TEXT BOOK EXERCISE 12.3

Q. 1. Carry out the following divisions :

(i) $20x^4 \div 10x^2$

(ii) $(-35y^4)$ by $(-7y^3)$

(iii) $16a^4$ by $-6a^2$

(iv) $7x^2y^2z^2 \div 21xyz$

(v) $24p^8q^8 \div (-8p^6q^4)$

(vi) $(-15x^2y^3z^2) \div 10x^2yz^2$

(vii) $8l^2m^3 \div (-16l^4m^2)$

(viii) $(-12x^2y) \div 20xy^2z$

Solution.

(i) $20x^4 \div 10x^2 = \dfrac{20x^4}{10x^2}$

$= \left(\dfrac{20}{10}\right) \times \left(\dfrac{x^4}{x}\right)$

$= 2 \times x^{4-2}$

$[\because x^m \div x^n = x^{m-n}]$

$= 2x^2$ **Ans.**

(ii) $(-35y^4)$ by $(-7y^3)$

$= \dfrac{-35y^4}{-7y^3} = \left\{\dfrac{-35}{-7}\right\} \times \left\{\dfrac{y^4}{y^3}\right\}$

$= 5 \times y^{4-3}$ $[\because x^m \div x^n = x^{m-n}]$

$= 5y$ **Ans.**

(iii) $16a^4$ by $-6a^2 = \dfrac{16a^4}{-6a^2}$

$= \left(\dfrac{16}{-6}\right) \times \left(\dfrac{a^4}{a^2}\right)$

$= \dfrac{-8}{3} \times a^{4-2}$ $[\because a^m \div a^n = a^{m-n}]$

$= \dfrac{-8}{3}a^2$ **Ans.**

(iv) $7x^2y^2z^2 \div 21xyz = \dfrac{7x^2y^2z^2}{21xyz}$

$= \left(\dfrac{7}{21}\right) \times \left(\dfrac{x^2}{x}\right) \times \left(\dfrac{y^2}{y}\right) \times \left(\dfrac{z^2}{z}\right)$

$= \dfrac{1}{3} \times x^{2-1} \times y^{2-1} \times z^{2-1}$

$[\because x^m \div x^n = x^{m-n}]$

$= \dfrac{1}{3}xyz$ **Ans.**

(v) $24p^8q^8 \div (-8p^6q^4) = \dfrac{24p^8q^8}{-8p^6q^4}$

$= \left(\dfrac{24}{-8}\right) \times \left(\dfrac{p^8}{p^6}\right) \times \left(\dfrac{q^8}{q^4}\right)$

$= (-3) \times (p^{8-6}) \times (q^{8-4})$

$[\because x^m \div x^n = x^{m-n}]$

$= -3p^2q^4$ **Ans.**

(vi) $(-15x^2y^3z^2) \div 10x^2yz^2 = \dfrac{(-15x^2y^3z^2)}{10x^2yz^2}$

$= \left(\dfrac{-15}{10}\right) \times \left(\dfrac{x^2}{x^2}\right) \times \left(\dfrac{y^3}{y}\right) \times \left(\dfrac{z^2}{z^2}\right)$

$= \dfrac{-3}{2} \times (x^{2-2}) \times (y^{3-1}) \times (z^{2-2})$

$[\because x^m \div x^n = x^{m-n}]$

$= \dfrac{-3}{2}y^2$ **Ans.**

(vii) $8l^2m^3 \div (-16l^4m^2) = \dfrac{8l^2m^3}{-16l^4m^2}$

$= \left(\dfrac{8}{-16}\right) \times \left(\dfrac{l^2}{l^4}\right) \times \left(\dfrac{m^3}{m^2}\right)$

$$= \left(\frac{-1}{2}\right) \times (l^{2-4}) \times (m^{3-2})$$

$$[\because x^m \div x^n = x^{m-n}]$$

$$= -\frac{1}{2} \times l^{-2} \times m$$

$$= \frac{-m}{2l^2} \text{ Ans.}$$

(*viii*) $(-12x^2y) \div 20xy^2z = \frac{-12x^2y}{20xy^2z}$

$$= \left(\frac{-12}{20}\right) \times \left(\frac{x^2}{x}\right) \times \left(\frac{y}{y^2}\right) \times \frac{1}{z}$$

