

Algebra

बीजगणित

Low power to high power

$$\textcircled{1} \quad x + \frac{1}{x} = 2$$

$$\text{put } \rightarrow x = 1$$

$$\textcircled{2} \quad x + \frac{1}{x} = -2$$

$$\text{put } \rightarrow x = -1$$

$$\# \quad x + \frac{1}{x} = 2$$
$$x^{119} + \frac{1}{x^{121}} \rightarrow 1 + 1 = 2$$

$$\# \quad x + \frac{1}{x} = -2$$
$$x^{120} + \frac{1}{x^{121}} \rightarrow (-1)^{120} + \frac{1}{(-1)^{121}}$$
$$\cancel{-1} - \cancel{1} = 0$$

$$x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} = 4$$

$$x = y = 1$$

$$x^3 + y^3 = 1 + 1 = 2$$

$$\# x + \frac{1}{x} = 4$$

$$\textcircled{i} x^2 + \frac{1}{x^2} = 4^2 - 2 = 14$$

$$\textcircled{ii} x^3 + \frac{1}{x^3} = 4^3 - 3 \times 4 = 52$$

$$\# x + \frac{1}{x} = a$$

$$\textcircled{i} x^2 + \frac{1}{x^2} = a^2 - 2$$

$$\textcircled{ii} x^3 + \frac{1}{x^3} = a^3 - 3a$$

$$x + \frac{1}{x} = 3$$

$$\textcircled{i} x^2 + \frac{1}{x^2} = 3^2 - 2 = 7$$

$$\textcircled{ii} x^3 + \frac{1}{x^3} = 3^3 - 3 \times 3 = 27 - 9 = 18$$

$$\# x - \frac{1}{x} = a$$

$$\textcircled{i} x^2 + \frac{1}{x^2} = a^2 + 2$$

$$\textcircled{ii} x^3 - \frac{1}{x^3} = a^3 + 3a$$

$$x + \frac{1}{x} = 3$$

$$x^2 + \frac{1}{x^2} = 3^2 - 2 = 7$$

$$x^4 + \frac{1}{x^4} = 7^2 - 2 = 49 - 2 = 47$$

$$x^8 + \frac{1}{x^8} = 47^2 - 2 = 2209 - 2 = 2207$$

$$\# x + \frac{1}{x} = 5$$

$$x^2 + \frac{1}{x^2} \rightarrow 5^2 - 2 = 23$$

$$\begin{aligned} x^4 + \frac{1}{x^4} &= 23^2 - 2 \\ &= 529 - 2 \\ &= 527 \end{aligned}$$

$$\# x - \frac{1}{x} = 2$$

$$x^{16} + \frac{1}{x^{16}}$$

$$x - \frac{1}{x} = 2$$

$$x^2 + \frac{1}{x^2} = 2^2 + 2 = 6$$

$$x^4 + \frac{1}{x^4} = 6^2 - 2 = 34$$

$$x^8 + \frac{1}{x^8} = 34^2 - 2 = 1156 - 2 = 1154$$

$$x^{16} + \frac{1}{x^{16}} = 1154^2 - 2 = 1331714$$

$$x - \frac{1}{x} = 1$$

$$x^2 + \frac{1}{x^2} \rightarrow 1^2 + 2 = 3$$

$$x^4 + \frac{1}{x^4} \rightarrow 3^2 - 2 = 7$$

$$x^8 + \frac{1}{x^8} \rightarrow 7^2 - 2 = 47$$

$$x^{16} + \frac{1}{x^{16}} \rightarrow 47^2 - 2 = 2207$$

$$x^7 - \frac{1}{x^7} = 8$$

$$x^{7.5} + \frac{1}{x^{7.5}} = 12$$

$$x^{14} + \frac{1}{x^{14}} = 8^2 + 2 \\ = 66$$

$$x^{15} + \frac{1}{x^{15}} = 12^2 - 2 \\ = 142$$

$$\# \quad x - \frac{1}{x} = 4$$

$$\# \quad x^4 - \frac{1}{x^4} = 5$$

$$x^3 - \frac{1}{x^3} = 4^3 + 3 \times 4 \\ 64 + 12 = 76$$

$$x^{12} - \frac{1}{x^{12}} = 5^3 + 3 \times 5 \\ 125 + 15 \\ = 140$$

$$x^{10.5} + \frac{1}{x^{10.5}} = 6 \\ x^{4.5} + \frac{1}{x^{4.5}} = 6^3 - 3 \times 6 \\ = 216 - 18 \\ = 198$$

