MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

HCF AND LCM OF POLYNOMIALS AND RATIONAL EXPRESSIONS

Solved Examples

1. What is HCF of $8x^2y^2$, $12x^3y^2$ and $24x^4y^3z^2$?

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2. Find the HCF of $x^2 - 5x + 6$ and $x^2 - 9$

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3. Find the LCM of $14a^2b^3c^4$, $20ab^3c^3$ and a^5b^4.

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4. Find the LCM of $3y + 12$, $y^2 - 16$ and $y^4 - 64y$

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5. The HCF of two expressions is x and their LCM is $x^3 - 9x$.If one of the expressions is $x^2 + 3x$, then find the other expression.

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6. If the HCF of $x^3 - 343$ and $x^2 - 9x + 14$ is $(x - 7)$ then find their LCM.

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7. Simplify the expression $\frac{6p^2 - 150}{p^2 - 3x - 40}$

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8. Add : $\frac{a}{3xy} + \frac{2b}{6yz} + \frac{3c}{15xz}$

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9. Simplify : $\frac{1}{x^2 - 8x + 15} - \frac{1}{x^2 - 25}$

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10. Simplify the expression :

$$\left[\frac{x^3 + y^3}{(x-y)^2 + 3xy}\right] \div \left[\frac{(x+y)^2 - 3xy}{x^3 - y^3}\right] \times \frac{xy}{x^2 - y^2}$$

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Question Bank

1. HCF of the polynomials $20x^2y(x^2 - y^2)$ and $35xy^2(x - y)$ is

A. $5x^2y^2(x - y)$

B. $5xy(x - y)$

C. $5x^2y^2(x + y)$

D. $5xy(x^2 - y^2)$

Answer: B

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2. HCF of $x^3 - 1$ and $x^4 + x^2 + 1$ will be

A. $(x - 1)$

B. $x^2 + x + 1$

C. $x^2 - x + 1$

D. $x^2 - x - 1$

Answer: B

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3. The HCF of the polynomials $x^3 - 3x^2 + x - 3$ and $x^3 - x^2 - 9x + 9$ is:

A. $x - 3$

B. $x - 1$

C. $x^2 + 1$

D. $(x - 1)(x - 3)$

Answer: A

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4. The LCM of $xy + yz + zx + y^2$ and $x^2 + xy + yz + zx$

A. $x + y$

B. $y + z$

C. $(x+y)(y+z)(z+x)$

D. x^2+y^2

Answer: C

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5. The LCM of $x^2-10x+16, x^2-9x+14$ and $x^2-10x+21$ is

A. $(x-2)^2(x-3)(x-7)^2(x-8)$

B. $(x-2)^2(x-3)(x-7)(x-8)$

C. $(x-2)(x-3)(x-7)^2(x-8)$

D. $(x-2)(x-3)(x-7)(x-8)$

Answer: D

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6. The LCM of $6\left(x^2+xy\right), 8\left(xy-y^2\right), 12\left(x^2-y^2\right)$ and $20(x+y)^2$ is:

A. $120x(x+y)(x-y)$

B. $120xy(x+y)(x-y)$

C. $120xy(x+y)^2(x-y)$

D. $120xy(x+y)(x-y)^2$

Answer: C

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7. The HCF of $\left\{x^4 - y^4\right)$ and $\left(x^6 - y^6\right)$ is

A. $x^2 - y^2$

B. $x^2 + y^2$

C. $x3 + y^3$

D. $x^3 - y^3$

Answer: A

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8. The LCM of the polynomials $x^3 + 3x^2 + 3x + 1$, $x^2 + 2x + 1$ and $x^2 - 1$ is :

A. $(x-1)(x+1)^3$

B. $\left(x^2+1\right)(x-1)^2$

C. $\left(x^2-1\right)(x-1)^2$

D. $(x+1)^3$

Answer: A

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9. The product of two expression is $x^3 + x^2 - 44x - 84$. If the HCF of these two expressions is $x + 6$, then their LCM will be:

A. $(x + 2)(x + 7)$

B. $(x + 2)(x - 7)$

C. $(x - 2)(x + 7)$

D. $(x - 2)(x - 7)$

Answer: B

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10. The HCF of $x^4 - 11x^2 + 10, x^2 - 5x + 4$ and $x^3 - 3x^2 + 3x - 1$ is

A. $x + 1$

B. $x - 4$

C. $x + 2$

D. $x - 1$

Answer: D

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11. The HCF of two polynomials $4x^2\left(x^2-3x+2\right)$ and $12x(x-2)\left(x^2-4\right)$ is $4x(x-2)$. The LCM of the two polynomials is :

