بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِيْمِ

বিস্‌মিল্লাহির রাহ্‌মানির রাহীম

উদ্ভাস

একাডেমিক এন্ড এডমিশন কেয়ার

Class-09 (Chapter: 03)

(ALGEBRAIC EXPRESSIONS)

LECTURE M-07

EXERCISE 3.2….

13) If $a + b + c = 0$, than should that

a) $a^3 + b^3 + c^3 = 3abc$

b) $\frac{(b+c)^2}{3bc} + \frac{(c+a)^2}{3ca} + \frac{(a+b)^2}{3ab} = 1$

$a+b+c=0$

$(a+b) = -c$

$a+c = -b$

$b+c = -a$

$\Rightarrow (a+b)^3 = (-c)^3$

$\Rightarrow a^3+b^3+3ab(a+b) = -c^3$

$\Rightarrow a^3+b^3+c^3+3ab(-c) = 0$

$\Rightarrow a^3+b^3+c^3 - 3abc = 0$

$\Rightarrow a^3+b^3+c^3 = 3abc$

a

b

$L.H.S = \frac{(-a)^2}{3bc} + \frac{(-b)^2}{3ca} + \frac{(-c)^2}{3ab}$

$= \frac{a \cdot a^2 + b \cdot b^2 + c \cdot c^2}{3abc}$

$= \frac{a^3+b^3+c^3}{3abc} = \frac{\cancel{3abc}}{\cancel{3abc}} = 1.$

Factorization

- If an expression is equal to the product of two or more expressions, each of the latter expression is called a factor of the former expression.

$(a = b \cdot c)$

$(x+5)(x+6) = x^2 + 6x + 5x + 30 = x^2 + 11x + 30$

$\Rightarrow x^2 + 11x + 30 = (x+5)(x+6)$

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

$\Rightarrow a^2 + 2ab + b^2 = (a+b)(a+b)$

Example 21:

$\mathbf{9x^2 - 30xy + 25y^2}$

$= (3x)^2 - 2 \cdot 3x \cdot 5y + (5y)^2$

$= (3x - 5y)^2$

(Ans.)

$3x \Rightarrow a$

$5y \Rightarrow b$

$a^2 - \quad + b^2$

$\Rightarrow a^2 - \boxed{2ab} + b^2$

$2ab = 2 \cdot 3x \cdot 5y$

$= 6x \cdot 5y$

$= 30xy$

$9x^2 - 30xy + 25y^2$

Poll Question: 01

$4x^2 + 12x + 9$

1. (2x+3) (2x+5)
2. (x+3) (x+3)
3. (3x+3) (2x+3)
4. (2x+3) (2x+3)

$4x^2 + 12x + 9$

$= (2x)^2 + 2 \cdot 2x \cdot 3 + 3^2$

$= (2x+3)^2$

$2 \cdot 2x \cdot 3$

$= 4x \cdot 3$

$= 12x$

Difference of two squares:

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

a , b → term

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

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

M: $x^2 - 16$

$= x^2 - 4^2$

$= (x+4)(x-4)$ Ans.

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Activity: (Page: 56)

a) $abx^2 + acx^3 + adx^4$

b) $xa^2 - 144xb^2$

Poll Question: 02

$$a^2 - 1 + 2b - b^2$$

1. (a+b-2) (a-b+1)
2. (a+b-1) (a+b+1)
3. (a+b+1) (a-b+1)
4. (a+b-1) (a-b+1)

$-1 + 2b - b^2$

$-(+1 - 2b + b^2)$

$a^2 - (b^2 - 2b + 1)$

$= a^2 - (b^2 - 2 \cdot b \cdot 1 + 1^2)$

$= a^2 - (b-1)^2$

$= (a+b-1)(a-b+1)$

$a^2 - 2ab + b^2$

$= (a-b)^2$

Middle term factorization:

