Ex 5.1

Answer 1A.

$$4x^{2}y^{3} - 6x^{3}y^{2} - 12xy^{2}$$

Here, the common factor is $2xy^{2}$.
Dividing throughout by $2xy^{2}$, we get
$$\frac{4x^{2}y^{3}}{2xy^{2}} - \frac{6x^{3}y^{2}}{2xy^{2}} - \frac{12xy^{2}}{2xy^{2}}$$
$$= 2xy - 3x^{2} - 6$$
$$\therefore 4x^{2}y^{3} - 6x^{3}y^{2} - 12xy^{2} = 2xy^{2}(2xy - 3x^{2} - 6)$$

Answer 1B.

$$5a(x^{2} - y^{2}) + 35b(x^{2} - y^{2})$$

Here, the common factor is $5(x^{2} - y^{2})$.
Dividing throughout by $5(x^{2} - y^{2})$, we get
$$\frac{5a(x^{2} - y^{2})}{5(x^{2} - y^{2})} + \frac{35b(x^{2} - y^{2})}{5(x^{2} - y^{2})}$$
$$= a + 7b$$
$$\therefore 5a(x^{2} - y^{2}) + 35b(x^{2} - y^{2}) = 5(x^{2} - y^{2})(a + 7b)$$

Answer 1C.

$$\begin{array}{l} 2x^{5}y + 8x^{3}y^{2} - 12x^{2}y^{3} \\ \text{Here, the common factor is } 2x^{2}y. \\ \text{Dividing throughout by } 2x^{2}y, \text{ we get} \\ \frac{2x^{5}y}{2x^{2}y} + \frac{8x^{3}y^{2}}{2x^{2}y} - \frac{12x^{2}y^{3}}{2x^{2}y} \\ = x^{3} + 4xy - 6y^{2} \\ \therefore 2x^{5}y + 8x^{3}y^{2} - 12x^{2}y^{3} = 2x^{2}y(x^{3} + 4xy - 6y^{2}) \end{array}$$



Answer 1D.

 $12a^{3} + 15a^{2}b - 21ab^{2}$ Here, the common factor is 3a. Dividing throughout by 3a, we get $\frac{12a^{3}}{3a} + \frac{15a^{2}b}{3a} - \frac{21ab^{2}}{3a}$ $= 4a^{2} + 5ab - 7b^{2}$ $\therefore 12a^{3} + 15a^{2}b - 21ab^{2} = 3a(4a^{2} + 5ab - 7b^{2})$

Answer 1E.

 $\begin{array}{l} 24m^4n^6 + 56m^6n^4 - 72m^2n^2 \\ \mbox{Here, the common factor is $8m^2n^2$.} \\ \mbox{Dividing throughout by 3a, we get} \\ \frac{24m^4n^6}{8m^2n^2} + \frac{56m^6n^4}{8m^2n^2} - \frac{72m^2n^2}{8m^2n^2} \\ = 3m^2n^4 + 7m^4n^2 - 9 \\ \therefore $24m^4n^6 + 56m^6n^4 - 72m^2n^2 = 8m^2n^2(3m^2n^4 + 7m^4n^2 - 9) \end{array}$

Answer 1F.

 $(a-b)^2 - 2(a-b)$ Here, the common factor is (a-b). Dividing throughout by (a-b), we get $\frac{(a-b)^2}{(a-b)} - \frac{2(a-b)}{(a-b)}$ = a-b-2 $\therefore (a-b)^2 - 2(a-b) = (a-b)(a-b-2)$

Answer 1G.

$$2a(p^{2} + q^{2}) + 4b(p^{2} + q^{2})$$

Here, the common factor is $2(p^{2} + q^{2})$.
Dividing throughout by $2(p^{2} + q^{2})$, we get
$$\frac{2a(p^{2} + q^{2})}{2(p^{2} + q^{2})} + \frac{4b(p^{2} + q^{2})}{2(p^{2} + q^{2})}$$
$$= a + 2b$$
$$\therefore 2a(p^{2} + q^{2}) + 4b(p^{2} + q^{2}) = 2(p^{2} + q^{2})(a + 2b)$$

Answer 1H.

