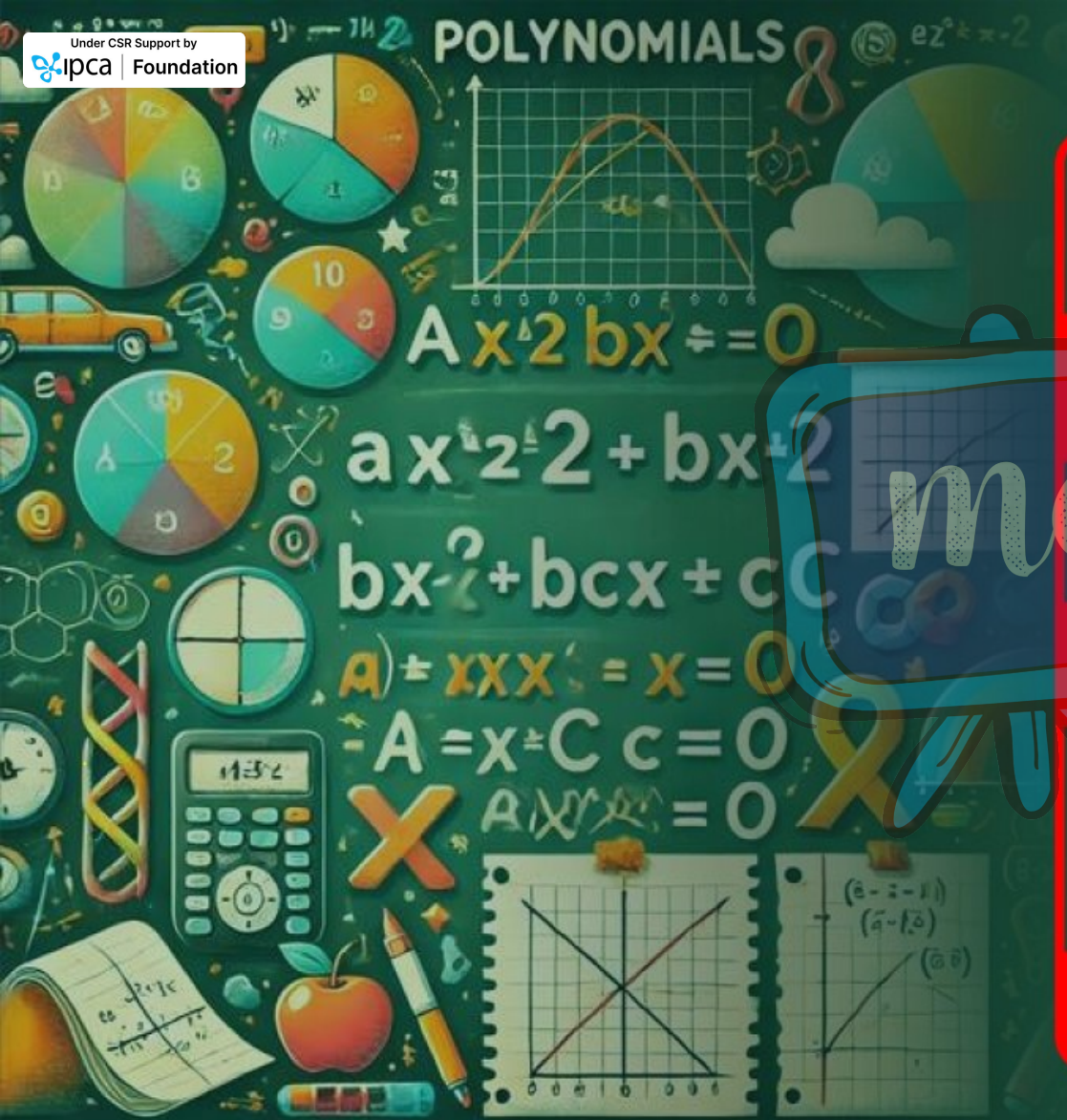
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कक्षा – 9

