\sqrt{2}x - 30$

21. $x^2 - \sqrt{3}x - 6$

22. $x^2 + 5\sqrt{5}x + 30$

23. $x^2 + 2\sqrt{3}x - 24$

24. $2x^2 + 3\sqrt{5}x + 5$

25. $\sqrt{8 + 2\sqrt{15}}$ (solve)

26. $\sqrt{16 + 6\sqrt{7}}$ (solve)

27. $\sqrt{12 + \sqrt{12 + \sqrt{12}}} \dots$ (solve)

28. $x^4 - 3x^2 + 2$ (29) $y^4 - 3x^2 + 2$

30. $3(x+y)^2 - 5(x+y) + 2$

$$16. \quad x^2 + 3\sqrt{3}x + 6$$

$$\Rightarrow x^2 + 2\sqrt{3}x + \sqrt{3}x + 6$$

$$\Rightarrow x(x + 2\sqrt{3}) + \sqrt{3}(x + 2\sqrt{3})$$

$$= (x + \sqrt{3})(x + 2\sqrt{3})$$

$$\begin{array}{c} 6 \\ \wedge \\ 2 \times 3 \\ \downarrow \\ 2 \times \sqrt{3} \times \sqrt{3} \end{array}$$

$$17. \quad 10\sqrt{2}x^2 + 3x - 9\sqrt{2}$$

$$= 10\sqrt{2}x^2 + 15x - 12x - 9\sqrt{2}$$

$$= 5x(2\sqrt{2}x + 3) - 3\sqrt{2}(2\sqrt{2}x + 3)$$

$$= (5x - 3\sqrt{2})(2\sqrt{2}x + 3)$$

$$\begin{array}{c} 10\sqrt{2} \times 9\sqrt{2} \\ = 90 \times 2 = 180 \\ \wedge \\ 15 \times 12 \end{array}$$

$$18. \quad x^2 + 7\sqrt{3}x + 30$$

$$= x^2 + 5\sqrt{3}x + 2\sqrt{3}x + 30$$

$$= x(x + 5\sqrt{3}) + 2\sqrt{3}(x + 5\sqrt{3})$$

$$= (x + 2\sqrt{3})(x + 5\sqrt{3})$$

$$\begin{array}{c} 30 \\ \wedge \\ 6 \times 5 \\ \downarrow \\ 2 \times 3 \times 5 \\ \downarrow \\ \sqrt{3} \times \sqrt{3} \end{array}$$

$$\begin{aligned}
 19. \quad & x^2 + 6\sqrt{2}x + 10 \\
 &= \underline{x^2 + 5\sqrt{2}x} + \underline{1\sqrt{2}x + 10} \\
 &= x(\underline{x + 5\sqrt{2}}) + \sqrt{2}(\underline{x + 5\sqrt{2}}) \\
 &= (x + 5\sqrt{2})(x + \sqrt{2})
 \end{aligned}$$

$$\begin{array}{c}
 10 \\
 \wedge \\
 2 \times 5 \\
 \sqrt{2} \times \sqrt{2} \times 5
 \end{array}$$

$$\begin{aligned}
 20. \quad & x^2 - 2\sqrt{2}x - 30 \\
 &= x^2 + 3\sqrt{2}x - 5\sqrt{2}x - 30 \\
 &= x(x + 3\sqrt{2}) - 5\sqrt{2}(x + 3\sqrt{2}) \\
 &= (x - 5\sqrt{2})(x + 3\sqrt{2})
 \end{aligned}$$

$$\begin{array}{c}
 30 \\
 \wedge \\
 6 \times 5 \\
 2 \times 3 \times 5 \\
 \sqrt{2} \times \sqrt{2} \times 3 \times 5
 \end{array}$$

$$\begin{aligned}
 21. \quad & x^2 - \sqrt{3}x - 6 \\
 &= x^2 + \sqrt{3}x - 2\sqrt{3}x - 6 \\
 &= x(x + \sqrt{3}) - 2\sqrt{3}(x + \sqrt{3}) \\
 &= (x - 2\sqrt{3})(x + \sqrt{3})
 \end{aligned}$$

$$\begin{array}{c}
 6 \\
 \wedge \\
 2 \leftrightarrow 3 \\
 2 \leftrightarrow \sqrt{3} \times \sqrt{3}
 \end{array}$$

$$\begin{aligned}
 22. \quad & x^2 + 5\sqrt{5}x + 30 \\
 &= x^2 + 6\sqrt{5}x - 1\sqrt{5}x + 30 \\
 &= x(x + 6\sqrt{5}) - \sqrt{5}(x - 6\sqrt{5}) \\
 &= (x - \sqrt{5})(x + 6\sqrt{5})
 \end{aligned}$$

