

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

বিস্মিল্লাহির রাহমানির রাহীম



ଉତ୍କଳ

একাডেমিক এন্ড এডমিশন কেয়ার

# নবম শ্রেণি (অধ্যায়: ৩)

## বীজগাণিতিক রাশি

### লেকচার M-07

## অনুশীলনী- ৩.২

13)  $a + b + c = 0$  হলে, তবে দেখাও যে

$$\text{ক) } a^3 + b^3 + c^3 = 3abc$$

$$\begin{aligned} &\cancel{\text{প্রমাণ}} \quad a+b+c=0 \\ &\Rightarrow (a+b)^3 = (-c)^3 \\ &\Rightarrow a^3 + b^3 + 3ab(a+b) = -c^3 \\ &\Rightarrow a^3 + b^3 + c^3 = -3abc(a+b) \end{aligned}$$

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

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

$$\left| \begin{array}{l} a+b=-c \\ c+a=-b \\ b+c=-a \end{array} \right.$$

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

$$\begin{aligned} &\cancel{\text{প্রমাণ}} \quad L.H.S = \frac{(-a)^2}{3bc} + \frac{(-b)^2}{3ca} + \frac{(-c)^2}{3ab} \\ &= \frac{a \cdot a^2 + b \cdot b^2 + c \cdot c^2}{3abc} \end{aligned}$$

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

$$= \frac{3abc}{3abc} = 1 = R.H.S$$

## উৎপাদকে বিশ্লেষণ

→ কোন রাশি দুই বা ততোধিক রাশির গুণফলের সমান হলে, শেষোক্ত রাশিগুলোর প্রত্যেকটি প্রথমোক্ত রাশির উৎপাদক বা গুণনীয়ক বলা হয়।

$$\begin{aligned} (x+5)(x+6) &= x^2 + 6x + 5x + 30 \\ &= \underline{\underline{x^2 + 11x + 30}} \end{aligned}$$

$$a = b \cdot c$$

RR

$$\underline{\underline{x^2 + 11x + 30}} = \underline{(x+5)} \underline{(x+6)} \quad \left. \right\} \text{উৎপাদকে বিশ্লেষণ}$$

## উদাহরণ ২১:

$$\begin{aligned}
 & \rightarrow 9x^2 - \underline{\underline{30xy}} + 25y^2 \\
 & = (\underline{3x})^2 - 2 \cdot 3x \cdot 5y + (\underline{5y})^2 \\
 & = (\underline{3x} - \underline{5y})^2
 \end{aligned}$$

$$\left. \begin{aligned}
 & x^2 + 11xy + 25 = (\underline{x+5})(\underline{x+5}) \\
 & x^2 + 2ab + b^2 = (\underline{a+b})^2 = (\underline{a+b})(\underline{a+b}) \\
 & a^2 - \underline{2ab} + b^2 = (\underline{a-b})^2 \\
 & 2ab \Rightarrow 2 \cdot 3x \cdot 5y = \underline{\underline{30xy}}
 \end{aligned} \right\}$$

$$\begin{aligned}
 & a^2 + 2ab + b^2 = (a+b)^2 \\
 & a^2 - 2ab + b^2 = (a-b)^2
 \end{aligned}$$

# Poll Question: 01

→  $4x^2 + 12x + 9$

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

$$\begin{aligned} & \frac{4x^2 + 12x + 9}{\text{---}} \\ &= (\underline{2x})^2 + 2 \cdot 2x \cdot 3 + (\underline{3})^2 \\ &= (\underline{2x+3})^2 \end{aligned}$$

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

$$2 \cdot 2x \cdot 3$$

$$= (12x)$$

$$4x^2 + 12x + 9$$

## দুইটি পদের বর্গের অন্তর:

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

$$\begin{aligned} &= \underline{x^2 - 81} \\ &= \underline{x^2} - \underline{9^2} \\ &= \cancel{(x+9)(x-9)} \end{aligned}$$

$$\left| \begin{aligned} &\underline{a^2 + 2ab + b^2} = \underline{(a+b)^2} \\ &\underline{a^2 - 2ab + b^2} = \underline{(a-b)^2} \end{aligned} \right.$$

## কাজ: (পৃষ্ঠা:৫৬)

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

$$\begin{aligned} & -1 + 2b - b^2 \\ & - (b^2 - 2b + 1) \end{aligned}$$

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

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

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

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

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

$$(a-b)^2$$

## সরল মধ্যপদ বিভক্তিরণ :

$$\rightarrow \underline{x^2 + (a+b)x + ab} = (x+a)(x+b)$$

$$x^2 + mx + n$$

$\left. \begin{array}{l} a+b=m \\ a \cdot b=n \end{array} \right\}$

$$\left. \begin{array}{l} x^2 + mx + n \\ = x^2 + (a+b)x + ab \\ = x^2 + ax + bx + ab \end{array} \right\}$$

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

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

$$x^2 + 11(x+30)$$

$\left. \begin{array}{l} 5+6=11 \\ 5 \cdot 6=30 \end{array} \right\}$

8	3
-	-

## যৌগিক মধ্যপদ বিভক্তিরণ:

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

$x$

$m \quad n$

$$\frac{m+n=b}{m \cdot n = a \cdot c}$$

$\left. \begin{array}{l} 1. x^2 + bx + c \\ m \quad n \end{array} \right\} \begin{array}{l} m+n=b \\ mn=c \end{array}$