गणित

अध्याय – 2

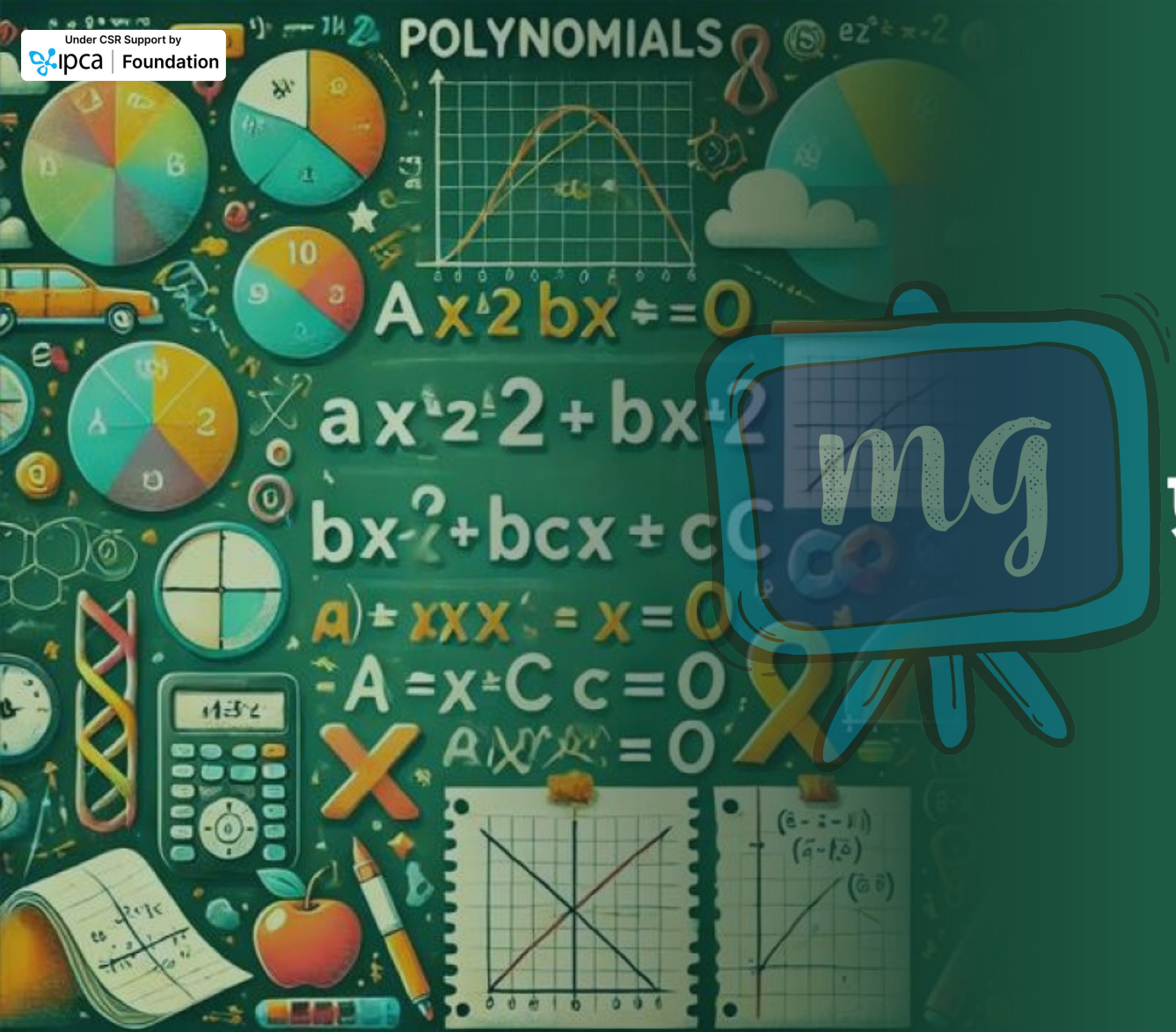
बहुपद

भाग – 12

प्रश्नावली 2.4 (प्रश्न : 5 से 7)