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

$x^2 + 11x + 30$

$x^2 + mx + n$

$a + b = m$

$a \cdot b = n$

a　b

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

$\Rightarrow x^2 + ax + bx + ab$

$\Rightarrow x(x+a) + b(x+a)$

$= \boxed{(x+a)(x+b)}$

$x^2 + 3x + 2$

$2 + 1 = 3$

$2 \cdot 1 = 2$

$x^2 + (2+1)x + 2 \cdot 1$

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

Middle term Break Up:

$$ax^2 + bx + c = (rx + p)(sx + q)$$

$ax^2 + bx + c$

$m + n = b$

$m \cdot n = a \cdot c$

$m \quad n$

$R.H.S = (rx + p)(sx + q)$

$= rsx^2 + qrx + psx + pq$

$= rsx^2 + (ps + qr)x + pq$

$L.H.S = \boxed{ax^2 + bx + c}$

$ps \cdot \quad qr$

$ps + qr = b$

$ps \cdot qr = pqrs = ac$

$c = pq$

$a = rs$

Activity :(Page: 59)

1) $x^2 + x - 56$

2) $16x^3 - 46x^2 + 15x$

Perfect Cube Form:

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

$a^3 + b^3$

$a^3 - b^3$

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

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

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

$x^2 + mx + n = (x+a)(x+b)$

a b

$ax^2 + bx + c = \boxed{}\boxed{}$

m n

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Poll Question: 03

$x^3 + 6x^2y + 11xy^2 + 6y^3$

1. (x+y) (x-y) (x-3y)
2. (x+y) (x-2y) (x+2y)
3. (x-y) (x+y) (x+2y)
4. (x+y) (x+2y) (x+3y)

$x^3 + 3x^2y + 3x^2y + 2xy^2 + 9xy^2 + 6y^3$

$= (x^3 + 3x^2y + 2xy^2) + (3x^2y + 9xy^2 + 6y^3)$

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

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

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

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

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

Exercise -3.3

2. $9x^2 + 24x + 16$

$= (3x)^2 + 2\cdot 3x\cdot 4 + 4^2$

$= (3x+4)^2$

$2ab$

$2\cdot 3x\cdot 4 = 24x$

$a^2 + 2ab + b^2$

Exercise -3.3

7. $a^2 + 6a + 8 - y^2 + 2y$

$= a^2+6a+9 - 1 - y^2+2y$

$= (a^2+6a+9) - (y^2-2y+1)$

$= (a+3)^2 - (y-1)^2$

$= (a+y+2)(a-y+4)$

$(a^2+6a+\boxed{})$

$=(a^2+2\cdot a\cdot 3+3^2)$

$(\boxed{})^2$

$y^2-2\cdot y\cdot 1+1^2$

$(y-1)^2$

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Exercise -3.3

14. $9x^2y^2 -5xy^2 -14y^2$

m n

$+9$ -14

$m+n=-5$

$m.n=9(-14)$

$+9-14=-5$

$(+9)(-14)=(+9)\cdot(-14)$

$= 9x^2y^2+9xy^2-14xy^2-14y^2$

$= 9xy^2(x+1)-14y^2(x+1)$

$= (x+1)(9xy^2-14y^2)$

$= y^2(x+1)(9x-14)$

Exercise -3.3

25. $4a^2 + \frac{1}{4a^2} + 2 + 4a + \frac{1}{a}$

$(4a^2 + 4a + 1) + \left(1 + \frac{1}{4a^2} + \frac{1}{a}\right)$

$= (2a+1)^2 + \left\{\left(\frac{1}{2a}\right)^2 + 2 \cdot \frac{1}{2a} \cdot 1 + 1^2\right\}$

$= (2a+1)^2 + \left(\frac{1}{2a} + 1\right)^2$

$= (2a+1)^2 + \left(\frac{2a+1}{2a}\right)^2 = (2a+1)^2\left(1 + \frac{1}{4a^2}\right)$

$(2a)^2$

$\left(\frac{1}{2a}\right)^2$

$a^2 + 2ab + b^2$

$4a^2 + 4a + 1^2$

$(2a)^2 + 2 \cdot 2a \cdot 1 + 1^2$

Exercise -3.3

Prove:-

31. $(x+1)(x+2)(3x-1)(3x-4) = (3x^2+2x-1)(3x^2+2x-8)$

3 −1 6 −4

R.H.S $= (3x^2+2x-1)(3x^2+2x-8)$

3 −1 6 −4

$= (3x^2+3x-x-1)(3x^2+6x-4x-8)$

$= \{3x(x+1)-1(x+1)\}\{3x(x+2)-4(x+2)\}$

$= (x+1)(3x-1)(x+2)(3x-4)$

Ans.

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লেগে থাকো সৎভাবে,
স্বপ্ন জয় তোমারই হবে

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