81(p + q)² - 9p - 9q = 81(p + q)² - 9(p + q) Here, the common factor is 9(p + q). Dividing throughout by 9(p + q), we get $\frac{81(p + q)^{2}}{9(p + q)} - \frac{9(p + q)}{9(p + q)}$ = 9(p + q) - 1 : 81(p + q)² - 9p - 9q = 9(p + q)[9(p + q) - 1]

Answer 1I.

$$(mx + ny)^{2} + (nx - my)^{2}$$

$$= m^{2}x^{2} + n^{2}y^{2} + 2mnxy + n^{2}x^{2} + m^{2}y^{2} - 2mnxy$$

$$= m^{2}x^{2} + n^{2}y^{2} + n^{2}x^{2} + m^{2}y^{2}$$

$$= m^{2}x^{2} + n^{2}x^{2} + m^{2}y^{2} + n^{2}y^{2}$$

$$= x^{2}(m^{2} + n^{2}) + y^{2}(m^{2} + n^{2})$$
Here, the common factor is $(m^{2} + n^{2})$.
Dividing throughout by $(m^{2} + n^{2})$, we get

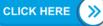
$$\frac{x^{2}(m^{2} + n^{2})}{(m^{2} + n^{2})} + \frac{y^{2}(m^{2} + n^{2})}{(m^{2} + n^{2})}$$

$$= x^{2} + y^{2}$$

$$\therefore (mx + ny)^{2} + (nx - my)^{2} = (m^{2} + n^{2})(x^{2} + y^{2})$$

Answer 1J.

 $\begin{array}{l} 36(x+y)^3 - 54(x+y)^2 \\ \text{Here, the common factor is } 18(x+y)^2. \\ \text{Dividing throughout by } 18(x+y)^2, \text{ we get} \\ \frac{36(x+y)^3}{18(x+y)^2} - \frac{54(x+y)^2}{18(x+y)^2} \\ = 2(x+y) - 3 \\ \therefore 36(x+y)^3 - 54(x+y)^2 = 18(x+y)^2[2(x+y) - 3] \end{array}$



Answer 1K.

$$\begin{split} p(p^2 + q^2 - r^2) + q(r^2 - q^2 - p^2) - r(p^2 + q^2 - r^2) \\ &= p(p^2 + q^2 - r^2) - q(-r^2 + q^2 + p^2) - r(p^2 + q^2 - r^2) \\ &= p(p^2 + q^2 - r^2) - q(p^2 + q^2 - r^2) - r(p^2 + q^2 - r^2) \\ &\text{Here, the common factor is } (p^2 + q^2 - r^2) \\ &\text{Dividing throughout by } (p^2 + q^2 - r^2), \text{ we get} \\ &\frac{p(p^2 + q^2 - r^2)}{(p^2 + q^2 - r^2)} - \frac{q(p^2 + q^2 - r^2)}{(p^2 + q^2 - r^2)} - \frac{r(p^2 + q^2 - r^2)}{(p^2 + q^2 - r^2)} \\ &= p - q - r \\ &\therefore p(p^2 + q^2 - r^2) + q(r^2 - q^2 - p^2) - r(p^2 + q^2 - r^2) = (p^2 + q^2 - r^2)(p - q - r) \end{split}$$

Answer 2A.

15xy - 9x - 25y + 15= (15xy - 9x) - (25y + 15) = 3x(5y - 3) - 5(5y - 3) = (5y - 3)(3x - 5)

Answer 2B.

 $15x^{2} + 7y - 3x - 35xy$ = $15x^{2} - 3x - 35xy + 7y$ = $(15x^{2} - 3x) - (35xy - 7y)$ = 3x(5x - 1) - 7y(5x - 1)= (5x - 1)(3x - 7y)

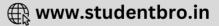
Answer 2C.

 $9 + 3xy + x^{2}y + 3x$ = 9 + 3xy + 3x + x²y = (9 + 3xy) + (3x + x²y) = 3(3 + xy) + y(3 + xy) = (3 + xy)(3 + x)

Answer 2D.

 $8(2a + b)^{2} - 8a - 4b$ = 8(2a + b)² - (8a + 4b) = 8(2a + b)² - 4(2a + b) = 4(2a + b)[2(2a + b) - 1] = 4(2a + b)[4a + 2b - 1]





Answer 2E.

 $\begin{array}{l} x(x-4) - x + 4 \\ = x(x-4) - 1(x-4) \\ = (x-4)(x-1) \end{array}$

Answer 2F.

 $2m^{3} - 5n^{2} - 5m^{2}n + 2mn$ = $2m^{3} + 2mn - 5m^{2}n - 5n^{2}$ = $(2m^{3} + 2mn) - (5m^{2}n + 5n^{2})$ = $2m(m^{2} + n) - 5n(m^{2} + n)$ = $(m^{2} + n)(2m - 5n)$

Answer 2H.

$$9x^{3} + 6x^{2}y^{2} - 4y^{3} - 6xy$$

= $9x^{3} + 6x^{2}y^{2} - 6xy - 4y^{3}$
= $(9x^{3} + 6x^{2}y^{2}) - (6xy + 4y^{3})$
= $3x^{2}(3x + 2y^{2}) - 2y(3x + 2y^{2})$
= $(3x + 2y^{2})(3x^{2} - 2y)$

Answer 2I.

