

गणित

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(अध्याय - 9) (बीजीय व्यंजक एवं सर्वसमिकाएँ)

(कक्षा - 8)

प्रश्नावली 9.4

प्रश्न 1:

द्विपदों को गुणा कीजिए:

- (i) $(2x+5)$ और $(4x-3)$
- (ii) $(y-8)$ और $(3y-4)$
- (iii) $(2.5l-0.5m)$ और $(2.5l+0.5m)$
- (iv) $(a+3b)$ और $(x+5)$
- (v) $(2pq+3q^2)$ और $(3pq-2q^2)$
- (vi) $\left(\frac{3}{4}a^2+3b^2\right)$ और $4\left(a^2-\frac{2}{3}b^2\right)$

उत्तर 1:

- (i) $(2x+5)\times(4x-3) = 2x(4x-3)+5(4x-3) = 2x\times 4x-2x\times 3+5\times 4x-5\times 3$
 $= 8x^2-6x+20x-15 = 8x^2+14x-15$
- (ii) $(y-8)\times(3y-4) = y(3y-4)-8(3y-4) = y\times 3y-y\times 4-8\times 3y-8\times -4$
 $= 3y^2-4y-24y+12 = 3y^2-28y+12$
- (iii) $(2.5l-0.5m)\times(2.5l+0.5m) = 2.5l\times(2.5l+0.5m)-0.5m\times(2.5l+0.5m)$
 $= 2.5l\times 2.5l+0.5l\times 0.5m-0.5m\times 2.5l-0.5m\times 0.5m$
 $= 6.25l^2+1.25lm-1.25lm-0.25m^2 = 6.25l^2-0.25m^2$
- (iv) $(a+3b)\times(x+5) = a(x+5)+3b(x+5) = a\times x+a\times 5+3b\times x+3b\times 5$
 $= ax+5a+3bx+15b$
- (v) $(2pq+3q^2)(3pq-2q^2) = 2pq\times(3pq-2q^2)+3q^2(3pq-2q^2)$
 $= 2pq\times 3pq-2pq\times 2q^2+3q^2\times 3pq-3q^2\times 2q^2$
 $= 6p^2q^2-4pq^3+9pq^3-6q^4 = 6p^2q^2+5pq^3-6q^4$
- (vi) $\left(\frac{3}{4}a^2+3b^2\right)\times 4\left(a^2-\frac{2}{3}b^2\right) = \left(\frac{3}{4}a^2+3b^2\right)\times\left(4a^2-\frac{8}{3}b^2\right)$
 $= \frac{3}{4}a^2\times\left(4a^2-\frac{8}{3}b^2\right)+3b^2\times\left(4a^2-\frac{8}{3}b^2\right)$
 $= \frac{3}{4}a^2\times 4a^2-\frac{3}{4}a^2\times\frac{8}{3}b^2+3b^2\times 4a^2-3b^2\times\frac{8}{3}b^2$
 $= 3a^4-2a^2b^2+12a^2b^2-8b^4 = 3a^4+10a^2b^2-8b^4$

प्रश्न 2:

गुणनफल ज्ञात कीजिए:

- (i) $(5-2x)(3+x)$
- (ii) $(x+7y)(7x-y)$
- (iii) $(a^2+b)(a+b^2)$
- (iv) $(p^2-q^2)(2p+q)$

उत्तर 2:

- (i) $(5-2x)(3+x) = 5\times(3+x)-2x(3+x) = 5\times 3+5\times x-2x\times 3-2x\times x$
 $= 15+5x-6x-2x^2 = 15-x-2x^2$

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$$\begin{aligned} \text{(ii)} \quad (x+7y)(7x-y) &= x(7x-y) + 7y \times (7x-y) \\ &= x \times 7x - x \times y + 7y \times 7x - 7y \times y \\ &= 7x^2 - xy + 49xy - 7y^2 \\ &= 7x^2 + 48xy - 7y^2 \end{aligned}$$
$$\begin{aligned} \text{(iii)} \quad (a^2+b)(a+b^2) &= a^2 \times (a+b^2) + b \times (a+b^2) \\ &= a^2 \times a + a^2 \times b^2 + b \times a + b \times b^2 \\ &= a^3 + a^2b^2 + ab + b^3 \end{aligned}$$
$$\begin{aligned} \text{(iv)} \quad (p^2-q^2)(2p+q) &= p^2 \times (2p+q) - q^2(2p+q) \\ &= p^2 \times 2p + p^2 \times q - q^2 \times 2p - q^2 \times q \\ &= 2p^3 + p^2q - 2pq^2 - q^3 \end{aligned}$$