$\left. \begin{array}{l} ax^2 + bx + c \\ m \quad n \end{array} \right\} \begin{array}{l} m+n=b \\ m \cdot n = c \cdot a \end{array}$

## কাজ: (পৃষ্ঠা: ৫৯)

$$1) x^2 + x - 56$$

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

# দুইটি ঘন এর যোগফল বা বিয়োগফলের সূত্রঃ

$$\begin{aligned} a^3 - b^3 &= (a - b)(a^2 + ab + b^2) \\ a^3 + b^3 &= (a + b)(a^2 - ab + b^2) \end{aligned}$$

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

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

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

$$a^2 + b^2 + c \quad \left\{ \begin{array}{l} m+n=b \\ m \cdot n=c \end{array} \right.$$

$$ax^2 + bxy + cy^2 \quad \left\{ \begin{array}{l} m+n=b \\ m \cdot n=c \cdot a \end{array} \right.$$

## Poll Question: 03

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

$\rightarrow \cancel{x^3 + 6x^2y + 11xy^2 + 6y^3} - 11xy^2$

1.  $(x+y)(x-y)(x-3y)$

2.  $(x+y)(x-2y)(x+2y)$

3.  $(x-y)(x+y)(x+2y)$

4.  $(x+y)(x+2y)(x+3y)$

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

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

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

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

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

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

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

## Exercise -3.3

$$\begin{aligned}
 &\rightarrow 2.9x^2 + \cancel{24x} + 16 \\
 &= (\underline{3x})^2 + 2 \cdot \underline{3x} \cdot \underline{4} + \underline{4^2} \\
 &= (3x+4)^2 \\
 &= \cancel{(3x+4)(3x+4)} \quad (\text{Ans.})
 \end{aligned}$$

$$\left| \begin{array}{ccc}
 (bx)^2 & & 4^2 \\
 a^2 + \cancel{2ab} & + b^2 & \\
 2 \cdot 3x \cdot 4 = \cancel{24x} & &
 \end{array} \right.$$

## Exercise -3.3

→ 7.  $a^2 + 6a + 8 - y^2 + 2y$

$$= \underline{a^2 + 6a + 9} - \underline{1 - y^2 + 2y}$$

$$= \underline{(a+3)^2} - \underline{(1+y^2 - 2y)}$$

$$= \underline{(a+3)^2} - \underline{(y^2 - 2 \cdot y \cdot 1 + 1^2)}$$

$$= \underline{(a+3)^2} - \underline{(y-1)^2}$$

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

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

$$\begin{aligned} & 9-1=8 \\ & (a^2 + 6a + \boxed{9}) \\ & = a^2 + 2 \cdot a \cdot 3 + 3^2 \\ & = (a+3)^2 \end{aligned}$$

$$\boxed{a^2 - b^2}$$

(Ans.)

## Exercise -3.3

→ 14.  ~~$9x^2y^2 - 5xy^2 - 14y^2$~~

$$\begin{aligned}
 &= 9xy^2 + 9xy^2 - 14xy^2 - 14y^2 \\
 &= 9xy^2(x+1) - 14y^2(x+1) \\
 &= (x+1)(9xy^2 - 14y^2) \\
 &= y^2(x+1)(9x - 14)
 \end{aligned}$$

~~(Ans.)~~

$$\left. \begin{array}{l} ax^m + bx^n + c \\ m+n = 6 \\ m \cdot n = e \cdot a \end{array} \right\}$$

$$\begin{array}{ll}
 -5 & 9 + (-14) = -5 \\
 (+9) & (+9)(-14) = 9 \cdot (-14) \\
 (-14) & \hline
 \end{array}$$

$$\frac{9xy^2 - 14xy^2 + 9xy^2 - 14y^2}{ay^2(9x - 14)} + y^2(9x - 14)$$

## Exercise -3.3

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

$$= \frac{4a^2 + 4a - 1 - 1 + \frac{1}{4a^2} - \frac{1}{a}}{\cancel{4a^2} \cancel{-1} \cancel{-1} \cancel{+1} \cancel{\frac{1}{4a^2}} \cancel{-\frac{1}{a}}}$$



$$= 2a \left( 2a + 2 - \frac{1}{2a} \right) \ominus \frac{1}{2a} \quad (2a + 2 \ominus \frac{1}{2a})$$

$$= \left( 2a - \frac{1}{2a} \right) \left( 2a - \frac{1}{2a} + 2 \right) \quad (\text{Am.})$$

$$\frac{1}{2a} \cdot \frac{1}{2a}$$

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

## Exercise -3.3

**Prove:**

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

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

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

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

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

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

$\boxed{\cancel{x^2+bx+c}}$

$m = 2$

$m+n = 6$

$m.n = c.a$

$3-1=2$

$6-4=2$

**Proved**

ଲେଗେ ଥାକୋ ସନ୍ତାବେ,  
ସ୍ଵପ୍ନ ଜୟ ତୋମାରି ହବେ

ଡକ୍ଟର-ଡିଲ୍ଯୁସ ଶିକ୍ଷା ପରିବାର