 $3ax^{2} - 5bx^{2} + 9az^{2} + 6ay^{2} - 10by^{2} - 15bz^{2}$ = $3ax^{2} + 6ay^{2} + 9az^{2} - 5bx^{2} - 10by^{2} - 15bz^{2}$ = $(3ax^{2} + 6ay^{2} + 9az^{2}) - (5bx^{2} + 10by^{2} + 15bz^{2})$ = $3a(x^{2} + 2y^{2} + 3z^{2}) - 5b(x^{2} + 2y^{2} + 3z^{2})$ = $(x^{2} + 2y^{2} + 3z^{2})(3a - 5b)$

Answer 2J.

$$8x^{3} - 24x^{2}y + 54xy^{2} - 162y^{3}$$

= $(8x^{3} - 24x^{2}y) + (54xy^{2} - 162y^{3})$
= $8x^{2}(x - 3y) + 54y^{2}(x - 3y)$
= $(x - 3y)(8x^{2} + 54y^{2})$



Answer 2K.

$$2a + b + 3c - d + (2a + b)^{3} + (2a + b)^{2}(3c - d)$$

= (2a + b + 3c - d) + [(2a + b)^{3} + (2a + b)^{2}(3c - d)]
= 1(2a + b + 3c - d) + (2a + b)^{2}(2a + b + 3c - d)
= (2a + b + 3c - d)[1 + (2a + b)^{2}]

Answer 2L.

 $xy(a^{2} + 1) + a(x^{2} + y^{2})$ = $a^{2}xy + xy + ax^{2} + ay^{2}$ = $(a^{2}xy + ax^{2}) + (ay^{2} + xy)$ = ax(ay + x) + y(ay + x)= (ay + x)(ax + y)

Answer 2M.

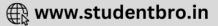
 $p^{2}x^{2} + (px^{2} + 1)x + p$ = $p^{2}x^{2} + px^{3} + x + p$ = $(p^{2}x^{2} + px^{3}) + (p + x)$ = $px^{2}(p + x) + 1(p + x)$ = $(p + x)(px^{2} + 1)$

Answer 2N.

 $x^{2} - (p + q)x + pq$ = $x^{2} - px - qx + pq$ = $(x^{2} - px) - (qx + pq)$ = x(x - p) - q(x - p)= (x - p)(x - q)







Answer 20.

$$p^{2} + \frac{1}{p^{2}} - 2 - 5p + \frac{5}{p}$$

$$= \left(p^{2} + \frac{1}{p^{2}} - 2\right) - \left(5p - \frac{5}{p}\right)$$

$$= \left((p)^{2} + \left(\frac{1}{p}\right)^{2} - 2 \times p \times \frac{1}{p}\right) - \left(5p - \frac{5}{p}\right)$$

$$= \left(p - \frac{1}{p}\right)^{2} - 5\left(p - \frac{1}{p}\right)$$

$$= \left(p - \frac{1}{p}\right)\left(p - \frac{1}{p} - 5\right)$$

Answer 2P.

x + y + m(x + y)= (x + y) + m(x + y)= (x + y)(1 + m)

Answer 2Q.

$$\frac{1}{25x^{2}} + 16x^{2} + \frac{8}{5} - 12x - \frac{3}{5x}$$

$$= \left(\frac{1}{25x^{2}} + 16x^{2} + \frac{8}{5}\right) - \left(12x + \frac{3}{5x}\right)$$

$$= \left(\left(\frac{1}{5x}\right)^{2} + \left(4x\right)^{2} + 2x\frac{1}{5x} \times 4x\right) - \left(12x + \frac{3}{5x}\right)$$

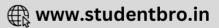
$$= \left(\frac{1}{5x} + 4x\right)^{2} - 3\left(4x + \frac{1}{5x}\right)$$

$$= \left(\frac{1}{5x} + 4x\right)^{2} - 3\left(\frac{1}{5x} + 4x\right)$$

$$= \left(\frac{1}{5x} + 4x\right)\left(\frac{1}{5x} + 4x - 3\right)$$

Answer 2R.

$$\begin{aligned} &2p(a^2 - 2b^2) - 14p + (a^2 - 2b^2)^2 - 7(a^2 - 2b^2) \\ &= 2p(a^2 - 2b^2) + (a^2 - 2b^2)^2 - 14p - 7(a^2 - 2b^2) \\ &= [2p(a^2 - 2b^2) + (a^2 - 2b^2)^2] - [14p + 7(a^2 - 2b^2)] \\ &= (a^2 - 2b^2)(2p + a^2 - 2b^2) - 7(2p + a^2 - 2b^2) \\ &= (2p + a^2 - 2b^2)(a^2 - 2b^2 - 7) \end{aligned}$$



Ex 5.2

Answer 1Q.

