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ARJUN BATCH

CLASS 9th MATHS

संख्या पद्धति

NUMBER SYSTEM

Chapter-1 | Part-5



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आज क्या पढेंगे ?

1. प्रश्नावली - 1.4
2. घातांक नियम
3. प्रश्नावली - 1.5

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Q. परिमेय / अपरिमेय

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

(ii) $(3\sqrt{7}) \times \sqrt{7}$

$3 \times 7 = 21$ परिमेय स.

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2. निम्नलिखित व्यंजकों में से प्रत्येक व्यंजक को सरल कीजिए :

I. $(3+\sqrt{3})(2+\sqrt{2})$

हल :-

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

$= 6 + 3\sqrt{2} + 2\sqrt{3} + \sqrt{3} \times \sqrt{2}$

$= 6 + 3\sqrt{2} + 2\sqrt{3} + \sqrt{6}$

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II. $(3+\sqrt{3})(3-\sqrt{3})$

हल :- $(3+\sqrt{3})(3-\sqrt{3})$

$\{(a+b)(a-b)=a^2-b^2\}$

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

$= 9-3$

$(3+\sqrt{3})(3-\sqrt{3}) = 6$

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III. $(\sqrt{5}+\sqrt{2})^2$

हल:- $(a+b)^2 = a^2+b^2+2ab$

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

$= 5+2+2\sqrt{10}$

$(\sqrt{5}+\sqrt{2})^2 = 7+2\sqrt{10}$

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IV. $(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2})$

हल :-

$(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2})$

$\{(a+b)(a-b)=a^2-b^2\}$

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

$=5-2$

$=3$

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3. आपको याद होगा कि π को एक वृत्त की परिधि (मान लीजिए c) और उसके व्यास (मान लीजिए d) के अनुपात से परिभाषित किया जाता है, अर्थात् $\pi = \frac{c}{d}$ है। यह इस तथ्य का अंतर्विरोध करता हुआ प्रतीत होता है कि π अपरिमेय है। इस अंतर्विरोध का निराकरण आप किस प्रकार करेंगे?

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4. संख्या रेखा पर $\sqrt{9.3}$ को निरूपित कीजिए।



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5. निम्न के हरों का परिमेयकरण कीजिए:

I. $\frac{1}{\sqrt{7}}$



हल :-

$\frac{1}{\sqrt{7}}$

हर का परिमेयकरण

$\frac{1}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{7}}{7}$

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$\{(a+b)(a-b) = a^2 - b^2\}$

$$= \frac{\sqrt{7}+\sqrt{6}}{(\sqrt{7})^2-(\sqrt{6})^2}$$

$$= \frac{\sqrt{7}+\sqrt{6}}{7-6} = \sqrt{7}+\sqrt{6}$$

II. $\frac{1}{\sqrt{7}-\sqrt{6}}$

हल :- $\frac{1}{\sqrt{7}-\sqrt{6}}$

परिमेयकरण करने पर

$$= \frac{1}{\sqrt{7}-\sqrt{6}} \times \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}+\sqrt{6}}$$

$$= \frac{\sqrt{7}+\sqrt{6}}{(\sqrt{7}-\sqrt{6})(\sqrt{7}+\sqrt{6})}$$ ✓

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III. $\frac{1}{\sqrt{5}+\sqrt{2}}$

हल :-

$\frac{1}{\sqrt{5}+\sqrt{2}}$

परिमेयकरण करने पर

$\frac{1}{\sqrt{5}+\sqrt{2}} \times \frac{\sqrt{5}-\sqrt{2}}{\sqrt{5}-\sqrt{2}}$

a b

$= \frac{\sqrt{5}-\sqrt{2}}{(\sqrt{5})^2-(\sqrt{2})^2}$

$= \frac{\sqrt{5}-\sqrt{2}}{5-2} = \frac{1}{3}(\sqrt{5}-\sqrt{2})$

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IV. $\frac{1}{\sqrt{7}-2}$



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घातांक नियम

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a^m (m) घात / Power

↳ आधार

3^4 (3) Power / घात

(2) आधार (base)

(1) $a^m \times a^n = a^{m+n}$

(आधार समान, गुणा)

↓

घातें जुड़ेंगी

Exa. $3^2 \times 3^3 = 3^{2+3} = 3^5$

$3 \times 3 \times 3 \times 3 \times 3 = 3^5$

(2) $\frac{a^m}{a^n} = a^{m-n}$

(आधार समान, भाग)

↓

घातें घटेंगी

Exa. $\frac{5^4}{5^6} = 5^{4-6} = 5^{-2}$

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$2^2 = 4$

$3^3 = 27$

$\frac{5^4}{5^6} = \frac{5\times5\times5\times5}{5\times5\times5\times5\times5\times5} = \frac{1}{5^2} = 5^{-2}$

