

5.3

উৎপাদকে বিশ্লেষণ

উৎপাদকে বিশ্লেষণ কর:

১. $x^2+xy+zx+yz$

সমাধান:

$$\begin{aligned} & x^2+xy+zx+yz \\ &= x(x+y)+z(x+y) \\ &= (x+y)(x+z) \end{aligned}$$

২. $a^2+bc+ca+ab$

সমাধান:

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

৩. $ab(px+qy)+a^2qx+b^2py$

সমাধান:

$$\begin{aligned} & ab(px+qy)+a^2qx+b^2py \\ &= abpx+abqy+a^2qx+b^2py \\ &= a^2qx+ abpx+ abqy+ b^2py \\ &= ax(aq+bp)+by(aq+bp) \\ &= (aq+bp)(ax+by) \end{aligned}$$

৪. $4x^2-y^2$

সমাধান:

$$\begin{aligned} & 4x^2-y^2 \\ &= (2x)^2-y^2 \end{aligned}$$

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

৫. $9a^2-4b^2$

সমাধানঃ

$$9a^2-4b^2$$

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

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

৬. $a^2b^2-49y^2$

সমাধানঃ

$$a^2b^2-49y^2$$

$$=(ab)^2-(7y)^2$$

$$=(ab-7y)(ab+7y)$$

৭. $16x^4-81y^4$

সমাধানঃ

$$16x^4-81y^4$$

$$=(4x^2)^2-(9y^2)^2$$

$$=(4x^2-9y^2)(4x^2+9y^2)$$

$$=\{(2x)^2-(3y)^2\}(4x^2+9y^2)$$

$$=(2x-3y)(2x+3y)(4x^2+9y^2)$$

৮. $a^2-(x+y)^2$

সমাধানঃ

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

$$=\{a-(x+y)\}\{a+(x+y)\}$$

$$=(a-x-y)(a+x+y)$$

৯. $(2x-3y+5z)^2-(x-2y+3z)^2$

সমাধানঃ

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

$$=\{2x-3y+5z-(x-2y+3z)\}\{2x-3y+5z+(x-2y+3z)\}$$

$$=(2x-3y+5z-x+2y-3z)(2x-3y+5z+x-2y+3z)$$

$$=(x-y+2z)(3x-5y+8z)$$

১০. $4+8a^2+9a^4$

সমাধানঃ

$$4+8a^2+9a^4$$

$$=(2)^2+2*2*3a^2+(3a^2)^2-4a^2$$

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

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

১১. $2a^2+6a-80$

সমাধানঃ

$$\begin{aligned}
&2a^2+6a-80 \\
&=2(a^2+3a-40) \\
&=2(a^2+8a-5a-40) \\
&=2\{a(a+8)-5(a+8)\} \\
&=2(a+8)(a-55)
\end{aligned}$$

১২. $y^2-6y-91$

সমাধানঃ

$$\begin{aligned}
&y^2-6y-91 \\
&= y^2-13y+7y-91 \\
&= y(y-13)+7(y-13) \\
&=(y+7)(y-13)
\end{aligned}$$

১৩. $p^2-15p+56$

সমাধানঃ

$$\begin{aligned}
&p^2-15p+56 \\
&= p^2-7p-8p+56 \\
&=p(p-7)-8(p-7) \\
&=(p-7)(p-8)
\end{aligned}$$

১৪. $45a^8-5a^4x^4$

সমাধানঃ

$$\begin{aligned}
&45a^8-5a^4x^4 \\
&=5a^4(9a^4-x^4) \\
&=5a^4\{(3a^2)^2-(x^2)^2\} \\
&=5a^4(3a^2+x^2)(3a^2-x^2)
\end{aligned}$$

১৫. $a^2+3a-40$

সমাধানঃ

$$\begin{aligned}
&a^2+3a-40 \\
&= a^2+8a-5a-40 \\
&=a(a+8)-5(a+8) \\
&=(a-5)(a+8)
\end{aligned}$$

১৬. $(x^2+1)^2-(y^2+1)^2$

সমাধানঃ

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

১৭. $x^2+11x+30$

সমাধানঃ

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

১৮. $a^2-b^2+2bc-c^2$

সমাধানঃ

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

১৯. $144x^7-25x^3a^4$

সমাধানঃ

$$\begin{aligned}
 & 144x^7-25x^3a^4 \\
 &=x^3(144x^4-25a^4) \\
 &= x^3\{(12x^2)^2-(5a^2)^2\} \\
 &=x^3(12x^2+5a^2)(12x^2-5a^2)
 \end{aligned}$$

২০. $4x^2+12xy+9y^2-16a^2$

সমাধানঃ

$$\begin{aligned}
 & 4x^2+12xy+9y^2-16a^2 \\
 &=(2x)^2+2*2x*3y+(3y)^2-(4a)^2 \\
 &=(2x+3y)^2-(4a)^2 \\
 &=(2x+3y-4a)(2x+3y+4a)
 \end{aligned}$$