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ARJUN BATCH

CLASS 9th MATHS

बहुपद

Chapter-2 | Part-9



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आज क्या पढेंगे ?

1 प्रश्नावली - 2.4



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बीजीय सर्वसमिकाएँ

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$$(x+y)^2 = x^2+y^2+2xy$$

$$(x-y)^2 = x^2+y^2-2xy$$

$$(x+y)(x-y) = x^2-y^2$$

$$(x+a)(x+b) = x^2+x(a+b)+ab$$

$$(x+y)^3 = x^3+y^3+3x^2y+3xy^2$$

$$(x-y)^3 = x^3-y^3-3x^2y+3xy^2$$

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$$(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$$



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$$(I+II)^3 = I^3 + II^3 + 3I^2II + 3III^2$$

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8. निम्नलिखित में से प्रत्येक का गुणनखंड कीजिए:

(i) $8a^3 + b^3 + 12a^2b + 6ab^2$

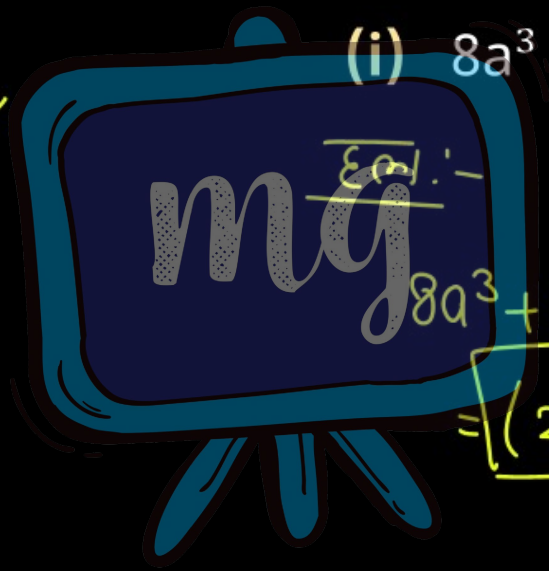
$I^3 = 8a^3$

$I^3 = (2a)^3$

$I = 2a$

$II^3 = b^3$

$II = b$



हल :-

$8a^3 + b^3 + 12a^2b + 6ab^2$

$= (2a+b)^3$

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$(I - II)^3 = I^3 - II^3 - 3I^2II + 3III^2$

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(ii) $8a^3 - b^3 = 12a^2b + 6ab^2$

$I^3 = 8a^3$

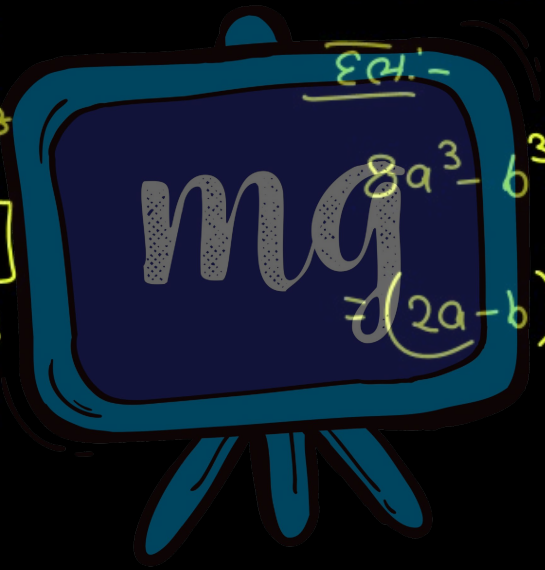
$I^3 = (2a)^3$

$I = 2a$

$II^3 = b^3$

$II^3 = b^3$

$II = b$



हल :-

$8a^3 - b^3 - 12a^2b + 6ab^2$

$= (2a - b)^3$

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$(I - II)^3 = I^3 - II^3 - 3I^2II + 3III^2$

(iii) $27 - 125a^3 - 135a + 225a^2$

हल :-

$27 - 125a^3 - 135a + 225a^2$

$= (3 - 5a)^3$

$I^3 = 27$

$I^{\frac{3}{3}} = 3^{\frac{3}{3}}$

$I = 3$

$II^3 = 125a^3$

$II^{\frac{3}{3}} = (5a)^{\frac{3}{3}}$

$II = 5a$

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H.W.

