

गणित

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(अध्याय - 14) (गुणनखंडन)

(कक्षा - 8)

प्रश्नावली 14.3

प्रश्न 1:

निम्नलिखित विभाजन कीजिए:

(i) $28x^4 \div 56x$

(ii) $-36y^3 \div 9y^2$

(iii) $66pq^2r^3 \div 11qr^2$

(iv) $34x^3y^3z^3 \div 51xy^2z^3$

(v) $12a^8b^8 \div (-6a^6b^4)$

उत्तर 1:

(i) $28x^4 \div 56x = \frac{28x^4}{56x} = \frac{28}{56} \times \frac{x^4}{x} = \frac{1}{2}x^3$ $[\because x^m \div x^n = x^{m-n}]$

(ii) $-36y^3 \div 9y^2 = \frac{-36y^3}{9y^2} = \frac{-36}{9} \times \frac{y^3}{y^2} = -4y$ $[\because x^m \div x^n = x^{m-n}]$

(iii) $66pq^2r^3 \div 11qr^2 = \frac{66pq^2r^3}{11qr^2} = \frac{66}{11} \times \frac{pq^2r^3}{qr^2} = 6pqr$ $[\because x^m \div x^n = x^{m-n}]$

(iv) $34x^3y^3z^3 \div 51xy^2z^3 = \frac{34x^3y^3z^3}{51xy^2z^3} = \frac{34}{51} \times \frac{x^3y^3z^3}{xy^2z^3}$
 $= \frac{2}{3}x^2y$ $[\because x^m \div x^n = x^{m-n}]$

(v) $12a^8b^8 \div (-6a^6b^4) = \frac{12a^8b^8}{-6a^6b^4} = \frac{12}{-6} \times \frac{a^8b^8}{a^6b^4} = -2a^2b^4$ $[\because x^m \div x^n = x^{m-n}]$

प्रश्न 2:

दिए हुए बहुपद को दिए हुए एकपदी से भाग दीजिए:

(i) $(5x^2 - 6x) \div 3x$

(ii) $(3y^8 - 4y^6 + 5y^4) \div y^4$

(iii) $8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3) \div 4x^2y^2z^2$

(iv) $(x^3 + 2x^2 + 3x) \div 2x$

(v) $(p^3q^6 - p^6q^3) \div p^3q^3$

उत्तर 2:

(i) $(5x^2 - 6x) \div 3x = \frac{5x^2 - 6x}{3x} = \frac{5x^2}{3x} - \frac{6x}{3x} = \frac{5}{3}x - 2 = \frac{1}{3}(5x - 6)$

(ii) $(3y^8 - 4y^6 + 5y^4) \div y^4 = \frac{3y^8 - 4y^6 + 5y^4}{y^4}$
 $= \frac{3y^8}{y^4} - \frac{4y^6}{y^4} + \frac{5y^4}{y^4} = 3y^4 - 4y^2 + 5$

(iii) $8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3) \div 4x^2y^2z^2 = \frac{8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3)}{4x^2y^2z^2}$
 $= \frac{8x^3y^2z^2}{4x^2y^2z^2} + \frac{8x^2y^3z^2}{4x^2y^2z^2} + \frac{8x^2y^2z^3}{4x^2y^2z^2} = 2x + 2y + 2z = 2(x + y + z)$

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$$\begin{aligned} \text{(iv)} \quad (x^3 + 2x^2 + 3x) \div 2x &= \frac{x^3 + 2x^2 + 3x}{2x} \\ &= \frac{x^3}{2x} + \frac{2x^2}{2x} + \frac{3x}{2x} = \frac{x^2}{2} + \frac{2x}{2} + \frac{3}{2} = \frac{1}{2}(x^2 + 2x + 3) \end{aligned}$$

$$\text{(v)} \quad (p^3q^6 - p^6q^3) \div p^3q^3 = \frac{p^3q^6 - p^6q^3}{p^3q^3} = \frac{p^3q^6}{p^3q^3} - \frac{p^6q^3}{p^3q^3} = q^3 - p^3$$