प्रश्न 3:

सरल कीजिए:

$$\begin{aligned} \text{(i)} \quad &(x^2-5)(x+5)+25 \\ \text{(ii)} \quad &(a^2+5)(b^2+3)+5 \\ \text{(iii)} \quad &(t+s^2)(t^2-s) \\ \text{(iv)} \quad &(a+b)(c-d)+(a-b)(c+d)+2(ac+bd) \\ \text{(v)} \quad &(x+y)(2x+y)+(x+2y)(x-y) \\ \text{(vi)} \quad &(x+y)(x^2-xy+y^2) \\ \text{(vii)} \quad &(1.5x-4y)(1.5x+4y+3)-4.5x+12y \\ \text{(viii)} \quad &(a+b+c)(a+b-c) \end{aligned}$$

उत्तर 3:

$$\begin{aligned} \text{(i)} \quad (x^2-5)(x+5)+25 &= x^2(x+5)-5(x+5)+25 \\ &= x^2 \times x + x^2 \times 5 - 5 \times x - 5 \times 5 + 25 \\ &= x^3 + 5x^2 - 5x - 25 + 25 \\ &= x^3 + 5x^2 - 5x \end{aligned}$$
$$\begin{aligned} \text{(ii)} \quad (a^2+5)(b^2+3)+5 &= a^2(b^2+3)+5(b^2+3)+5 \\ &= a^2 \times b^2 + a^2 \times 3 + 5 \times b^2 + 5 \times 3 + 5 \\ &= a^2b^2 + 3a^2 + 5b^2 + 15 + 5 \\ &= a^2b^2 + 3a^2 + 5b^2 + 20 \end{aligned}$$
$$\begin{aligned} \text{(iii)} \quad (t+s^2)(t^2-s) &= t(t^2-s) + s^2(t^2-s) \\ &= t \times t^2 - t \times s + s^2 \times t^2 - s^2 \times s \\ &= t^3 - st + s^2t^2 - s^3 \end{aligned}$$

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- (iv) $(a+b)(c-d) + (a-b)(c+d) + 2(ac+bd)$
 $= a(c-d) + b(c-d) + a(c+d) - b(c+d) + 2ac + 2bd$
 $= ac - ad + bc - bd + ac + ad - bc - bd + 2ac + 2bd$
 $= ac + ac - ad + ad + bc - bc - bd - bd + 2ac + 2bd$
 $= 2ac - 2bd + 2ac + 2bd$
 $= 4ac$
- (v) $(x+y)(2x+y) + (x+2y)(x-y) = x(2x+y) + y(2x+y) + x(x-y) + 2y(x-y)$
 $= 2x^2 + xy + 2xy + y^2 + x^2 - xy + 2xy - 2y^2$
 $= 2x^2 + x^2 + xy + 2xy - xy + 2xy + y^2 - 2y^2$
 $= 3x^2 + 4xy - y^2$
- (vi) $(x+y)(x^2 - xy + y^2) = x(x^2 - xy + y^2) + y(x^2 - xy + y^2)$
 $= x^3 - x^2y + xy^2 + x^2y - xy^2 + y^3$
 $= x^3 - x^2y + x^2y + xy^2 - xy^2 + y^3$
 $= x^3 + y^3$
- (vii) $(1.5x - 4y)(1.5x + 4y + 3) - 4.5x + 12y$
 $= 1.5x(1.5x + 4y + 3) - 4y(1.5x + 4y + 3) - 4.5x + 12y$
 $= 2.25x^2 + 6.0xy + 4.5x - 6.0xy - 16y^2 - 12y - 4.5x + 12y$
 $= 2.25x^2 + 6.0xy - 6.0xy + 4.5x - 4.5x - 16y^2 - 12y + 12y$
 $= 2.25x^2 - 16y^2$
- (viii) $(a+b+c)(a+b-c) = a(a+b-c) + b(a+b-c) + c(a+b-c)$
 $= a^2 + ab - ac + ab + b^2 - bc + ac + bc - c^2$
 $= a^2 + ab + ab - ac + ac - bc + bc + b^2 - c^2$
 $= a^2 + b^2 - c^2 + 2ab$