Exercise 5.1

Q.1 **Factorize**

(i) $2abc-4abx+2abd$

$=2ab(c-2x+d)$

(ii) $9xy-12x^2y+18y^2$

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

(iii) $-3x^2y-3x+9xy^2$

$=-3x(xy+1-3y^2)$

(iv) $5ab^2c^3-10a^2b^3c+20a^3bc^2$

$=5abc(bc^2-2ab^2+4a^2c)$

(v) $3x^3y(x-3y)-7x^2y^2(x-3y)$

$(x-3y)(3x^3y-7x^2y^2)$

$(x-3y).x^2y(3x-7y)$

$\Rightarrow$ $x^2y(x-3y)(3x-7y)$

(vi) $2xy^3(x^2+5)+8xy^2(x^2+5)$

$(x^2+5)(2xy^3+8xy^2)$

$(x^2+5)\ 2xy^2(y+4)$

$=2xy^2(x^2+5)(y+4)$

Q.2 (i) $5ax-3ay-5bx+3by$

$=5ax-5bx-3ay+3by$

$=5x(a-b)-3y(a-b)$

$=(a-b)(5x-3y)$

(ii) $3xy+2y-12x-8$

$=3xy-12x+2y-8$

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

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

(iii) $x^3+3xy^2-2x^2y-6y^3$

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

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

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

(iv) $(x^2-y^2)z+(y^2-z^2)x$

$=x^2z-y^2z+y^2x-z^2x$

$=x^2z-z^2x+y^2x-y^2z$

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

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

Q.3 (i) $144a^2+24a+1$

$=(12a)^2+2(12a)(1)+(1)^2$

$=(12a+1)^2$

$=(12a+1)(12a+1)$

(ii) $\frac{a^2}{b^2}-2+\frac{b^2}{a^2}$

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

$=\left(\frac{a}{b}-\frac{b}{a}\right)^2$

$=\left(\frac{a}{b}-\frac{b}{a}\right)\left(\frac{a}{b}-\frac{b}{a}\right)$

(iii) $(x+y)^2-14z(x+y)+49z^2$

$=(x+y)^2-2(x+y)(7z)+(7z)^2$

$=(x+y-7z)^2$

$=(x+y-7z)(x+y-7z)$

(iv) $12x^2-36x+27$

$=3(4x^2-12x+9)$

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

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

$=3(2x-3)(2x-3)$

Q.4 (i) $3x^2-75y^2$

$=3(x^2-25y^2)$

$=3\left[(x)^2-(5y)^2\right]$

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

(ii) $x(x-1)-y(y-1)$

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

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

$=(x+y)(x-y)-1(x-y)$

$=(x-y)(x+y-1)$

(iii) $128am^2 - 242an^2$

$= 2a(64m^2 - 121n^2)$

$= 2a\left[(8m)^2 - (11n)^2\right]$

$= 2a(8m+11n)(8m-11n)$

(iv) $3x - 243x^3$

$= 3x(1-81x^2)$

$= 3x\left[(1)^2 - (9x)^2\right]$

$= 3x(1+9x)(1-9x)$

Q.5 (i) $x^2 - y^2 - 6y - 9$

$= x^2 - (y^2 + 6y + 9)$

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

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

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

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

(ii) $x^2 - a^2 + 2a - 1$

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

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

$= [(x) + (a-1)][(x) - (a-1)]$

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

(iii) $4x^2 - y^2 - 2y - 1$

$= 4x^2 - (y^2 + 2y + 1)$

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

$= [(2x) + (y+1)][(2x - (y+1)]$

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

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

$= x^2 - y^2 - 4x - 2y + 4 - 1$

$= x^2 - 4x + 4 - y^2 - 2y - 1$

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

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

$= [(x-2) + (y+1)][(x-2) - (y+1)]$

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

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

(v) $25x^2 - 10x + 1 - 36z^2$

$= (5x)^2 - 2(5x)(1) + (1)^2 - (6z)^2$

$= (5x-1)^2 - (6z)^2$

$= [(5x-1) + (6z)][(5x-1) - (6z)]$

$= (5x-1+6z)(5x-1-6z)$

$= (5x+6z-1)(5x-6z-1)$

(vi) $x^2 - y^2 - 4xz + 4z^2$

$= x^2 - 4xz + 4z^2 - y^2$

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

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

$= [(x-2z) + (y)][(x-2z) - (y)]$

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