 $x^{2} + 6x + 8$ = $x^{2} + 4x + 2x + 8$ = x(x + 4) + 2(x + 4)= (x + 4)(x + 2)

Answer 1B.

 $x^{2} - 11x + 24$ = x² - 8x - 3x + 24 = x(x - 8) - 3(x - 8) = (x - 8)(x - 3)

Answer 1C.

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

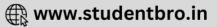
Answer 1D.

 $p^{2} - 12p - 64$ = p^{2} - 16p + 4p - 64 = p(p - 16) + 4(p - 16) = (p - 16)(p + 4)

Answer 1E.

 $y^2 - 2y - 24$ = $y^2 - 6y + 4y - 24$ = y(y - 6) + 4(y - 6)=(y - 6)(y + 4)





Answer 1F.

 $3x^{2} + 19x - 14$ = 3x² + 21x - 2x - 14 = 3x(x + 7) - 2(x + 7) = (x + 7)(3x - 2)

Answer 1G.

 $15a^2 - 14a - 16$ = $15a^2 - 24a + 10a - 16$ = 3a(5a - 8) + 2(5a - 8)= (5a - 8)(3a + 2)

Answer 1H.

 $12 + x - 6x^{2}$ = 12 + 9x - 8x - 6x² = 3(4 + 3x) - 2x(4 + 3x) = (4 + 3x)(3 - 2x)

Answer 1I.

 $7x^{2} + 40x - 12$ = 7x² + 42x - 2x - 12 = 7x(x + 6) - 2(x + 6) = (x + 6)(7x - 2)

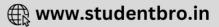
Answer 2A.

 $5x^{2} - 17xy + 6y^{2}$ = 5x² - 15xy - 2xy + 6y² = 5x(x - 3y) - 2y(x - 3y) = (x - 3y)(5x - 2y)

Answer 2B.

 $9x^{2} - 22xy + 8y^{2}$ = 9x² - 18xy - 4xy + 8y² = 9x(x - 2y) - 4y(x - 2y) = (x - 2y)(9x - 4y)





Answer 2C.

 $2x^{3} + 5x^{2}y - 12xy^{2}$ = $2x^{3} + 8x^{2}y - 3x^{2}y - 12xy^{2}$ = $2x^{2}(x + 4y) - 3xy(x + 4y)$ = $(x + 4y)(2x^{2} - 3xy)$ = (x + 4y)x(2x - 3y)= x(x + 4y)(2x - 3y)

Answer 2D.

 $x^{2}y^{2} + 15xy - 16$ = $x^{2}y^{2} + 16xy - xy - 16$ = xy(xy + 16) - 1(xy + 16)= (xy + 16)(xy - 1)

Answer 2E.

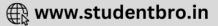
 $\begin{aligned} (2p+q)^2 - 10p - 5q - 6 \\ &= (2p+q)^2 - (10p - 5q) - 6 \\ &= (2p+q)^2 - 5(2p+q) - 6 \\ &= (2p+q)^2 - 6(2p+q) + (2p+q) - 6 \\ &= (2p+q)(2p+q - 6) + 1(2p+q - 6) \\ &= (2p+q - 6)(2p+q + 1) \end{aligned}$

Answer 2F.

 $y^{2} + 3y + 2 + by + 2b$ = $y^{2} + y + 2y + 2 + by + 2b$ = $y^{2} + y + by + 2y + 2 + 2b$ = y(y + 1 + b) + 2(y + 1 + b)= (y + 1 + b)(y + 2)







Answer 2G.

 $\begin{aligned} x^{3}y^{3} - 8x^{2}y^{2} + 15xy \\ &= x^{3}y^{3} - 3x^{2}y^{2} - 5x^{2}y^{2} + 15xy \\ &= x^{2}y^{2}(xy - 3) - 5xy(xy - 3) \\ &= (xy - 3)(x^{2}y^{2} - 5xy) \\ &= (xy - 3)xy(xy - 5) \\ &= xy(xy - 3)(xy - 5) \end{aligned}$

Answer 2H.

$$6\sqrt{3}x^{2} - 19x + 5\sqrt{3}$$

= $6\sqrt{3}x^{2} - 10x - 9x + 5\sqrt{3}$
= $2x(3\sqrt{3}x - 5) - \sqrt{3}(3\sqrt{3}x - 5)$
= $(3\sqrt{3}x - 5)(2x - \sqrt{3})$

Answer 2I.

$$2\sqrt{5}x^{2} - 7x - 3\sqrt{5}$$

= $2\sqrt{5}x^{2} - 10x + 3x - 3\sqrt{5}$
= $2\sqrt{5}x(x - \sqrt{5}) + 3(x - \sqrt{5})$
= $(x - \sqrt{5})(2\sqrt{5}x + 3)$

Answer 3A.