$$\# \quad x + \frac{1}{x} = 3$$

$$x^6 + \frac{1}{x^6} =$$

I-method

$$x^2 + \frac{1}{x^2} = 3^2 - 2 = 7$$

$$\begin{aligned} x^6 + \frac{1}{x^6} &= 7^3 - 3 \times 7 \\ &= 343 - 21 \\ &= 322 \end{aligned}$$

II-method ✓

$$x^3 + \frac{1}{x^3} = 3^3 - 3 \times 3 = 18$$

$$x^6 + \frac{1}{x^6} = 18^2 - 2 = 322$$

High power to lowest power

$$x^8 + \frac{1}{x^8} = 2207$$

$$x^8 + \frac{1}{x^8} = 2207$$

$$x^4 + \frac{1}{x^4} = \sqrt{2207+2}$$
$$= \sqrt{2209}$$
$$= 47$$

$$\textcircled{i} \quad x + \frac{1}{x} = 3$$

$$\textcircled{ii} \quad x - \frac{1}{x} = \sqrt{5}$$

$$x^2 + \frac{1}{x^2} = \sqrt{47+2}$$
$$= \sqrt{49}$$
$$= 7$$
$$x + \frac{1}{x} = \sqrt{7+2}$$
$$= 3$$
$$x - \frac{1}{x} = \sqrt{7-2}$$
$$= \sqrt{5}$$

$$x^4 + \frac{1}{x^4} = 527$$

$$x^4 + \frac{1}{x^4}$$

$$527$$

$$x^2 + \frac{1}{x^2}$$

$$\sqrt{527+2}$$

$$\sqrt{529}$$

$$\textcircled{23}$$

$$x + \frac{1}{x} \mid x - \frac{1}{x}$$

$$\sqrt{23+2}$$

$$\sqrt{25}$$

$$\textcircled{5}$$

$$\sqrt{23-2}$$

$$= \sqrt{21}$$

$$\textcircled{I} \quad x + \frac{1}{x} = 5$$

$$\textcircled{II} \quad x - \frac{1}{x} = \sqrt{21}$$

$$\# \quad x^{38} + \frac{1}{x^{38}} = 786$$

$$x^{19} - \frac{1}{x^{19}} = \sqrt{786-2}$$

$$= \sqrt{784}$$

$$x^{18} + \frac{1}{x^{18}} = 959$$

$$x^9 + \frac{1}{x^9} = \sqrt{\frac{959+2}{2}}$$

$$= \sqrt{\frac{961}{2}}$$

$$= \textcircled{31}$$

Same power

$$\textcircled{I} \quad x^n + \frac{1}{x^n} = A$$

$$x^n - \frac{1}{x^n} = \sqrt{A^2 - 4}$$

$$\textcircled{II} \quad x^n - \frac{1}{x^n} = A$$

$$x^n + \frac{1}{x^n} = \sqrt{A^2 + 4}$$

$$x^{17} + \frac{1}{x^{17}} = 5$$

$$x^{17} - \frac{1}{x^{17}} = \sqrt{5^2 - 4} = \sqrt{21}$$

$$\# \quad x^{119} - \frac{1}{x^{119}} = 7$$

$$x^{119} + \frac{1}{x^{119}} = \sqrt{7^2 + 4} = \sqrt{53}$$

$$x^{500} + \frac{1}{x^{500}} = 7$$

$$x^{500} - \frac{1}{x^{500}} = \sqrt{7^2 - 4} = \sqrt{49 - 4} \\ = \sqrt{45} \\ = \textcircled{3\sqrt{5}}$$

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9AM to 11AM

KUS Bihar Exams

$$\# \frac{x^2 - 7x + 1 = 0}{x} \\ x - 7 + \frac{1}{x} = 0 \\ x + \frac{1}{x} = 7$$

$$x^3 + \frac{1}{x^3} = 7^3 - 3 \times 7 \\ = 343 - 21 \\ = 322$$