Mathematics-9

Unit 6 – Review Exercise 6

Review Exercise 6

Q.1 Choose the correct answer.

(i) **H.C.F of** p^3q-pq^3 **and** $p^5q^2-pq^5$ **is** __________ **(U.B)**

(a) $pq(p^2-q^2)$
(b) $pq(p-q)$
(c) $p^2q^2(p-q)$
(d) $pq(p^3-q^3)$

(ii) **H.C.F of** $5x^2y^2$ *and* $20x^3y^3$ is __________ **(K.B)**

(FSD 2014, SWL 2013, MTN 2013, D.G.K 2013)

(a) $5x^2y^2$
(b) $20x^3y^3$
(c) $100x^5y^5$
(d) $5xy$

(iii) **H.C.F of** $x-2$ **and** x^2+x-6 is ______ **(U.B)**

(a) x^2+x-6
(b) $x+3$
(c) $x-2$
(d) $x+2$

(iv) **H.C.F of** a^3+b^3 **and** a^2-ab+b^2 is ______ **(U.B)**

(a) $a+b$
(b) a^2-ab+b^2
(c) $(a-b)^2$
(d) a^2+b^2

(v) **H.C.F of** x^2-5x+6 **and** x^2-x-6 is______ **(K.B)**

(GRW 2013, FSD 2013, BWP 2013, BWP 2013, 16)

(a) $x-3$
(b) $x+2$
(c) x^2-4
(d) $x-2$

(vi) **H.C.F of** a^2-b^2 **and** a^3-b^3 is______ **(U.B)**

(a) $a-b$
(b) $a+b$
(c) a^2+ab+b^2
(d) a^2-ab+b^2

(vii) **H.C.F of** x^2+3x+2, x^2+4x+3 **and** x^2+5x+4 is______ **(K.B)**

(a) $x+1$
(b) $(x+1)(x+2)$
(c) $x+3$
(d) $(x+4)(x+1)$

(viii) **L.C.M of** $15x^2, 45xy$ **and** $30xyz$ is______ **(A.B)**

(a) $90xyz$
(b) $90x^2yz$
(c) $15xyz$
(d) $15x^2yz$

(ix) **L.C.M of** a^2+b^2 **and** a^4-b^4 is______ **(K.B)**

(a) a^2+b^2
(b) a^2-b^2
(c) a^4-b^4
(d) $a-b$

(x) **The product of two algebraic expression is equal to the ________ of their H.C.F and L.C.M** **(K.B)**

(a) Sum **(b)** Difference
(c) Product **(d)** Quotient

(xi) **Simplify** $\frac{a}{9a^2-b^2}+\frac{1}{3a-b}$ is_______ **(A.B)**

(a) $\frac{4a}{9a^2-b^2}$ **(b)** $\frac{4a-b}{9a^2-b^2}$
(c) $\frac{4a+b}{9a^2-b^2}$ **(d)** $\frac{b}{9a^2-b^2}$

(xii) **Simplify** $\frac{a^2+5a-14}{a^2-3a-18}\times\frac{a+3}{a-2}$ =_______ **(A.B)**

(a) $\frac{a+7}{a-6}$ **(b)** $\frac{a+7}{a-2}$
(c) $\frac{a+3}{a-6}$ **(d)** $\frac{a-2}{a+3}$

(xiii) **Simplify the** $\frac{a^3-b^3}{a^4-b^4}\div\frac{a^2+ab+b^2}{a^2+b^2}$ =_______ **(A.B)**

(a) $\frac{1}{a+b}$ **(b)** $\frac{1}{a-b}$
(c) $\frac{a-b}{a^2+b^2}$ **(d)** $\frac{a+b}{a^2+b^2}$

(xiv) **Simplify** $\left(\frac{2x+y}{x+y}-1\right)\div\left(1-\frac{x}{x+y}\right)$ =_______ **(A.B)**

(a) $\frac{x}{x+y}$ **(b)** $\frac{y}{x+y}$
(c) $\frac{y}{x}$ **(d)** $\frac{x}{y}$

(xv) **The square root of** a^2-2a+1 is ________ **(K.B)**

(LHR 2017, GRW 2017, MTN 2014, 15, 16, 17, SGD 2013)

(a) $\pm(a+1)$ **(b)** $\pm(a-1)$
(c) $a-1$ **(d)** $a+1$

(xvi) **What should be added to complete the square of** x^4+64 ?______

(a) $8x^2$ **(b)** $-8x^2$
(c) $16x^2$ **(d)** $4x^2$

(xvii) **The square root to** $x^4+\frac{1}{x^4}+2$ **is**________ **(SWL 2013, BWP 2016)** **(K.B)**