हर्ष गोयल

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प्रश्नावली 2.4

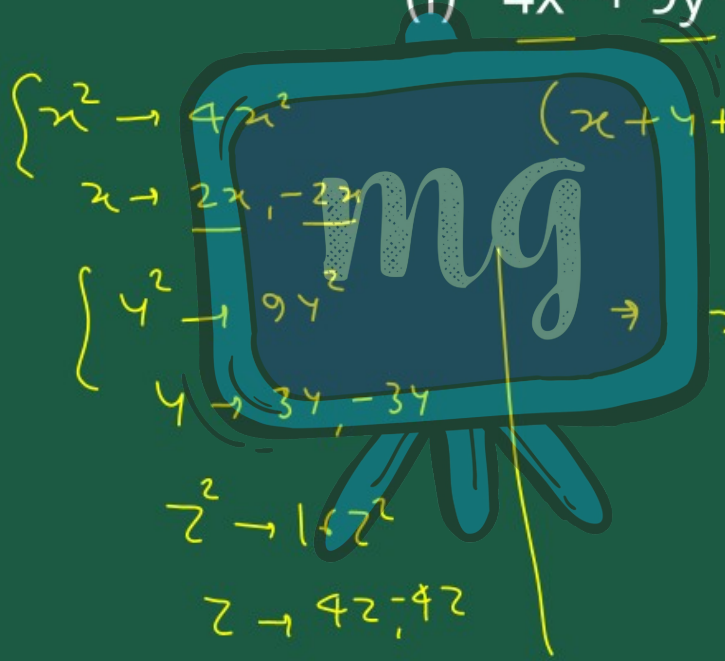
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5. गुणनखंडन कीजिए:

(i) $4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$



$x^2 \to 4x^2$

$x \to 2x, -2x$

$y^2 \to 9y^2$

$y \to 3y, -3y$

$z^2 \to 16z^2$

$z \to 4z, -4z$

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

$\Rightarrow$ $x \to 2x$

$y \to 3y$

$z \to -4z$

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$4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$

$x \to 2x$

$y \to 3y$

$z \to -4z$

$= (2x)^2 + (3y)^2 + (-4z)^2 + 2(2x)(3y) + 2(3y)(-4z) + 2(-4z)(2x)$

सर्वसमिका में

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

$= (2x + 3y - 4z)^2$

$= (2x + 3y - 4z)(2x + 3y - 4z)$

Ans

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(ii) $2x^2 + y^2 + 8z^2 - 2\sqrt{2}\,xy + 4\sqrt{2}\,yz - 8xz$

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

$x^2 \to 2x^2$

$x \to \sqrt{2}x, -\sqrt{2}x$

$y^2 \to y^2$

$y \to y, -y$

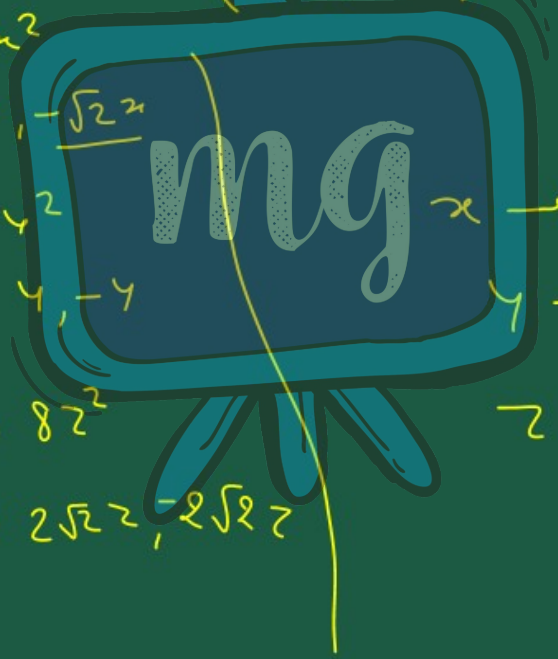
$z^2 \to 8z^2$

$z \to 2\sqrt{2}z, -2\sqrt{2}z$

$x \to -\sqrt{2}x$

$y \to y$

$z \to 2\sqrt{2}z$



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$$2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8xz$$

$$= (-\sqrt{2}x)^2 + (y)^2 + (2\sqrt{2}z)^2 + 2(-\sqrt{2}x)(y) + 2(y)(2\sqrt{2}z) + 2(-\sqrt{2}x)(2\sqrt{2}z)$$

$x \to -\sqrt{2}x$

$y \to y$

$z \to 2\sqrt{2}z$

सर्वसमिका से

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

$$= (-\sqrt{2}x + y + 2\sqrt{2}z)^2$$

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

Ans

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6. निम्नलिखित घनों को प्रसारित रूप में लिखिए :