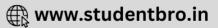
$$\begin{array}{l} 5(3x+y)^2+6(3x+y)-8\\ =5(3x+y)^2+10(3x+y)-4(3x+y)-8\\ =5(3x+y)(3x+y+2)-4(3x+y+2)\\ =(3x+y+2)[5(3x+y)-4]\end{array}$$

Answer 3B.

$$5 - 4(a - b) - 12(a - b)^{2}$$

= 5 - 10(a - b) + 6(a - b) - 12(a - b)^{2}
= 5[1 - 2(a - b)] + 6(a - b)[1 - 2(a - b)]
= [5 + 6(a - b)][1 - 2(a - b)]
= (5 + 6a - 6b)(1 - 2a + 2b)





Answer 3C.

 $\begin{array}{l} (3a-2b)^2+3(3a-2b)-10\\ =(3a-2b)^2+5(3a-2b)-2(3a-2b)-10\\ =(3a-2b)(3a-2b+5)-2(3a-2b+5)\\ =(3a-2b+5)((3a-2b+2)-2)\end{array}$

Answer 3D.

 $\begin{aligned} (a^2 - 2a)^2 - 23(a^2 - 2a) + 120 \\ &= (a^2 - 2a)^2 - 15(a^2 - 2a) - 8(a^2 - 2a) + 120 \\ &= (a^2 - 2a)(a^2 - 2a - 15) - 8(a^2 - 2a - 15) \\ &= (a^2 - 2a - 15)(a^2 - 2a - 8) \\ &= (a^2 - 5a + 3a - 15)(a^2 - 4a + 2a - 8) \\ &= [a(a - 5) + 3(a - 5)][a(a - 4) + 2(a - 4)] \\ &= [(a - 5)(a + 3)][(a - 4)(a + 2)] \\ &= (a - 5)(a + 3)(a - 4)(a + 2) \\ &= (a + 2)(a + 3)(a - 4)(a - 5) \end{aligned}$

Answer 3E.

$$(x + 4)^{2} - 5xy - 20y - 6y^{2}$$

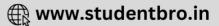
= (x + 4)² - 5y(x + 4) - 6y²
= (x + 4)² - 6y(x + 4) + y(x + 4) - 6y²
= (x + 4)(x + 4 - 6y) + y(x + 4 - 6y)
= (x + 4 - 6y)(x + 4 + y)
= (x - 6y + 4)(x + y + 4)

Answer 3F.

 $\begin{array}{l} 7(x-2)^2 - 13(x-2) - 2 \\ = 7(x-2)^2 - 14(x-2) + (x-2) - 2 \\ = 7(x-2)(x-2-2) + 1(x-2-2) \\ = 7(x-2)(x-4) + 1(x-4) \\ = (x-4)[7(x-2) + 1] \\ = (x-4)(7x-14+1) \\ = (x-4)(7x-13) \end{array}$







Answer 3G.

 $\begin{aligned} &12 - (y + y^2)(8 - y - y^2) \\ &= 12 - a(8 - a) [Taking y + y^2 = a] \\ &= 12 - 8a + a^2 \\ &= 12 - 6a - 2a + a^2 \\ &= 6(2 - a) - a(2 - a) \\ &= (2 - a)(6 - a) \\ &= [2 - (y + y^2)][6 - (y + y^2)] \\ &= (2 - y - y^2)(6 - y - y^2) \\ &= (2 - 2y + y - y^2)(6 - 3y + 2y - y^2) \\ &= [2(1 - y) + y(1 - y)][3(2 - y) + y(2 - y)] \\ &= [(1 - y)(2 + y)][(2 - y)(3 + y)] \\ &= (y - 1)(y + 2)(y - 2)(y + 3) \end{aligned}$

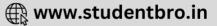
Answer 3H.

$$\begin{array}{l} (p^2 + p)^2 - 8(p^2 + p) + 12 \\ = (p^2 + p)^2 - 6(p^2 + p) - 2(p^2 + p) + 12 \\ = (p^2 + p)(p^2 + p - 6) - 2(p^2 + p - 6) \\ = (p^2 + p - 6)(p^2 + p - 2) \\ = (p^2 + 3p - 2p - 6)(p^2 + 2p - p - 2) \\ = [p(p + 3) - 2(p + 3)][p(p + 2) - 1(p + 2)] \\ = [(p + 3)(p - 2)][(p + 2)(p - 1)] \\ = (p + 3)(p - 2)(p + 2)(p - 1) \end{array}$$

Answer 4A.