$$= \frac{-3}{5} \times (x^{2-1}) \times \left(\frac{1}{y^{2-1}}\right) \times \frac{1}{z}$$

$$[\because x^m \div x^n = x^{m-n}]$$

$$= -\frac{3}{5} \times x \times \frac{1}{y} \times \frac{1}{z} = \frac{-3x}{5yz} \text{ Ans.}$$

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

(*i*) $(3x^2 - 4x) \div 7x$

(*ii*) $(-12a + 22a^2 - 16a^3 + 4) \div 2a$

(*iii*) $(-8y^3 + 16y^2 + 14y + 1) \div 4y$

(*iv*) $(ax^8 - bx^6 + cx^4) + x^4$

(*v*) $(15x^2y^3 - 10x^3y^2 + 2xy) \div (-5xy^2)$

Solution. (*i*) We have : $(3x^2 - 4x) \div 7x$

$$= \frac{3x^2 - 4x}{7x} = \frac{3x^2}{7x} - \frac{4x}{7x}$$

$$= \frac{3x}{7} - \frac{4}{7} \text{ Ans.}$$

(*ii*) We have : $(-12a + 22a^2 - 16a^3 + 4) \div 2a$

$$= \frac{-12a + 22a^2 - 16a^3 + 4}{2a}$$

$$= \frac{-12a}{2a} + \frac{22a^2}{2a} - \frac{16a^3}{2a} + \frac{4}{2a}$$

$$= -6 + 11a - 8a^2 + \frac{2}{a} \text{ Ans.}$$

(*iii*) We have : $(-8y^3 + 16y^2 + 14y + 1) \div 4y$

$$= \frac{(-8y^3 + 16y^2 + 14y + 1)}{4y}$$

$$= \frac{-8y^3}{4y} + \frac{16y^2}{4y} + \frac{14y}{4y} + \frac{1}{4y}$$

$$= -2y^2 + 4y + \frac{7}{2} + \frac{1}{4y} \text{ Ans.}$$

(*iv*) We have : $(ax^8 - bx^6 + cx^4) \div x^4$

$$= \frac{ax^8 - bx^6 + cx^4}{x^4}$$

$$= \frac{ax^8}{x^4} - \frac{bx^6}{x^4} + \frac{cx^4}{x^4}$$

$$= ax^4 + bx^2 + c \text{ Ans.}$$

(*v*) We have :

$$(15x^2y^3 - 10x^3y^2 + 2xy) \div (-5xy^2)$$

$$= \frac{15x^2y^3 - 10x^3y^2 + 2xy}{-5xy^2}$$

$$= \frac{15x^2y^3}{-5xy^2} - \frac{10x^3y^2}{-5xy^2} + \frac{2xy}{-5xy^2}$$

$$= -3xy + 2x^2 - \frac{2}{5y} \text{ Ans.}$$

Q. 3. Divide as directed :

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

(*ii*) $x(x + 1)(x + 2)(x + 3) \div x(x + 1)$

(*iii*) $9a^2b^2(3c - 24) \div 27ab(c - 8)$

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

(*v*) $(x^3y^6 - x^6y^3) \div x^3y^3$

(*vi*) $48xyz(3x - 12)(5y - 30) \div 72(x - 4)(y - 6)$

Solution. (*i*) We have :

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

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

$$= 5(3x + 5) \text{ Ans.}$$

(*ii*) We have :

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

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

$$= (x + 2)(x + 3) \text{ Ans.}$$

(*iii*) We have :

$$9a^2b^2\,(3c-24) \div 27ab\,(c-8)$$

$$= \frac{9a^2b^2\,(3c-24)}{27ab\,(c-8)}$$

$$= \frac{9a^2b^2 \times 3\,\cancel{(c-8)}}{27ab\,\cancel{(c-8)}} = ab \text{ Ans.}$$