(a) $\pm\left(x+\frac{1}{x}\right)$ **(b)** $\pm\left(x^2+\frac{1}{x^2}\right)$

(c) $\pm\left(x-\frac{1}{x}\right)$ **(d)** $\pm\left(x^2-\frac{1}{x^2}\right)$

ANSWER KEYS

1	b	5	a	9	c	13	a	17	b
2	a	6	a	10	c	14	d		
3	c	7	a	11	c	15	b		
4	b	8	b	12	a	16	c		

Q.2 Find the H.C.F of the following by factorization.

$8x^4-128, 12x^3-96$

Solution:

$8x^4-128 \quad =8\left(x^4-16\right) \quad =8\left[(x)^2-(4)^2\right]$

$=2\times2\times2\left(x^2+4\right)\left(x^2-4\right) \qquad a^2-b^2=(a+b)(a-b)$

$=2\times2\times2\left(x^2+4\right)(x+2)(x-2)$

$12x^3-96 \quad =12(x^3-8)$

$=\left(12(x^3-2^3\right) \qquad a^3-b^3=(a-b)\left(a^2+ab+b^2\right)$

$=12(x-2)(x^2+2x+4)$

$2\times2\times3(x-2)\left(x^2+2x+4\right)$

H.C.F = $2\times2(x-2)$

$=4(x-2)$

Q.3 Find the H.C.F of the following by division method $y^3+3y^2-3y-9,\ y^3+3y^2-8y-24$**.**

(A.B)

Solution:

$$\begin{array}{r|l} & 1 \\ y^3+3y^2-8y-24 & \cancel{y^3}+\cancel{3y^2}-3y-9 \\ & \underline{\pm\cancel{y^3}\pm\cancel{3y^2}\mp 8y\mp 24} \\ & \qquad 5y+15 \end{array}$$

$$5(y+3)$$

$$\begin{array}{r|l} & y^2-8 \\ y+3 & \cancel{y3}+3y^2-8y-24 \\ & \underline{\pm\cancel{y3}\pm 3y^2} \\ & -\cancel{8y}-\cancel{24} \\ & \underline{\pm\cancel{8y}\pm\cancel{24}} \\ & \quad\times \end{array}$$

$$\textbf{H.C.F}=(y+3)$$

Q.4 Find the L.C.M of the following by factorization.

$12x^2-75,\ 6x^2-13x-5,\ 4x^2-20x+25$

Solution:

$$\begin{aligned}12x^2-75&=3\left(4x^2-25\right)\\&=3\left[(2x)^2-(5)^2\right] \qquad \because\ a^2-b^2=(a+b)(a-b)\\&=3(2x-5)(2x+5)\end{aligned}$$

$$\begin{aligned}6x^2-13x-5&=6x^2-15x+2x-5\\&=3x(2x-5)+1(2x-5)\\&=(2x-5)(3x+1)\end{aligned}$$

$$\begin{aligned}4x^2-20x+25&=4x^2-10x-10x+25\\&=2x(2x-5)-5(2x-5)\\&=(2x-5)(2x-5)\end{aligned}$$

Common factor = $(2x–5)$

Non common factor $=3(3x+1)(2x-5)(2x+5)$

L.C.M = common factor × non common factor

L.C.M = $(2x-5)3(3x+1)(2x+5)(2x-5)$

$\text{L.C.M}=3(2x+5)(2x-5)^2(3x+1)$

Q.5 If H.C.F of $x^4+3x^3+5x^2+26x+56$ and $x^4+2x^3-4x^2-x+28$ is x^2+5x+7 find their L.C.M. **(A.B+K.B)**

Solution: $p(x)=x^4+3x^3+5x^2+26x+56$ and $q(x)=x^4+2x^3-4x^2-x+28$

$\text{H.C.F.}=x^2+5x+7$, L.C.M. = ?

