SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Factorisation
Exercise 14.3

Q.1: Carry out the following divisions.

(i) $28x^4 + 56x$ (ii) $- 36y^3 + 9y^2$

(iii) $66pq^2r^3 + 11qr^2$ (iv) $34x^3y^3z^3 \div 51xy^2z^3$

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

Sol:

(i) $28x^4 \div 56x = \frac{28x^4}{56x}$

$= \frac{28}{2 \times 28} \times \frac{x^3 \times x}{x}$

$= \frac{1}{2} x^3$. (Cancelling the common factors 28 and x from Nr. and Dr.)

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

$= \frac{-36y^3}{9y^2} = \frac{9 \times -4 \times y^2 \times y}{9 \times y^2}$

$= -4y$. (Cancelling the common factors 9 and y^2 from Nr. and Dr.)

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

$\frac{66pq^2r^3}{11qr^2} = \frac{11 \times 6 \times p \times q \times q \times r^2 \times r}{11 \times q \times r^2}$

$= 6qpr$.(Cancelling the common factors 11, q and r^2 from Nr. and Dr.)

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

$= \frac{34x^3y^3z^3}{51xy^2z^3} = \frac{34 \times x \times x^2 \times y \times y^2 \times z^3}{51 \times x \times y^2 \times z^3}$

$= \frac{2 \times 17 \times x \times x^2 \times y \times y^2 \times z^3}{3 \times 17 \times x \times y^2 \times z^3} = \frac{2}{3} x^2y$. (Cancelling the common factors 17, x^2, y^2 and z^2 from Nr. and Dr.)

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

$= \frac{12a^8b^8}{-6a^6b^4} = \frac{12a^2 \times a^6 \times b^4 \times b^4}{-6 \times a^6 \times b^4} = \frac{6 \times 2a^2 \times a^6 \times b^4 \times b^4}{-6 \times a^6 b^4}$

$= -2a^2 \times b^4 = -2a^2b^4.$

(Cancelling the common factors 6, a^6 and b^4 from Nr. and Dr.)

Q.2 Divide the given polynomial by the given monomial.

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

Sol:

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

$= \frac{5x^2 - 6x}{3x} = \frac{5x^2}{3x} - \frac{6x}{3x}$ (Dividing each term by 3x)

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

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

$= \frac{3y^8 - 4y^6 + 5y^4}{y^4} = \frac{3y^8}{y^4} - \frac{4y^6}{y^4} + \frac{5y^4}{y^4}$ (Dividing each term by y^4)

$= 3y^2 - 4y^2 + 5.$

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

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

$= \frac{8x^3y^2z^2}{4x^2y^2z^2} + \frac{8x^2y^3z^2}{4x^2y^2z^2} + \frac{8x^2y^2z^3}{4x^2y^2z^2}$ (Dividing term by $4x^2y^2z^2$)

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

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

$= \frac{x^3+2x^2+3x}{2x} = \frac{2x^2}{2x} + \frac{3x}{2x}$ (Dividing each term by 2x)

$= \frac{x^2}{2} + \frac{2x}{2} + \frac{3}{2}$

$= \frac{1}{2}\ (x^2 + 2x + 3)$ (Taking out as common factor $\frac{1}{2}$)

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

$= \frac{p^3q^6-p^6q^3}{p^3q^3} = \frac{p^3q^6}{p^3q^3} - \frac{p^6q^3}{p^3q^3}$

$= q^3 - p^3.$

Q.3 Work out the following divisions.

(i) (10x - 25) ÷5 (ii) (10x - 25) ÷ (2x - 5)

(iii) 10y (6y +21) ÷ 5 (2y + 7) (iv) $9x^2y^2\ (3z - 24)\ \div 27xy\ (z - 8)$

(v) $96abc\ (3a - 12)(5b - 30) \div 144(a - 4)(b - 6)$

Sol:

(i) (10x - 25)÷ 5

$= \frac{10x-25}{5} = \frac{5(2x-5)}{5}$

$= (2x - 5)$. (Cancelling the similar factors 5)

(ii) (10x - 25) ÷ (2x - 5)

$= \frac{(10x-25)}{(2x-5)} = \frac{5(2x-5)}{(2x-5)}$ (Cancelling the similar factors (2x – 5))

= 5.

(iii) 10y (6y +21) ÷ 5 (2y + 7)

$= \frac{9x^2y^2\ (3z-24)}{27xy\ (z-8)} = \frac{9}{9\times3}\frac{xy\times xy\times3(z-8)}{xy\times(z-8)}$ (Cancelling the factors 3, 9, xy and (z – 8)).

$= xy \times l = xy.$

(v) $96abc(3a - 12)(5b - 30) \div 144(a - 4)(b - 6)$

$= \frac{96abc\,(3a-12)(5b-30)}{144(a-4)(b-6)} = \frac{12\times4\times2\times abc\times3(a-4)\times5(b-6)}{12\times4\times3\,(a-4)(b-6)}$

(Cancelling the common factors 12,4, 3(a - 4) and (b – 6))

$= 10abc$

Q.4 Divide as directed.

(i) $5(2x + 1)(3x + 5) \div (2x + 1)$

(ii) $26xy(x + 5)(y - 4) \div 13x(y - 4)$

(iii) $52pqr(p + q)(q + r)(r + p) \div l04pq(q + r)(r + p)$

(iv) $20(y + 4)(y^2 + 5y + 3) \div 5(y + 4)$

(v) $x(x + l)(x + 2)(x + 3) \div x(x + 1)$

Sol:

(i) $5(2x + 1)(3x + 5) \div (2x + 1)$

$= \frac{5(2x+1)(3x+5)}{(2x+1)} = 5\,(3x + 5)$

(Cancelling the common factors $(2x + 1)$ from Nr. and Dr.)