(*iv*) We have : $4yz\,(z^2+6z-16) \div 2y\,(z+8)$

First factorise $z^2 + 6z - 16$

$\therefore \quad z^2 + 6z - 16$

$$= z^2 + [(8 + (-2)]\,z - 16$$
$$= z^2 + 8z - 2z - 16$$
$$= z\,(z+8) - 2\,(z+8)$$
$$= (z+8)\,(z-2)$$

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

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

$$= \frac{\overset{2}{\cancel{4y}}\,z\,\cancel{(z+8)}\,(z-2)}{\underset{1}{\cancel{2y}}\,\cancel{(z+8)}}$$

$$= 2z\,(z-2) \text{ Ans.}$$

(*v*) We have : $(x^3y^6 - x^6y^3) \div x^3y^3$

$$= \frac{x^3y^6 - x^6y^3}{x^3y^3}$$

$$= \frac{\cancel{x^3y^3}\,(y^3 - x^3)}{\cancel{x^3y^3}}$$

$$= y^3 - x^3 \text{ Ans.}$$

(*vi*) We have :

$48xyz\,(3x-12)\,(5y-30) \div 72\,(x-4)\,(y-6)$

$$= \frac{48xyz\,(3x-12)\,(5y-30)}{72\,(x-4)\,(y-6)}$$

$$= \frac{\overset{2}{\cancel{48}}\,xyz \times 3\,(x-4) \times 5\,\cancel{(y-6)}}{\underset{\underset{1}{\cancel{24}}}{\cancel{72}}\,(x-4)\,\cancel{(y-6)}}$$

$$= 10xyz \text{ Ans.}$$

Q. 4. Using factor method, divide the following polynomial by a binomial.

(*i*) $(x^2 + 6x + 8)$ by $(x + 2)$

(*ii*) $(x^2 - x - 42)$ by $(x + 6)$

(*iii*) $(p^2 - 6p - 27)$ by $(p - 9)$

(*iv*) $(7x^2 + 14x)$ by $(x + 2)$

(*v*) $(a^2 - 7a + 12)$ by $(a - 3)$

(*vi*) $(x^4 + 3x^2 - 10)$ by $(x^2 + 5)$

(Hint put $x^2 = y$)