(iv) $64a^3 - 27b^3 - 144a^2b + 108ab^2$



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(v) $27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$

$I^3 = 27p^3$

$I^3 = (3p)^3$

$I = 3p$

$II^3 = \frac{1}{216}$

$II^3 = \frac{1}{6^3}$

$II^3 = \left(\frac{1}{6}\right)^3$

$II = \frac{1}{6}$

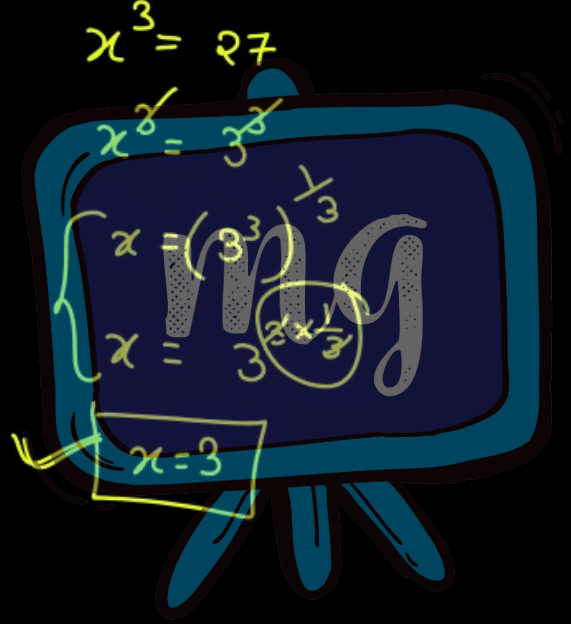
हल :-

$27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$ X

$= \left(3p - \frac{1}{6}\right)^3$

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9. सत्यापित कीजिए:

(i) $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

हल :- हम जानते हैं कि -

$(x+y)^3 = x^3+y^3+3x^2y+3xy^2$

$(x+y)^3 - 3x^2y - 3xy^2 = x^3+y^3$

$(x+y)^3 - 3xy(x+y) = x^3+y^3$

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$$(x+y)\left[(x+y)^2-3xy\right]=x^3+y^3$$

$$(x+y)\left[x^2+y^2+2xy-3xy\right]=x^3+y^3$$

$$(x+y)\left[x^2+y^2-xy\right]=x^3+y^3$$

"H.P."

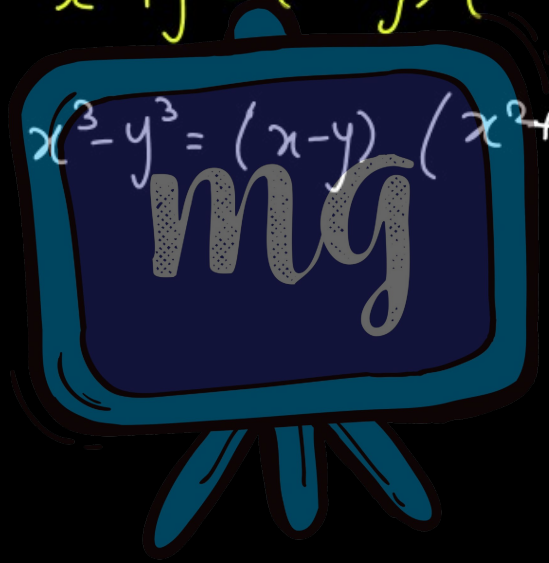
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$(x+y)^3$

$x^3+y^3=(x+y)(x^2+y^2-xy)$

$x^3-y^3=(x-y)(x^2+y^2+xy)$



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$(x-y)[x^2+y^2-2xy+3xy] = x^3-y^3$

$(x-y)[x^2+y^2+xy] = x^3-y^3$

(ii) $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

हल :-

$(x-y)^3 = x^3-y^3-3x^2y+3xy^2$

$(x-y)^3+3x^2y-3xy^2 = x^3-y^3$

$(x-y)^3+3xy(x-y) = x^3-y^3$

$(x-y)[(x-y)^2+3xy] = x^3-y^3$

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10. निम्नलिखित में से प्रत्येक का गुणनखंडन कीजिए :

(i) $27y^3 + 125z^3$

$x^3+y^3=(x+y)(x^2+y^2-xy)$

$1^3 = 1$

$2^3 = 8$

$3^3 = 27$

$4^3 = 64$

$5^3 = 125$

$6^3 = 216$

$7^3 = 343$

$8^3 = 512$

$9^3 = 729$

$10^3 = 1000$

हल :-

$(3y)^3 + (5z)^3$

$= (3y+5z)[(3y)^2 + (5z)^2 - (3y)(5z)]$

$= (3y+5z)[9y^2 + 25z^2 - 15yz]$

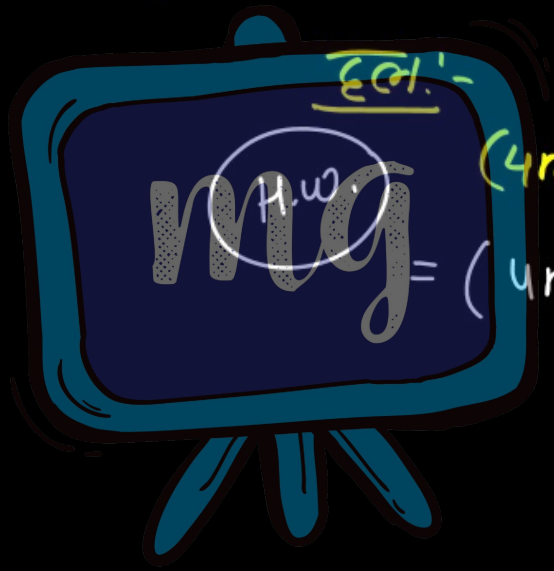
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$x^3 - y^3 = (x-y)(x^2+y^2+xy)$

