

Review Exercise 4

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Q1 Encircle the correct option.					
i)	The factorization of $12x+36$ is	$12(x+3)$	$12(3x)$	$12(3x+1)$	$x(12+36x)$
ii)	The factors of $4x^2-12y+9$ are	$(2x+3)^2$	$(2x-3)^2$	$(2x-3)(2x+3)$	$(2+3x)(2-3x)^2$
iii)	The HCF of a^3b^3 and ab^2 is	a^3b^3	ab^2	a^4b^5	a^2b
iv)	The LCM of $16x^2$, $4x$ and $30xy$ is	$480x^3y$	$240xy$	$240x^2y$	$120x^4y$
v)	Product of LCM and HCF =__ of two polynomials	Sum	Difference	Product	Quotient
vi)	The square root of x^2-6x+9 is	$\pm(x-3)$	$\pm(x-3)$	$x-3$	$x+3$
vii)	The LCM of $(a-b)^2$ and $(a-b)$ is	$(a-b)^2$	$(a-b)^3$	$(a-b)^4$	$(a-b)^6$
viii)	Factorization of x^3+3x^2+3x+1 is:	$(x+1)^3$	$(x-1)^3$	$(x+1)(x^2+x+1)$	$(x-1)(x^2+x+1)$
ix)	Cubic polynomial has degree:	1	2	3	4
x)	One of the factors of x^3-27 is:	$x-3$	$x+3$	x^2-3x+9	Both A and C

Q2 Factorize of the following expressions	
(i) $4x^3 + 18x^2 - 12x = 2x(2x^2 + 9x - 6)$ Ans	(vi) $x^4 + 64$ $= (x^2)^2 + (8)^2 + 2(x^2)(8) - 2(x^2)(8) = (x^2 + 8)^2 - 16x^2$ $= (x^2 + 8)^2 - (4x)^2 = (x^2 + 8 - 4x)(x^2 + 8 + 4x)$ $= (x^2 - 4x + 8)(x^2 + 4x + 8)$
(ii) $x^3 + 64y^3$ $= (x)^3 + (4y)^3$ $= (x + 4y)[(x)^2 - (x)(4y) + (4y)^2]$ $= (x + 4y)(x)^2 - 4xy + 16y^2$	(vii) $x^4 + 2x^2 + 9$ $= (x^2)^2 + 2x^2 + (3)^2$ $= (x^2)^2 + 2(x^2)(3) + (3)^2 + 2x^2 - 2(x^2)(3)$ $= (x^2 + 3)^2 - 4x^2$ $= (x^2 + 3)^2 - (2x)^2 = (x^2 + 3 - 2x)(x^2 + 3 + 2x)$ $= (x^2 - 2x + 3)(x^2 + 2x + 3)$
(iii) $x^3y^3 - 8$ $= (xy)^3 - (2)^3$ $= (xy - 2)[(xy)^2 + (xy)(2) + (2)^2]$ $= (xy - 2)(x^2y)^2 + 2xy + 4$	(viii) $(x+3)(x+4)(x+5)(x+6) - 360$ $= (x+3)(x+6)(x+4)(x+5) - 360$ $= (x^2 + 9x + 18)(x^2 + 9x + 20) - 360$ $= (y+18)(y+20) - 360 = y^2 + 38y + 360 - 360 = y^2 + 38y$ $= y(y+38) = (x^2 + 9x)(x^2 + 9x + 38)$ $= x(x+9)(x^2 + 9x + 38)$
(iv) $-x^2 - 23x - 60$ $= -(x^2 + 23x + 60) = -[x^2 + 20x + 3x + 60]$ $= -[x(x+20) + 3(x+20)]$ $= -(x+3)(x+20)$ Ans	(ix) $(x^2 + 6x + 3)(x^2 + 6x - 9) + 36$ $= (x^2 + 6x + 3)(x^2 + 6x - 9) + 36$ $= (Y+3)(y-9) + 36 = y^2 - 6y + 27 + 36 = y^2 - 6y + 9$ $= (y)^2 - 2(y)(3) + (3)^2 = (y-3)^2$ $= (x^2 + 6x - 3)^2$
(v) $2x^2 + 7x + 3$ $= 2x^2 + 6x + x + 3 = 2x(x+3) + 1(x+3)$ $= (2x+1)(x+3)$	