प्रश्न 3:

निम्नलिखित विभाजन कीजिए:

- (i) $(10x - 25) \div 5$ (ii) $(10x - 25) \div (2x - 5)$
(iii) $10y(6y + 21) \div 5(2y + 7)$ (iv) $9x^2y^2(3z - 24) \div 27xy(z - 8)$
(v) $96abc(3a - 12)(5b - 30) \div 144(a - 4)(b - 6)$

उत्तर 3:

$$\text{(i)} \quad (10x - 25) \div 5 = \frac{10x - 25}{5} = \frac{5(2x - 5)}{5} = 2x - 5$$

$$\text{(ii)} \quad (10x - 25) \div (2x - 5) = \frac{10x - 25}{(2x - 5)} = \frac{5(2x - 5)}{(2x - 5)} = 5$$

$$\begin{aligned} \text{(iii)} \quad 10y(6y + 21) \div 5(2y + 7) &= \frac{10y(6y + 21)}{5(2y + 7)} \\ &= \frac{2 \times 5 \times y \times 3(2y + 7)}{5(2y + 7)} = 2 \times y \times 3 = 6y \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad 9x^2y^2(3z - 24) \div 27xy(z - 8) &= \frac{9x^2y^2(3z - 24)}{27xy(z - 8)} \\ &= \frac{9}{27} \times \frac{xy \times xy \times 3(z - 8)}{xy(z - 8)} = xy \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad 96abc(3a - 12)(5b - 30) \div 144(a - 4)(b - 6) &= \frac{96abc(3a - 12)(5b - 30)}{144(a - 4)(b - 6)} \\ &= \frac{12 \times 4 \times 2 \times abc \times 3(a - 4) \times 5(b - 6)}{12 \times 4 \times 3(a - 4)(b - 6)} = 10abc \end{aligned}$$

प्रश्न 4:

निर्देशानुसार भाग दीजिए:

- (i) $5(2x + 1)(3x + 5) \div (2x + 1)$
(ii) $26xy(x + 5)(y - 4) \div 13x(y - 4)$
(iii) $52pqr(p + q)(q + r)(r + p) \div 104pq(q + r)(r + p)$
(iv) $20(y + 4)(y^2 + 5y + 3) \div 5(y + 4)$
(v) $x(x + 1)(x + 2)(x + 3) \div x(x + 1)$

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उत्तर 4:

$$(i) \quad 5(2x+1)(3x+5) \div (2x+1) = \frac{5(2x+1)(3x+5)}{(2x+1)} = 5(3x+5)$$

$$(ii) \quad 26xy(x+5)(y-4) \div 13x(y-4) = \frac{26xy(x+5)(y-4)}{13x(y-4)} \\ = \frac{13 \times 2 \times xy(x+5)(y-4)}{13x(y-4)} = 2y(x+5)$$

$$(iii) \quad 52pqr(p+q)(q+r)(r+p) \div 104pq(q+r)(r+p) = \frac{52pqr(p+q)(q+r)(r+p)}{104pq(q+r)(r+p)} \\ = \frac{52pqr(p+q)(q+r)(r+p)}{52 \times 2 \times pq(q+r)(r+p)} = \frac{1}{2}r(p+q)$$

$$(iv) \quad 20(y+4)(y^2+5y+3) \div 5(y+4) = \frac{20(y+4)(y^2+5y+3)}{5(y+4)} = 4(y^2+5y+3)$$

$$(v) \quad x(x+1)(x+2)(x+3) \div x(x+1) = \frac{x(x+1)(x+2)(x+3)}{x(x+1)} = (x+2)(x+3)$$

प्रश्न 5:

व्यंजक के गुणनखंड कीजिए और निर्देशानुसार भाग दीजिए:

$$(i) \quad (y^2 + 7y + 10) \div (y + 5)$$

$$(ii) \quad (m^2 - 14m - 32) \div (m + 2)$$

$$(iii) \quad (5p^2 - 25p + 20) \div (p - 1)$$

$$(iv) \quad 4yz(z^2 + 6z - 16) \div 2y(z + 8)$$

$$(v) \quad 5pq(p^2 - q^2) \div 2p(p + q)$$

$$(vi) \quad 12xy(9x^2 - 16y^2) \div 4xy(3x + 4y)$$

$$(vii) \quad 39y^3(50y^2 - 98) \div 26y^2(5y + 7)$$

उत्तर 5:

$$(i) \quad (y^2 + 7y + 10) \div (y + 5) = \frac{y^2 + 7y + 10}{(y + 5)} \\ = \frac{y^2 + (2+5)y + 2 \times 5}{(y + 5)} = \frac{y^2 + 2y + 5y + 2 \times 5}{(y + 5)} \\ = \frac{(y+2)(y+5)}{(y+5)} \quad [\because x^2 + (a+b)x + ab = (x+a)(x+b)] \\ = y + 2$$

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$$\begin{aligned} \text{(ii)} \quad (m^2 - 14m + 32) \div (m + 2) &= \frac{m^2 - 14m + 32}{(m + 2)} = \frac{m^2 + (-16 + 2)m + (-16) \times 2}{(m + 2)} \\ &= \frac{(m - 16)(m + 2)}{(m + 2)} \quad [\because x^2 + (a + b)x + ab = (x + a)(x + b)] \\ &= (m - 16) \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad (5p^2 - 25p + 20) \div (p - 1) &= \frac{5p^2 - 25p + 20}{(p - 1)} \\ &= \frac{5p^2 - 20p - 5p + 20}{(p - 1)} = \frac{5p(p - 4) - 5(p - 4)}{(p - 1)} \\ &= \frac{(5p - 5)(p - 4)}{(p - 1)} = \frac{5(p - 1)(p - 4)}{(p - 1)} = 5(p - 4) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad 4yz(z^2 + 6z - 16) \div 2y(z + 8) &= \frac{4yz(z^2 + 6z - 16)}{2y(z + 8)} = \frac{4yz[z^2 + (8 - 2)z + 8 \times (-2)]}{2y(z + 8)} \\ &= \frac{4yz(z - 2)(z + 8)}{2y(z + 8)} \quad [\because x^2 + (a + b)x + ab = (x + a)(x + b)] \\ &= 2z(z - 2) \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad 5pq(p^2 - q^2) \div 2p(p + q) &= \frac{5pq(p^2 - q^2)}{2p(p + q)} \\ &= \frac{5pq(p - q)(p + q)}{2p(p + q)} \quad [\because a^2 - b^2 = (a - b)(a + b)] \\ &= \frac{5}{2}q(p - q) \end{aligned}$$

$$\begin{aligned} \text{(vi)} \quad 12xy(9x^2 - 16y^2) \div 4xy(3x + 4y) &= \frac{12xy(9x^2 - 16y^2)}{4xy(3x + 4y)} = \frac{12xy[(3x)^2 - (4y)^2]}{4xy(3x + 4y)} \\ &= \frac{12xy(3x - 4y)(3x + 4y)}{4xy(3x + 4y)} \quad [\because a^2 - b^2 = (a - b)(a + b)] \\ &= 3(3x - 4y) \end{aligned}$$

$$\begin{aligned} \text{(vii)} \quad 39y^3(50y^2 - 98) \div 26y^2(5y + 7) &= \frac{39y^3(50y^2 - 98)}{26y^2(5y + 7)} \\ &= \frac{39y^3 \times 2(25y^2 - 49)}{26y^2(5y + 7)} = \frac{39y^2 \times 2[(5y)^2 - (7)^2]}{26y^2(5y + 7)} \\ &= \frac{39y^2 \times 2(5y - 7)(5y + 7)}{26y^2(5y + 7)} \quad [\because a^2 - b^2 = (a - b)(a + b)] \\ &= 3y(5y - 7) \end{aligned}$$