(ii) $64m^3 - 343n^3$



$(4m)^3 - (7n)^3$

$= (4m-7n)[(4m)^2+(7n)^2+(4m)(7n)]$

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$$x^3+y^3+z^3-3xyz=(x+y+z)(x^2+y^2+z^2-xy-yz-zx)$$

$$\text{I}^3+\text{II}^3+\text{III}^3-3\,\text{I}\,\text{II}\,\text{III}=(\text{I}+\text{II}+\text{III})(\text{I}^2+\text{II}^2+\text{III}^2-\text{I}\,\text{II}-\text{II}\,\text{III}-\text{III}\,\text{I})$$

प्रश्नावली - 2.4

11. गुणनखंडन कीजिए :

$$27x^3 + y^3 + z^3 - 9xyz$$

हल :- $27x^3+y^3+z^3-9xyz$

$$(\underset{\text{I}}{3x})^3+(\underset{\text{II}}{y})^3+(\underset{\text{III}}{z})^3$$

$$=(3x+y+z)\left((3x)^2+y^2+z^2-3xy-yz-z(3x)\right]$$

$$=(3x+y+z)(9x^2+y^2+z^2-3xy-yz-3xz]$$

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$$I^3+II^3+III^3-3I\,II\,III = (I+II+III)(I^2+II^2+III^2-I\,II-II\,III-III\,I)$$

$$8x^3+64y^3-125+120xy$$

$$(2x)^3+(4y)^3-(5)^3$$

$$=(2x+4y-5)\left[(2x)^2+(4y)^2+(-5)^2-2x\times 4y-4y(-5)-(-5)(2x)\right]$$

$$=(2x+4y-5)\left[4x^2+16y^2+25-8xy+20y+10x\right]$$

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12. सत्यापित कीजिए :

$$x^3+y^3+z^3-3xyz = \frac{1}{2}(x+y+z)\left[(x-y)^2+(y-z)^2+(z-x)^2\right]$$

हल :-

$$x^3+y^3+z^3-3xyz = (x+y+z)(x^2+y^2+z^2-xy-yz-zx)$$

RHS.

$$\frac{1}{2}(x+y+z)(x^2+y^2+z^2-xy-yz-zx)$$

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$$= \frac{1}{2}(x+y+z)(2x^2+2y^2+2z^2-2xy-2yz-2zx)$$

$$= \frac{1}{2}(x+y+z)[x^2+x^2+y^2+y^2+z^2+z^2-2xy-2yz-2zx]$$

$$x^2-2xy+y^2 \quad + \quad y^2-2yz+z^2 \quad + x^2+z^2-2zx$$

$$x^3+y^3+z^3-3xyz = \frac{1}{2}(x+y+z)[(x-y)^2 + (y-z)^2 + (z-x)^2]$$

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$$= \frac{1}{2}(x+y+z)\left[(x-y)^2+(y-z)^2+(z-x)^2\right]$$

$$= \frac{1}{2}(x+y+z)\left[x^2+y^2-2xy+y^2+z^2-2yz+z^2+x^2-2zx\right]$$

$$= \frac{1}{2}(x+y+z)\left[2x^2+2y^2+2z^2-2xy-2xy-2zx\right]$$

$$= \frac{2}{2}(x+y+z)\left[x^2+y^2+z^2-xy-yz-zx\right)$$

$$= x^3+y^3+z^3-3xyz$$

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13. यदि $x + y + z = 0$ हो, तो दिखाइए कि

$x^3 + y^3 + z^3 = 3xyz$ है।



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14. वास्तव में घनों का परिकलन किए बिना निम्नलिखित में से प्रत्येका मान ज्ञात कीजिए।

(i) $(-12)^3 + (7)^3 + (5)^3$

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(ii) $(28)^3 + (-15)^3 + (-13)^3$



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15. नीचे दिए गए आयतों, जिनमें उनके क्षेत्रफल दिए गए हैं, में से प्रत्येक की लंबाई और चौड़ाई के लिए संभव व्यंजक दीजिए:

(i) क्षेत्रफल : $25a^2 - 35a + 12$

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(ii) क्षेत्रफल : $35y^2 + 13y - 12$



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16. घनाभों (cuboids), जिनके आयतन नीचे दिए गए हैं कि, विमाओं के लिए संभव व्यंजक क्या है?

(i) आयतन : $3x^2 - 12x$

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(ii) आयतन : $12ky^2 + 6ky - 20k$