Solution. (*i*) First factorise $(x^2 + 6x + 8)$

Therefore, $x^2 + 6x + 8 = x^2 + (4+2)\,x + 4 \times 2$

$$= (x+4)\,(x+2)$$

Now, $(x^2 + 6x + 8) \div (x+2)$

$$= \frac{x^2+6x+8}{x+2} = \frac{(x+4)\,\cancel{(x+2)}}{\cancel{x+2}}$$

$$= (x+4) \text{ Ans.}$$

(*ii*) First factorise $(x^2 - x - 42)$

Therefore, $x^2 - x - 42$

$$= x^2 + \{(-7) + (6)\}\,x - 7 \times 6$$
$$= (x-7)\,(x+6)$$

Now, $(x^2 - x - 42) \div (x+6)$

$$= \frac{x^2-x-42}{x+6} = \frac{(x-7)\,\cancel{(x+6)}}{\cancel{x+6}}$$

$$= x - 7 \text{ Ans.}$$

(*iii*) First factorise $(p^2 - 6p - 27)$

Therefore, $p^2 - 6p - 27 = p^2 + \{(-9) + (3)\}\,p + (-9)\,(3) = (p-9)\,(p+3)$

Now, $(p^2 - 6p - 27) \div (p - q)$

$$= \frac{p^2-6p-27}{p-9} = \frac{\cancel{(p-9)}\,(p+3)}{\cancel{p-9}}$$

$$= p + 3 \text{ Ans.}$$

(*iv*) We have : $(7x^2 - 14x) \div (x+2)$

$$= \frac{7x^2+14x}{(x+2)} = \frac{7x\,\cancel{(x+2)}}{\cancel{x+2}}$$

$$= 7x \text{ Ans}$$

(v) First factorise $(a^2 - 7a + 12)$

$a^2 - 7a + 42 = a^2 + [(-4) + (-3)]\,a + (-4)(-3) = (a-4)(a-3)$

Now, $(a^2 - 7a + 42) \div (a - 3)$

$$= \frac{a^2 - 7a + 42}{a-3} = \frac{(a-4)\cancel{(a-3)}}{\cancel{a-3}}$$

$= a - 4$ **Ans.**

(vi) First factorise $(x^4 + 3x^2 - 10)$

Put $x^2 = y$

$\therefore \quad x^4 + 3x^2 - 10 = y^2 + 3y - 10$

$= y^2 + [5 + (-2)]\,y + (5) \times (-2) = (y+5)(y-2)$

$= (x^2 + 5)(x^2 - 2)$

$$\text{Now, } \frac{x^4 + 3x^2 - 10}{x^2 + 5} = \frac{\cancel{(x^2+5)}(x^2-2)}{\cancel{x^2+5}}$$

$= x^2 - 2$ **Ans.**

Q. 5. Divide the following polynomial by a binomial using long division method.

(i) $(p^2 + 12p + 35)$ by $(p + 7)$

(ii) $(9y^2 - 6y - 8)$ by $(3y - 4)$

Solution. (i) $(p^2 + 12p + 35)$ by $(p + 7)$

$= (p^2 + 12p + 35) \div (p + 7)$

$$= \frac{p^2 + 12p + 35}{p + 7}$$

Here,

Dividend $= p^2 + 12p + 35$

and divisor $= p + 7$

Let us divide by long division method

$$\begin{array}{r|l} p+7 & \cancel{p^2} + 12p + 35 \;(\,p+5 \\ & \underline{\cancel{p^2} + 7p} \\ & \underline{\;\;-\;\;\;\;\;-\;\;} \\ & \quad \cancel{5p} + \cancel{35} \\ & \quad \cancel{5p} + \cancel{35} \\ & \quad \underline{\;-\;\;\;\;\;-\;} \\ & \qquad 0 \end{array}$$

The remainder is zero and quotient is $p + 5$

Hence, $(p^2 + 12p + 35) \div (p - 7)$

$= p + 5$ **Ans.**

(ii) $(9y^2 - 6y - 8)$ by $3y - 4$

$= (9y^2 - 6y - 8) \div (3y - 4)$

$$= \frac{9y^2 - 6y - 8}{3y - 4}$$

Here,

Dividend $= 9y^2 - 6y - 8$

and divisor $= 3y - 4$

$$\begin{array}{r|l} 3y-4 & \cancel{9y^2} - 6y - 8 \;(\,3y+2 \\ & \cancel{9y^2} - 12y \\ & \underline{\;-\;\;\;\;\;\;+\;\;} \\ & \quad \cancel{6y} - \cancel{8} \\ & \quad \cancel{6y} - \cancel{8} \\ & \quad \underline{\;-\;\;\;\;+\;} \\ & \qquad 0 \end{array}$$

The remainder is zero and quotient is $3y + 2$

Hence, $9y^2 - 6y - 8 \div (3y - 4)$

$= 3y + 2$ **Ans.**

Q. 6. Divide :

(i) $z(5z^2 - 80)$ by $5z(z + 4)$

(ii) $10pq(p^2 - q^2)$ by $2p(p + q)$

(iii) $15ab(16a^2 - 25)$ by $10ab(4a + 5)$

(iv) $44(x^4 - 5x^3 - 24x^2)$ by $11(x^2 - 8x)$

(v) $39x^3(50x^2 - 98)$ by $26x^2(5x + 7)$

Solution.