$\text{L.C.M.}=\dfrac{P(x)\times q(x)}{\text{H.C.F.}}$ **(K.B)**

$$\text{L.C.M}=\frac{\left(x^4+3x^2+5x^2+26x+56\right)\times\left(x^4+2x^3-4x^2-x+28\right)}{\left(x^2+5x+7\right)}$$

$$\begin{array}{r|l}
 & x^2-3x+4 \\ \hline
x^2+5x+7 & \cancel{x^4}+2x^3-4x^2-x+28 \\
 & \underline{\pm\cancel{x^4}\pm5x^3\pm7x^2} \\
 & \quad -\cancel{3x^3}-11x^2-x+28 \\
 & \quad \underline{\mp\cancel{3x^3}\mp15x^2\mp21x} \\
 & \quad +\cancel{4x^2}+\cancel{20x}+\cancel{28} \\
 & \quad \underline{\pm\cancel{4x^2}\pm\cancel{20x}\pm\cancel{28}} \\
 & \qquad 0
\end{array}$$

$$\text{L.C.M} = \frac{q(x)\,p(x)}{H.C.F}$$

$$L.C.M = \frac{(x^4+3x^3+5x^2+26x+56)\,\overset{x^2-3x+4}{\cancel{(x^4+2x^3-4x^2-x+28)}}}{\cancel{(x^2+5x+7)}}$$

$$L.C.M = (x^4+3x^3+5x^2+26x+56)(x^2-3x+4)$$

Q.6 Simplify: **(A.B)**

Solution:

(i) $\dfrac{3}{x^3+x^2+x+1} - \dfrac{3}{x^3-x^2+x-1}$

Solution: $\dfrac{3}{x^3+x^2+x+1} - \dfrac{3}{x^3-x^2+x-1}$

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

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

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

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

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

$$= \frac{-6}{(x^4-1)}$$

$$= \frac{6}{1-x^4}$$

(ii) $\dfrac{a+b}{a^2-b^2}\div\dfrac{a^2-ab}{a^2-2ab+b^2}$

Solution: $\dfrac{a+b}{a^2-b^2}\div\dfrac{a^2-ab}{a^2-2ab+b^2}$

$$=\frac{a+b}{a^2-b^2}\times\frac{a^2-2ab+b^2}{a^2-ab}$$

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

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

$$=\frac{\cancel{a+b}}{(a-b)(\cancel{a+b})}\times\frac{(a-b)^2}{a(a-b)}$$

$$=\frac{(\cancel{a-b})^2}{a(\cancel{a-b})^2}$$

$$=\frac{1}{a}$$

Q.7 **Find the square root by using factorization.** $\left(x^2+\dfrac{1}{x^2}\right)+10\left(x+\dfrac{1}{x}\right)+27 \quad (x\neq 0)$.

(BWP 2013, 14, 16, FSD 2015,) (A.B+K.B)

Solution: $\left(x^2+\dfrac{1}{x^2}\right)+10\left(x+\dfrac{1}{x}\right)+27$

$$=\left(x^2+\frac{1}{x^2}\right)+10\left(x+\frac{1}{x}\right)+25+2$$

$$=\left(x^2+\frac{1}{x^2}+2\right)+10\left(x+\frac{1}{x}\right)+25$$

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

$$=\left[x+\frac{1}{x}+5\right]^2$$

$a^2+2ab+b^2=(a+b)^2$

Taking the square root

$$\sqrt{\left(x^2+\frac{1}{x^2}\right)+10\left(x+\frac{1}{x}\right)+27}=\sqrt{\left[x+\frac{1}{x}+5\right]^2}$$

$$=\pm\left(x+\frac{1}{x}+5\right)$$

Q.8 **Find the square roots0 by using division method.** $\frac{4x^2}{y^2}+\frac{20x}{y}+13-\frac{30y}{x}+\frac{9y^2}{x^2}$ **(A.B)**

Solution:

$$\frac{2x}{y}+5-\frac{3y}{x}$$

$$\frac{2x}{y}\Big)\ \frac{\cancel{4x^2}}{\cancel{y^2}}+\frac{20x}{4}+13-\frac{30y}{x}+\frac{9y^2}{x^2}$$

$$\pm\frac{\cancel{4x^2}}{\cancel{y^2}}$$

$$\frac{4x}{y}+5\Big)\ \frac{\cancel{20x}}{\cancel{y}}+13-\frac{30y}{x}+\frac{9y^2}{x^2}$$

$$\pm\frac{\cancel{20x}}{\cancel{y}}\pm25$$

$$\frac{4x}{y}+10-\frac{3y}{x}\Big)\ -\cancel{12}-\frac{\cancel{30y}}{\cancel{x}}+\frac{\cancel{9y^2}}{\cancel{x^2}}$$

$$\mp\cancel{12}\mp\frac{\cancel{30y}}{\cancel{x}}\pm\frac{\cancel{9y^2}}{\cancel{x^2}}$$

$$\times$$

Square root $=\pm\left[\frac{2x}{y}+5-\frac{3y}{x}\right]$