$$\begin{array}{c}
 30 \\
 \wedge \\
 6 \times 5 \\
 6 \times \sqrt{5} \times \sqrt{5}
 \end{array}$$

$$23. x^2 + 2\sqrt{3}x - 24$$

$$= x^2 + 4\sqrt{3}x - 2\sqrt{3}x - 24$$

$$= x(x + 4\sqrt{3}) - 2\sqrt{3}(x + 4\sqrt{3})$$

$$= (x - 2\sqrt{3})(x + 4\sqrt{3})$$

$$\begin{array}{c} 24 \\ \wedge \\ 6 \times 4 \\ \swarrow \quad \searrow \\ 2 \times 3 \quad + 4 \\ \swarrow \quad \searrow \\ 2 \times \sqrt{3} \quad + \sqrt{3} \times 4 \end{array}$$

$$24. 2x^2 + 3\sqrt{5}x + 5$$

$$= 2x^2 + 2\sqrt{5}x + \sqrt{5}x + 5$$

$$= 2x(x + \sqrt{5}) + \sqrt{5}(x + \sqrt{5})$$

$$= (2x + \sqrt{5})(x + \sqrt{5})$$

$$\begin{array}{c} 5 \times 2 \\ \sqrt{5} \times \sqrt{5} \times 2 \end{array}$$

$$25. \sqrt{8 + 2\sqrt{15}} \quad \text{solve}$$

$$= \sqrt{3 + 5 + 2\sqrt{15}}$$

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

$$= \sqrt{(\sqrt{3} + \sqrt{5})^2}$$

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

$$\begin{array}{c} \sqrt{15} \\ = \sqrt{3} \times \sqrt{5} \end{array}$$

$$26. \sqrt{16 + 6\sqrt{7}} \quad \underline{\text{solve}}$$

$$= \sqrt{9+7 + 2 \times 3 \times \sqrt{7}}$$

$$= \sqrt{(3)^2 + (\sqrt{7})^2 + 2 \times 3 \times \sqrt{7}}$$

$$= \sqrt{(3 + \sqrt{7})^2}$$

$$= \underline{\underline{(3 + \sqrt{7})}}$$

$$27. \sqrt{12 + \sqrt{12 + \sqrt{12} \dots}} \quad \underline{\text{solve}}$$

$$\text{let } \sqrt{12 + \sqrt{12 + \sqrt{12} \dots}} = x$$

Squaring both side

$$12 + \sqrt{12 + \sqrt{12} \dots} = x^2$$

$$12 + x = x^2$$

$$\Rightarrow 0 = x^2 - x - 12$$

$$0 = x^2 + 3x - 4x - 12$$

$$0 = x(x+3) - 4(x+3)$$

$$0 = (x-4)(x+3)$$

$$\text{if } x-4 = 0 \Rightarrow \underline{\underline{x = 4}}$$

$$\text{if } x+3 = 0 \Rightarrow \underline{\underline{x = -3}}$$

$$28. \quad x^4 - \underline{3x^2} + 2 \quad \underline{2 \times 1}$$

$$= x^4 - \underline{2x^2 - 1x^2} + 2$$

$$= x^2(x^2 - 2) - 1 \cdot (x^2 - 2)$$

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

using $a^2 - b^2 = (a+b)(a-b)$

$$= [x^2 - (1)^2] [x^2 - (\sqrt{2})^2]$$

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

$$29. \quad y^4 - 13y^2 + 36$$

$$= y^4 - 9y^2 - \underline{4y^2} + 36$$

$$= y^2(y^2 - 9) - 4(y^2 - 9)$$

$$= (y^2 - 9)(y^2 - 4)$$

$$= [y^2 - (3)^2] [y^2 - (2)^2]$$

$$= (y+3)(y-3)(y+2)(y-2) \quad |$$

$$30. \quad 3(x+y)^2 - 5(x+y) + 2$$

$$\text{let } (x+y) = P$$

$$= 3P^2 - 5P + 2$$

$$= 3P^2 - (3P + 2P) + 2$$

$$3 \times 2 = 6$$

$$\textcircled{2 \times 3}$$

$$= \frac{3P^2 - 3P - 2P + 2}{\textcircled{\text{Jsunil Tutorial}}}$$

$$= 3P(P-1) - 2(P-1)$$

$$= (3P-2)(P-1)$$

$$\text{put value of } P = x+y$$

$$= \{3(x+y) - 2\} \{(x+y) - 1\}$$

$$= \{3x + 3y - 2\} \{x + y - 1\}$$

$$31. \quad x^4 - 11x^2 - 12$$

$$\Rightarrow x^4 - 12x^2 + 1x^2 - 12$$

$$\Rightarrow x^2(x^2 - 12) + 1(x^2 - 12)$$

$$\Rightarrow (x^2 + 1)(x^2 - 12)$$

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

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