(i) We have : $z(5z^2 - 80) \div 5z(z + 4)$

$$= \frac{z(5z^2 - 80)}{5z(z+4)} = \frac{\cancel{z} \times \cancel{5}(z^2 - 16)}{\cancel{5}\cancel{z}(z+4)}$$

$$= \frac{\cancel{(z+4)}(z-4)}{\cancel{z+4}} = z - 4 \text{ Ans.}$$

(ii) We have : $10pq(p^2 - q^2) \div 2p(p + q)$

$$= \frac{10pq(p^2 - q^2)}{2p(p+q)}$$

$$= \frac{\overset{5}{\cancel{10}}\cancel{p}q\,\cancel{(p+q)}(p-q)}{\cancel{2}\cancel{p}\,\cancel{(p+q)}}$$

$= 5q(p - q)$ **Ans.**

(*iii*) We have :

$$15ab\ (16a^2 - 25) \div 10ab\ (4a + 5)$$

$$= \frac{15(ab)(16a^2 - 25)}{10ab(4a+5)}$$

$$= \frac{15ab[(4a)^2 - (5)^2]}{10ab(4a+5)}$$

$$= \frac{\overset{3}{\cancel{15ab}}(4a-5)(4a+5)}{\underset{2}{\cancel{10ab}}(4a+5)}$$

$$= \frac{3}{2}(4a-5) \textbf{ Ans.}$$

(*iv*) First factorise $(x^4 - 5x^3 - 24x^2)$

Therefore, $x^4 - 5x^3 - 24x^2$

$= x^2(x^2 - 5x - 24)$

$= x^2[x^2 + (-8 + 3)\ x - 24]$

$= x^2(x - 8)\ (x + 3)$

$44\ (x^4 - 5x^3 - 24x^2) \div 11\ (x^2 - 8x)$

$$= \frac{44(x^4 - 5x^3 - 24x^2)}{11(x^2 - 8x)}$$

$$= \frac{\overset{4}{\cancel{44}}}{\underset{1}{\cancel{11}}} \times \frac{\overset{x}{\cancel{x^2}}\ \cancel{(x-8)}(x+3)}{\cancel{x}\ \cancel{(x-8)}}$$

$= 4x\ (x + 3)$ **Ans.**

(*v*) We have : $39x^3\ (50x^2 - 98) \div 26x^2\ (5x + 7)$

$$= \frac{39x^3(50x^2 - 98)}{26x^2(5x+7)}$$

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

$$= \frac{2 \times 39x^3[(5x)^2 - (7)^2]}{26x^2(5x+7)}$$

$$= \frac{\cancel{2} \times \overset{3}{\cancel{39}} \times x^3 \times \cancel{(5x+7)}(5x-7)}{\underset{2}{\cancel{26}}\ x^2\ \cancel{(5x+7)}}$$

$$= \frac{3}{2}x(5x-7) \textbf{ Ans.}$$

Q. 7. Multiple Choice Questions :

(*i*) $(4x^2 - 8x) \div (-4x^2) =$

(*a*) $-1 + 2x$ (*b*) $\frac{2}{x}$

(*c*) $-1 + \frac{2}{x}$ (*d*) $2x$.

(*ii*) $(x^2yz + xy^2z + xyz^2) \div xyz =$

(*a*) xyz (*b*) $x + y + z$

(*c*) $x^2 + y^2 + z^2$ (*d*) $\frac{xy}{2}$

(*iii*) $2x^2\ (x + 1)\ (x + 3) \div 4x\ (x + 3) =$

(*a*) $2x\ (x + 1)$

(*b*) $2x^2\ (x + 1)$

(*c*) $\frac{x^2(x+1)}{2}$

(*d*) $\frac{x(x+1)}{2}$

(*iv*) $(72x^2 - 50) \div (6x - 5) =$

(*a*) $2\ (6x + 5)$ (*b*) $12x + 5$

(*c*) $12x^2 + 5$ (*d*) $2\ (12x + 5)$

(*v*) $(x^2 - 8x - 20) \div (x - 10) =$

(*a*) $(x - 2)$ (*b*) $(x + 2)$

(*c*) $x - 3$ (*d*) $x + 4$.