 $(y^{2} - 3y)(y^{2} - 3y + 7) + 10$ = a(a + 7) + 10 [taking (y² - 3y) = a] = a² + 7a + 10 = a² + 5a + 2a + 10 = a(a + 5) + 2(a + 5) = (a + 5)(a + 2) = (y² - 3y + 5)(y² - 3y + 2) = (y² - 3y + 5)(y² - 2y - y + 2) = (y² - 3y + 5)[y(y - 2) - 1(y - 2)] = (y² - 3y + 5)[(y - 2)(y - 1)] = (y - 1)(y - 2)(y² - 3y + 5)





Answer 4B.

 $(t^{2} - t)(4t^{2} - 4t - 5) - 6$ = $(t^{2} - t)[4(t^{2} - t) - 5] - 6$ = a[4a - 5] - 6 [Taking $(t^{2} - t) = a$] = $4a^{2} - 5a - 6$ = $4a^{2} - 8a + 3a - 6$ = 4a(a - 2) + 3(a - 2)= (a - 2)(4a + 3)= $(t^{2} - t - 2)[4(t^{2} - t) + 3]$ = $(t^{2} - 2t + t - 2)(4t^{2} - 4t + 3)$ = $[t(t - 2) + 1(t - 2)](4t^{2} - 4t + 3)$ = $[(t - 2)(t + 1)](4t^{2} - 4t + 3)$ = $(t + 1)(t - 2)(4t^{2} - 4t + 3)$

Answer 4C.

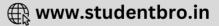
 $12(2x - 3y)^{2} - 1(2x - 3y) - 1$ = $12a^{2} - a - 1$ [Taking (2x - 3y) = a] = $12a^{2} - 4a + 3a - 1$ = 4a(3a - 1) + 1(3a - 1)= (3a - 1)(4a + 1)= [3(2x - 3y) - 1][4(2x - 3y) + 1]= (6x - 9y - 1)(8x - 12y + 1)

Answer 4D.

 $6 - 5x + 5y + (x - y)^{2}$ = 6 - 5(x - y) + (x - y)^{2} = 6 - 3(x - y) - 2(x - y) + (x - y)^{2} = 3[2 - (x - y)] - (x - y)[2 - (x - y)] = 3(2 - x + y) - (x - y)(2 - x + y) = (2 - x + y)(3 - x + y)







Answer 4E.

$$2x^{2} + \frac{x}{6} - 1$$

= $\frac{1}{6}(12x^{2} + x - 6)$
= $\frac{1}{6}(12x^{2} + 9x - 8x - 6)$
= $\frac{1}{6}[3x(4x + 3) - 2(4x + 3)]$
= $\frac{1}{6}[(4x + 3)(3x - 2)]$
= $\frac{1}{6}(4x + 3)(3x - 2)$

Answer 4F.

$$P^{4} + 23p^{2}q^{2} + 90q^{4}$$

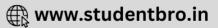
= p⁴ + 18p²q² + 5p²q² + 90q⁴
= p²(p² + 18q²) + 5q²(p² + 18q²)
= (p² + 18q²)(p² + 5q²)

Answer 4G.

 $2a^{3} + 5a^{2}b - 12ab^{2}$ = $2a^{3} + 8a^{2}b - 3a^{2}b - 12ab^{2}$ = $2a^{2}(a + 4b) - 3ab(a + 4b)$ = $(a + 4b)(2a^{2} - 3ab)$ = (a + 4b)a(2a - 3b)= a(a + 4b)(2a - 3b)







Ex 5.3

Answer 1A.

 $x^{2} - 16$ = $x^{2} - 4^{2}$ = (x - 4)(x + 4)

Answer 1B.

 $64x^2 - 121y^2$ = $(8x)^2 - (11y)^2$ = (8x - 11y)(8x + 11y)

Answer 1C.

 $441 - 81y^{2}$ = (21)² - (9y)² = (21 - 9y)(21 + 9y) = 3(7 - 3y)3(7 + 3y) = 9(7 - 3y)(7 + 3y)

Answer 1D.

 $x^{6} - 196$ = $(x^{3})^{2} - (14)^{2}$ = $(x^{3} - 14)(x^{3} + 14)$

Answer 1E.

625 - b² = (25)² - (b)² = (25 - b)(25 + b)





Answer 1F.

$$m^{2} - \frac{1}{9}n^{2}$$
$$= m^{2} - \left(\frac{1}{3}n\right)^{2}$$
$$= \left(m - \frac{1}{3}n\right)\left(m + \frac{1}{3}n\right)$$

Answer 1G.