(ii) $26xy\,(x + 5)(y - 4) \div 13x\,(y - 4)$

$= \frac{26xy\,(x+5)(y-4)}{13x\,(y-4)} = \frac{13\times2\times xy\,(x+5)(y-4)}{13x\,(y-4)}$

$= 2y\,(x + 5)$

(Cancelling the common factors 13, x and (y - 4) from Nr. and Dr.)

(iii) $52pqr\,(p + q)\,(q + r)\,(r + p) \div 104\,pq\,(q + r)\,(r + p)$

$= \frac{52pqr\,(p+q)(q+r)(r+p)}{104pq\,(q+r)(r+p)} = \frac{52pqr\,(p+q)(q+r)(r+p)}{52\times2\times pq\,(q+r)(r+p)}$

(Cancelling the common factors 52, p, q(q + r) and (r +p) from Nr. and Dr.)

$= \frac{1}{2}\,r\,(p+q)$

(iv) $20\,(y+4)(y^2+5y+3) \div 5(y+4) = \frac{20(y+4)(y^2+5y+3)}{5(y+4)} = \frac{5\times4\,(y+4)(y^2+5y+3)}{5(y+4)}$

(Cancelling the common factors 5 and (y + 4) from Nr. and Dr.)

$= 4(y^2 + 5y + 3)$

(v) $x(x + l)(x + 2)(x + 3) \div x(x + 1)$

$= \frac{x(x+1)(x+2)(x+3)}{x\,(x+1)} = (x + 2)(x + 3)$ (Cancelling the common factors x and (x + 1) from Nr. and Dr.)

Q.5 Factorise the expressions and divide them as directed.

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

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

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

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

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

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

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

Sol:

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

$= \frac{y^2+7y+10}{(y+5)} = \frac{y^2+2y+5y+2\times5}{(y+5)}$

$= \frac{y^2+(2+5)y+2\times5}{(y+5)} = \frac{(y+2)(y+5)}{(y+5)}$ $[\because x^2 + (a + b)x + ab = (x + a)(x + b)]$

= (y +2) (cancelling the similar factors (y +5))

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

$$= \frac{(m^2 - 14m - 32)}{(m + 2)} = \frac{m^2 - 16m + 2m + (-16) \times 2}{m + 2}$$

$$= \frac{m^2 + (-16 + 2)m + (-16)(2)}{(m + 2)} = \frac{(m - 16)(m + 2)}{(m + 2)}$$

$[\because x^2 + (a + b)x + a \times b = (x + a)(x + b)]$

= (m - 16). (Cancelling the similar factors (m +2))

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

$$= \frac{(5p^2 - 25p + 20)}{(p - 1)} = \frac{5p^2 - 20p - 5p + 20}{p - 1}$$

$$= \frac{5p\,(p - 4) - 5(p - 4)}{(p - 1)} = \frac{(5p - 5)(p - 4)}{(p - 1)} = \frac{5(p - 1)(p - 4)}{(p - 1)}$$

= 5(p - 4) (Cancelling the similar factors (p – 1))

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

$$= \frac{4yz\,(z^2 + 6z - 16)}{2y\,(z + 8)} = \frac{4yz\,(z^2 + 8z - 2z + 8 \times (-2))}{2y\,(z\ + 8)}$$

$= \frac{4yz\,\{z^2+(8-2)z+8\times-2\}}{2y\,(z+8)} = \frac{2\times2\times y\times z\,(z-2)(z+8)}{2y\,(z+8)}$ $[\because (x^2 + (a + b)x + a \times b = (x + a)(x + b)]$

= 2z (z -2) (Cancelling the factors 2, y and (z +8))

(v) $5pq\,(p^2 - q^2) \div 2p\,(p + q) = \frac{5pq\,(p^2-q^2)}{2p\,(p+q)} = \frac{5pq\,(p-q)(p+q)}{2p\,(p+q)}$

$= \frac{5}{2}q\,(p - q)$ (Cancelling the factors p and (p +q))

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

$$= \frac{12xy\,(9x^2 - 16y^2)}{4xy(3x + 4y)} = \frac{12xy\,[(3x)^2 - (4y)^2]}{4xy\,(3x + 4y)}$$

$$= \frac{4 \times 3 \times xy\,(3x - 4y)(3x + 4y)}{4xy\,(3x + 4y)}\ [\because a^2 - b^2\ = (a - b)(a + b)]$$

$= 3\ (3x - 4y)$

(Cancelling the factors 4, x, y and $(3x + 4)$)

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

$$= \frac{39y^3\ (50y^2 - 98)}{26y^2\ (5y + 7)} = \frac{39y^3 \times 2\ (25y^2 - 49)}{26y^2\ (5y + 7)}$$

$$= \frac{39y^3 \times 2\ [(5y)^2 - 7^2]}{26y^2\ (5y + 7)} \qquad [\because a^2 - b^2 = (a - b)(a + b)]$$

$$= \frac{3 \times 13 \times y^2 \times y \times 2\ (5y - 7)(5y + 7)}{2 \times 13y^2 \times (5y + 7)}$$

$= 3y\ (5y\ -\ 7)$.

(Cancelling the factors 13, y^2, 2 and $(5y + 7)$).