(iii) $(a^m)^n = a^{m\times n}$ Exa. $(2^3)^5 = 2^{3\times5} = 2^{15}$

(iv) $a^m \times b^m = (a\times b)^m$ Exa. $2^3\times3^3 = (2\times3)^3 = 6^3$

(v) $\frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$ Exa. $\frac{10^5}{2^5} = \left(\frac{10}{2}\right)^5 = 5^5$

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$\frac{1}{0}$

(vi) $a^0 = 1 \quad (a \neq 0)$

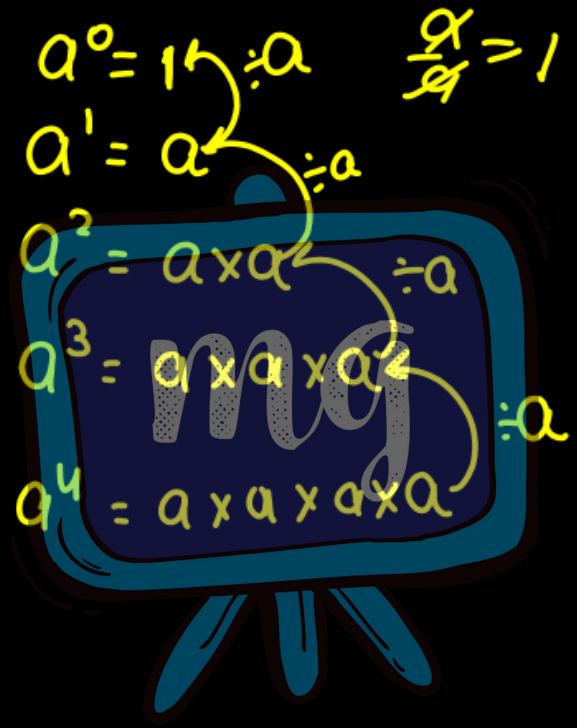
$0^0 \rightarrow$ अपरिभाषित

(vii) $a^{-m} = \frac{1}{a^m}$ / $\frac{1}{a^{-m}} = a^m$

Exa. $3^{-2} = \frac{1}{3^2}$ / $\frac{1}{3^{-2}} = 3^2$

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प्रश्नावली - 1.5

1. ज्ञात कीजिए :

I. $64^{\frac{1}{2}}$

II. $32^{\frac{1}{5}}$

III. $125^{\frac{1}{3}}$

$2^0 = 1$

$2^1 = 2$

$2^2 = 4$

$2^3 = 8$

$2^4 = 16$

$2^5 = 32$

$2^6 = 64$

1. $64^{\frac{1}{2}} = (8^2)^{\frac{1}{2}} = 8^{2 \times \frac{1}{2}} = 8$

2. $32^{\frac{1}{5}} = (2^5)^{\frac{1}{5}} = 2^{5 \times \frac{1}{5}} = 2$

3. $125^{\frac{1}{3}} = (5^3)^{\frac{1}{3}} = 5^{3 \times \frac{1}{3}} = 5^1 = 5$

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प्रश्नावली - 1.5

2. ज्ञात कीजिए :

I. $9^{\frac{3}{2}}$

हल : (i) $9^{3/2}$

$(3^2)^{3/2}$

$= 3^{\frac{2\times3}{2}}$

$= 3^3 = 27$

II. $32^{\frac{2}{5}}$

(ii) $32^{2/5}$

$(2^5)^{2/5}$

$2^{\frac{5\times2}{5}}$

$2^2 = 4$

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III. $16^{\frac{3}{4}}$ $= (2^4)^{3/4}$ $4 \times \frac{3}{4}$ $= 2^3 = 8$

IV. $125^{-\frac{1}{3}}$ $(5^3)^{-\frac{1}{3}} = 5^{-1}$

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प्रश्नावली - 1.5

3. सरल कीजिए :

I. $2^{\frac{2}{3}} \cdot 2^{\frac{1}{5}}$

हल :

$2^{\frac{2}{3}+\frac{1}{5}}$

$= 2^{\frac{10+3}{15}}$

$= 2^{\frac{13}{15}}$



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प्रश्नावली - 1.5

II. $\left(\frac{1}{3^3}\right)^7$



हल :-

$\left(\frac{1}{3^3}\right)^7 = \frac{1^7}{(3^3)^7} = \frac{1}{3^{21}}$

$= 3^{-21}$

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H.W.

III. $\frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$



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प्रश्नावली - 1.5

IV. $7^{\frac{1}{2}} . 8^{\frac{1}{2}}$



हल $7^{1/2} \cdot 8^{1/2}$

$(7 \cdot 8)^{1/2}$

$56^{1/2}$

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