 $8xy^{2} - 18x^{3}$ = 2x(4y^{2} - 9x^{2}) = 2x[(2y)^{2} - (3x)^{2}] = 2x[(2y - 3x)(2y + 3x)] = 2x(2y - 3x)(2y + 3x)

Answer 1H.

$$16a^{4} - 81b^{4}$$

$$= (4a^{2})^{2} - (9b^{2})^{2}$$

$$= (4a^{2} - 9b^{2})(4a^{2} + 9b^{2})$$

$$= [(2a)^{2} - (3b)^{2}](4a^{2} + 9b^{2})$$

$$= [(2a - 3b)(2a + 3b)](4a^{2} + 9b^{2})$$

$$= (2a - 3b)(2a + 3b)(4a^{2} + 9b^{2})$$

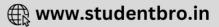
Answer 1I.

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

Answer 1J.

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





Answer 1K.

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

Answer 1L.

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

Answer 2A.

 $9(a - b)^{2} - (a + b)^{2}$ = [3(a - b)]^{2} - (a + b)^{2} = [3(a - b) - (a + b)][3(a - b) + (a + b)] = (3a - 3b - a - b)(3a - 3b + a + b) = (2a - 4b)(4a - 2b) = 2(a - 2b)2(2a - b) = 4(a - 2b)(2a - b)

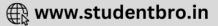
Answer 2B.

$$\begin{split} &25(x-y)^2 - 49(c-d)^2 \\ &= [5(x-y)]^2 - [7(c-d)]^2 \\ &= [5(x-y) - 7(c-d)][5(x-y) + 7(c-d)] \\ &= (5x-5y-7c+7d)(5x-5y+7c-7d) \end{split}$$

Answer 2C.

 $\begin{array}{l} (2a - b)^2 - 9(3c - d)^2 \\ = (2a - b)^2 - [3(3c - d)]^2 \\ = [(2a - b) - 3(3c - d)][(2a - b) + 3(3c - d)] \\ = (2a - b - 9c + 3d)(2a - b + 9c - 3d) \end{array}$





Answer 2D.

 $b^{2} - 2bc + c^{2} - a^{2}$ = (b² - 2bc + c²) - a² = (b - c)² - (a)² = (b - c - a)(b - c + a)

Answer 2E.

$$x^{2} + \frac{1}{x^{2}} - 2$$
$$= x^{2} + \frac{1}{x^{2}} - 2x \times x \frac{1}{x}$$
$$= \left(x - \frac{1}{x}\right)^{2}$$
$$= \left(x - \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

Answer 2F.

$$\begin{aligned} (x^2 + y^2 - z^2)^2 - 4x^2y^2 \\ &= (x^2 + y^2 - z^2)^2 - (2xy)^2 \\ &= (x^2 + y^2 - z^2 - 2xy)(x^2 + y^2 - z^2 + 2xy) \\ &= [(x^2 + y^2 - 2xy) - z^2][(x^2 + y^2 + 2xy) - z^2] \\ &= [(x - y)^2 - z^2][(x + y)^2 - z^2] \\ &= [(x - y - z)(x - y + z)][(x + y - z)(x + y + z)] \\ &= (x - y - z)(x - y + z)(x + y - z)(x + y + z) \end{aligned}$$

Answer 2G.

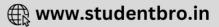
$$a^{2} + b^{2} - c^{2} - d^{2} + 2ab - 2cd$$

= (a² + b² + 2ab) - (c² + d² + 2cd)
= (a + b)² - (c + d)²
= (a + b + c + d)(a + b - c - d)

Answer 2H.

```
4xy - x^{2} - 4y^{2} + z^{2}
= z^{2} - x^{2} - 4y^{2} + 4xy
= z^{2} - (x^{2} + 4y^{2} - 4xy)
= z^{2} - (x - 2y)^{2}
= [z - (x - 2y)][z + (x - 2y)]
= (z - x + 2y)(z + x - 2y)
```





Answer 2I.

$$4x^{2} - 12ax - y^{2} - z^{2} - 2yz + 9a^{2}$$

= $(4x^{2} - 12ax + 9a^{2}) - (y^{2} + z^{2} + 2yz)$
= $(2x - 3a)^{2} - (y + z)^{2}$
= $[(2x - 3a) + (y + z)][(2x - 3a) - (y + z)]$
= $(2x - 3a + y + z)(2x - 3a - y - z)$

Answer 2J.

$$(x + y)^{3} - x - y$$

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

Answer 2K.

 $y^{4} + y^{2} + 1$ = $y^{4} + 2y^{2} + 1 - y^{2}$ = $(y^{2} + 1)^{2} - y^{2}$ = $(y^{2} + 1 + y)(y^{2} + 1 - y)$

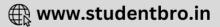
Answer 2L.