Ans. (*i*) (*c*) $-1 + \frac{2}{x}$

(*ii*) (*b*) $x + y + z$

(*iii*) (*d*) $\frac{x(x+1)}{2}$

(*iv*) (*a*) $2\ (6x + 5)$

(*v*) (*b*) $(x + 2)$.

Objective Type Questions

Multiple Choice Questions :

(i) The factorisation of $49p^2 - 36 =$
(a) $(7p + 6)(7p - 6)$
(b) $(6p + 7)(6p - 7)$
(c) $(7p + 6)^2$
(d) $(7p - 6)^2$.

Ans. (a) $(7p + 6)(7p - 6)$.

(ii) $(p^3q^6 - p^6q^3) \div p^3q^3 =$ ....
(a) $q^3 - p^3$ (b) $p^3 - q^3$
(c) $(p + q)^3$ (d) $(p - q)^3$.

Ans. (a) $q^3 - p^3$.

(iii) Find the common factor of $14pq$ and $28p^2q^2$.
(a) $14pq$ (b) $28p^3q^3$
(c) $7pq^3$ (d) $14p^3q^3$.

Ans. (a) $14pq$.

(iv) Identify $(a^2 - b^2) =$ ....
(a) $a^2 + b^2 + 2ab$ (b) $a^2 + b^2 - 2ab$
(c) $(a + b)(a - b)$ (d) $(a + b)^2$.

Ans. (a) $a^2 + b^2 - 2ab$.

(v) Factorise : $7a^2 + 14a$
(a) $7a(a + 2)$ (b) $7a(a - 2)$
(c) $7a$ (d) $98a^3$.

Ans. (a) $7a(a + 2)$

(vi) Factorise $6xy - 4y$.
(a) $2x(3y - 2)$ (b) $6y(x - 4)$
(c) $2y(3x - 2)$ (d) $4y(6x - 1)$.

Ans. (c) $2y(3x - 2)$.

(vii) $66pq^2r^3 \div 11qr^2 =$ ....
(a) $6pqr$ (b) $6pqr^2$
(c) $6pq^2r$ (d) $6qr^2$.

Ans. (a) $6pqr$.

(viii) Factorise $49x^2 - 36$.
(a) $(7x - 6)(7x - 6)$ (b) $(7x + 6)(7x + 6)$
(c) $(7x + 6)(7x - 6)$ (d) None of these.

Ans. (c) $(7x + 6)(7x - 6)$.

(ix) The common factor of $6abc$, $24ab^2$, $12a^2b$ is :
(a) $6abc$ (b) $6ab$
(c) $24abc$ (d) $2abc$.

Ans. (b) $6ab$.

(x) $99^2 =$ ....
(a) $(100 + 1)(100 - 1)$
(b) $(100 - 1)(100 - 1)$
(c) $100^2 + 100 + 1$
(d) $100^2 + 2 \times 100 + 1$.

Ans. (a) $(100 + 1)(100 - 1)$.

(xi) What is the common factor of $12x$ and 36 ?
(a) 12 (b) 36
(c) 6 (d) x.

Ans. (a) 12.

2. Choose True/False for the following questions :

(i) Common factor of $2y$ and $22xy$ is $2y$. (True/False)

Ans. True.

(ii) $3x^2 \div 3x^2 = 1$ (True/False)

Ans. True.

(iii) An irreducible factor is a factor which cannot be expressed further as a product of factors. (True/False)

Ans. True.

(iv) $(a^2 - b^2) = (a + b)(a + b)$ (True/False)

Ans. False.

(v) $(4y^2 + 2y) \div 2y = 2y + 1$. (True/False)

Ans. True.

3. Fill in the blanks :

(i) Common factor of $6abc$, $24ab^2$, $12a^2b$ is ....

Ans. $6ab$.

(ii) Factors of $6xy - 4xy$ are ....

Ans. $2y(3x - 2)$

(iii) $99^2 =$ ....

Ans. $(100 + 1)(100 - 1)$.

(iv) $28x^4 \div 56x =$ ....

Ans. $\frac{x^3}{2}$.

(v) $(10x - 25) \div 5 =$ ....

Ans. $2x - 5$.