Q3 Find LCM and HCF by prime factorization method

(i) $4x^3 + 12x^2, 8x^2 + 16x$

$$4x^3 + 12x^2 = 4x^2(x + 3) = 4 \times x \times x \times x(x + 3)$$

$$8x^2 + 16x = 8x(x + 2) = 2 \times 4 \times x \times (x + 2)$$

Common Factors = $4x$

Non-Common Factors = $x \times (x + 3) \times 2 \times (x + 2) = 2x(x + 3)(x + 2)$

HCF = $4x$

LCM = CF $\times$ NCF = $4x \times 2x(x + 3)(x + 2) = 8x^2(x + 2)(x + 3)$

(ii) $x^3 + 3x^2 - 4x, x^2 - x - 6$

$$x^3 + 3x^2 - 4x = x(x^2 + 3x - 4) = x(x^2 + 4x - x - 4) = x(x - 1)(x + 4)$$

$$x^2 - x - 6 = x^2 - 3x + 2x - 6 = (x - 3)(x + 2)$$

Common Factors = 1

Un-Common Factors = $x(x - 1)(x + 4)(x - 3)(x + 2)$

HCF = 1

LCM = CF $\times$ NCF = $x(x - 1)(x + 2)(x - 3)(x + 4)$ wrong answer in book

(iii) $x^2 + 8x + 16, x^2 - 16$

$$x^2 + 8x + 16 = (x)^2 + 2(x)(4) + (4)^2 = (x + 4)^2 = (x + 4)(x + 4)$$

$$x^2 - 16 = (x)^2 - (4)^2 = (x - 4)(x + 4)$$

Common Factors = $(x + 4)$

Non-Common Factors = $(x - 4)(x + 4)$

HCF = $(x + 4)$

LCM = CF $\times$ NCF = $(x + 4) \times (x - 4)(x + 4) = (x - 4)(x + 4)^2$

(iv) $x^3 - 9x, x^2 - 4x + 3$

$$x^3 - 9x = x(x^2 - 9) = x(x - 3)(x + 3)$$

$$x^2 - 4x + 3 = x^2 - 3x - x + 3 = (x - 3)(x - 1)$$

Common Factors = $(x - 3)$

Non-Common Factors = $x(x - 3)(x - 1)$

HCF = $(x - 3)$

LCM = CF $\times$ NCF = $(x - 3) \times x(x + 3)(x - 1)$

LCM = $x(x - 1)(x^2 - 9)$ wrong answer in book

Q4 Find square root by factorization and division method of the expression

Solution

$$16x^4 + 8x^2 + 1 = (4x^2)^2 + 2(4x^2)(1) + (1)^2$$

$$16x^4 + 8x^2 + 1 = (4x^2 + 1)^2$$

$$\sqrt{16x^4 + 8x^2 + 1} = \sqrt{(4x^2 + 1)^2}$$

$$\sqrt{16x^4 + 8x^2 + 1} = \pm(4x^2 + 1)^2$$

Division Method :

$$\begin{array}{r}
 4x^2 + 1 \\
 \overline{16x^4 + 8x^2 + 1} \\
 16x^4 \\
 \hline
 8x^2 + 1 \\
 \pm 8x^2 \pm 1 \\
 \hline
 0
 \end{array}$$

$$\sqrt{16x^4 + 8x^2 + 1} = \pm(4x^2 + 1)^2$$

Q5 Hurria is analyzing the total cost of her loan, modeled by the expression

$C(x) = x^2 - 8x + 15$, where x represents the number of years. What is the

Optimal repayment period for Hurria's loan?

Solution

$$C(x) = x^2 - 8x + 15 = x^2 - 5x - 3x + 15 = (x - 5)(x - 3)$$

For optimal repayment, using $C(x) = 0$ we have $(x - 5)(x - 3) = 0$

We have $x = 3, x = 5$. That is 3 years or 5 years.

These notes are prepared by **Mubashar Siddique (BS Mathematics)** and published on this website.

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