 $\begin{aligned} (a^2 - b^2)(c^2 - d^2) - 4abcd \\ &= a^2c^2 - a^2d^2 - b^2c^2 + b^2d^2 - 4abcd \\ &= a^2c^2 + b^2d^2 - 2abcd - a^2d^2 - b^2c^2 - 2abcd \\ &= (a^2c^2 + b^2d^2 - 2abcd) - (a^2d^2 + b^2c^2 + 2abcd) \\ &= (ac - bd)^2 - (ad + bc)^2 \\ &= [(ac - bd) + (ad + bc)][(ac - bd) - (ad + bc)] \\ &= (ac - bd + ad + bc)(ac - bd - ad - bc) \end{aligned}$

Answer 3A.

$$(x^{2} - 2x + 3)(x^{2} + 2x + 3)$$

= $[x^{2} + 3 - 2x][x^{2} + 3 + 2x]$
= $[(x^{2} + 3) - 2x][(x^{2} + 3) + 2x]$
= $(x^{2} + 3)^{2} - (2x)^{2}$
= $(x^{2} + 3)^{2} - 4x^{2}$



Answer 3B.

$$(x^{2} - 2x + 3)(x^{2} - 2x - 3)$$

= $[(x^{2} - 2x) + 3][(x^{2} - 2x) + 3]$
= $(x^{2} - 2x)^{2} - (3)^{2}$
= $(x^{2} - 2x)^{2} - 9$

Answer 3C.

$$(x^{2} + 2x - 3)(x^{2} - 2x + 3)$$

= $[x^{2} + (2x - 3)][x^{2} - (2x - 3)]$
= $x^{2} - (2x - 3)^{2}$
= $x^{4} - (2x - 3)^{2}$

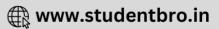
Answer 4A.

$$y^{2} + \frac{1}{4y^{2}} + 1 - 6y - \frac{3}{y}$$
$$= \left(y^{2} + \frac{1}{4y^{2}} + 1\right) - \left(6y + \frac{3}{y}\right)$$
$$= \left(y + \frac{1}{2y}\right)^{2} - 6\left(y + \frac{1}{2y}\right)$$
$$= \left(y + \frac{1}{2y}\right)\left(y + \frac{1}{2y} - 6\right)$$

Answer 4B.

$$4a^{2} + \frac{1}{4a^{2}} - 2 - 6a + \frac{3}{2a}$$
$$= \left(4a^{2} + \frac{1}{4a^{2}} - 2\right) - \left(6a - \frac{3}{2a}\right)$$
$$= \left(2a - \frac{1}{2a}\right)^{2} - 3\left(2a - \frac{1}{2a}\right)$$
$$= \left(2a - \frac{1}{2a}\right)\left(2a - \frac{1}{2a} - 3\right)$$





Answer 4C.

$$\begin{aligned} x^{4} + y^{4} - 6x^{2}y^{2} \\ &= (x^{2})^{2} + (y^{2})^{2} - 2x^{2}y^{2} - 4x^{2}y^{2} \\ &= \left[(x^{2})^{2} + (y^{2})^{2} - 2x^{2}y^{2} \right] - (4x^{2}y^{2}) \\ &= (x^{2} - y^{2})^{2} - (2xy)^{2} \\ &= (x^{2} - y^{2} - 2xy)(x^{2} - y^{2} + 2xy) \end{aligned}$$

Answer 4D.

$$4x^{4} + 25y^{4} + 19x^{2}y^{2}$$

$$= 4x^{4} + 25y^{4} + 20x^{2}y^{2} - x^{2}y^{2}$$

$$= (2x^{2})^{2} + (5y^{2})^{2} + 2x(2x^{2})x(5y^{2}) - x^{2}y^{2}$$

$$= [(2x^{2})^{2} + (5y^{2})^{2} + 2x(2x^{2})x(5y^{2})] - x^{2}y^{2}$$

$$= [2x^{2} + 5y^{2}] - (xy)^{2}$$

$$= (2x^{2} + 5y^{2} - xy)(2x^{2} - 5y + xy)$$

Answer 4E.

$$p^{2} + \frac{1}{p^{2}} - 3$$

$$= p^{2} + \frac{1}{p^{2}} - 2 - 1$$

$$= \left(p^{2} + \frac{1}{p^{2}} - 2 \times p \times \frac{1}{p}\right) - 1$$

$$= \left(p - \frac{1}{p}\right)^{2} - 1^{2}$$

$$= \left(p - \frac{1}{p} + 1\right) \left(p - \frac{1}{p} - 1\right)$$



Answer 4F.

$$5x^{2} - y^{2} - 4xy + 3x - 3y$$

= $x^{2} + 4x^{2} - y^{2} - 4xy + 3x - 3y$
= $(x^{2} - y^{2}) + (4x^{2} - 4xy) + (3x - 3y)$
= $(x - y)(x + y) + 4x(x - y) + 3(x - y)$
= $(x - y)[(x + y) + 4x + 3]$
= $(x - y)(x + y + 4x + 3)$
= $(x - y)(5x + y + 3)$