(i) $(2x + 1)^3$

$x \to 2x$

$y \to 1$

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

$(2x+1)^3 = (2x)^3 + (1)^3 + 3(2x)(1)(2x+1)$

$= 8x^3 + 1 + 6x(2x+1)$

$(2x+1)^3 = 8x^3 + 1 + 12x^2 + 6x$

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(ii) $(2a - 3b)^3$

$x \to 2a$

$y \to 3b$

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

$(2a-3b)^3 = (2a)^3 - (3b)^3 - 3(2a)(3b)(2a-3b)$

$= 8a^3 - 27b^3 - 18ab(2a-3b)$

$(2a-3b)^2 = 8a^3 - 27b^3 - 36a^2b + 54ab^2$

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(iii) $\left[\frac{3}{2}x+1\right]^3$

$x \to \frac{3}{2}x$

$y \to 1$

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

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

$= \frac{27}{8}x^3+1+\frac{9}{2}x\left[\frac{3}{2}x+1\right]$

$\left(\frac{3}{2}x+1\right)^2 = \frac{27}{8}x^3+1+\frac{27}{4}x^2+\frac{9}{2}x$

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(iv) $\left[x-\frac{2}{3}y\right]^3$

$x \to x$

$y \to \frac{2}{3}y$

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

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

$= x^3-\frac{8}{27}y^3-2xy\left[x-\frac{2}{3}y\right]$

$\left(x-\frac{2}{3}y\right)^3 = x^3-\frac{8}{27}y^3-2x^2y+\frac{4}{3}xy^2$

Ans

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7. उपयुक्त सर्वसमिकाएँ प्रयोग करके निम्नलिखित के मान ज्ञात कीजिए:

(i) $(99)^3$

$x \to 100$

$y \to 1$

99×3

297

$99 = (100-1)$

$(99)^3 = (100-1)^3$

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

$(99)^3 = (100-1)^3 = (100)^3 - (1)^3 - 3(100)(1)(100-1)$

$= 1000000 - 1 - 300(99)$

$= 1000000 - 1 - 29700$

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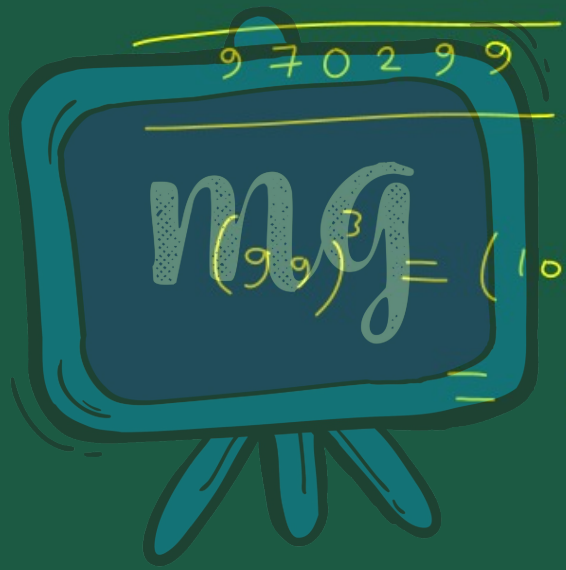
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1000000

$-\quad 29700$

1

970299



$(99)^3 = (100-1)^3$

970299

Ans

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

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



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$102 \times 6 = 612$

(ii) $(102)^3$

$102 = 100 + 2$

$(102)^3 = (100+2)^3$

$x \to 100$

$y \to 2$

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

$(102)^3 = (100)^3 + (2)^3 + 3(100)(2)(100+2)$

$= 1000000 + 8 + 600(102)$

$= 1000000 + 8 + 61200$

$= 1061208$ Ans

$1000000 + 61200 + 8 = 1061208$

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998 × 6 = 5988

(iii) $(998)^3$

$998 = (1000-2)$

$(998)^3 = (1000-2)^3$

$x \to 1000$

$y \to 2$

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

$(998)^3 = (1000)^3 - (2)^3 - 3(1000)(2)(1000-2)$

$= 1000000000 - 8 - 6000(998)$

$= 1000000000 - 8 - 5988000$

$(998)^3 = 994011992$

Ans

mg