A. $12x\left(x^2-4\right)$

B. $12x^2\left(x^2-3x+4\right)\left(x^2-2\right)$

C. $12x^2\left(x^2-3x+2\right)\left(x^2-4\right)$

D. $12x\left(x^2-3x-2\right)\left(x^2-4\right)$

Answer: C

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12. The rational expression $\frac{8x^3 - 125}{4x^2 + 10x + 25}$ in its simplest form is :

A. $2x$

B. 5

C. $2x + 5$

D. $2x - 5$

Answer: D

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13. $\sqrt{\frac{(x^2 + 3x + 2)(x^2 + 5x + 6)}{x^2(x^2 + 4x + 3)}}$ is equal to :

A. $x(x+1)$

B. $\frac{x+2}{x}$

C. $\frac{x}{x+2}$

D. $x(x+2)$

Answer: B

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14. If $A = \frac{2x+1}{2x-1}$ and $B = \frac{2x-1}{2x+1}$ then A - B is equal to:

A. $\frac{1}{4x^2-1}$

B. $\frac{8x}{4x^2-1}$

C. $\frac{-2}{2x^2-1}$

D. $\frac{4x}{4x^2-1}$

Answer: B

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15. $\frac{1}{x+1}-\frac{1}{x-1}-\frac{x^2}{x+1}+\frac{x^2}{x-1}$, when simplified is equal to :

A. 0

B. 1

C. 2

D. -2

Answer: C

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16. The product of the rational expressions $\frac{x^2 - y^2}{x^2 + 2xy + y^2}$ and $\frac{xy + y^2}{x^2 - xy}$ is:

A. xy

B. y/x

C. x/y

D. 1

Answer: B

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17. $\left(\frac{2x+y}{x+y}-1\right) \div \left(1-\frac{y}{x+y}\right)$ is equal to :

A. x

B. y

C. xy

D. 1

Answer: D

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18.

$$\frac{x^3+y^3+z^3-3xyz}{a^3+b^3+c^3-3abc} \times \frac{a^2+b^2+c^2-ab-bc-ca}{x^2+y^2+z^2-xy-yz-zx}$$

equals

A. 1

B. $\frac{x^2+y^2+z^2}{a^2+b^2+c^2}$

C. $\frac{x+y+z}{a+b+c}$

D. $\frac{xyz}{abc}$

Answer: C

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19. What should be added to $\frac{a}{a-b}+\frac{b}{a+b}$ to get 1?

A. $\frac{-2ab}{a^2+b^2}$

B. $\frac{2ab}{a^2-b^2}$

C. $\frac{2ab}{b^2-a^2}$

D. $\frac{-2ab}{b^2-a^2}$

Answer: C

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20. Simplify :

$$\left[\frac{1}{1+a}+\frac{2a}{1-a^2}\right]\times\left(\frac{a^2+4a-5}{a^2+10a+25}\right)$$

A. $\frac{-1}{a+1}$

B. $\frac{1}{1-a}$

C. $\frac{1}{a+5}$

D. $\frac{-1}{a+5}$

Answer: D

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Self Assessment Sheet

1. If p, m and n are prime numbers, none of which is equal to the other two, what is the greatest common

factor of $24pm^2n^2$, $9pmn^2$ and $36p(mn)^3$?

A. $3pmn$

B. $3p^2m^2n^2$

C. $3pmn^2$

D. $3pmn^3$

Answer: C

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2. The HCF of $x^5 + 2x^4 + x^3$ and $x^7 - x^5$ is

A. x

B. $x(x+1)$

C. x^3

D. $x^3(x+1)$

Answer: D

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3. The LCM of x^2-3x+2 and x^3-2x^2-3x is :

A. $x(x-2)(x+3)\left(x^2-1\right)$

B. $x(x-2)(x-3)\left(x^2+1\right)$

C. $x(x-2)(x-3)\left(x^2-1\right)$

D. $x(x-2)(x+3)(x^2+1)$

Answer: C

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4. The LCM and HCF of two polynomials are respectively $(2a-5)^2(a+1)$ and $(2a-5)$. If one of the polynomials is $4a^2-20a+25$, the other one is :

A. $4a^2+20a+5$

B. $4a^2-25$

C. $2a^2+3a-5$

D. $2a^2-3a-5$

Answer: D

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5. $\frac{a+1}{a^2+5a} \times \frac{a^2-25}{a^2-a-20} \div \frac{a^2-a-2}{a^2+2a-8}$ when simplified is equal to :

A. 1

B. a

C. $\frac{1}{a}$

D. a^2

Answer: C

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6. The value of $\frac{x+y}{x-y}+\frac{x-y}{x+y}-\frac{2\left(x^2-y^2\right)}{x^2-y^2}$ is :

A. 1

B. x

C. y

D. 0

Answer: D

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7. Evaluate

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

A. $2x$

B. -1

C. 0

D. x

Answer: C

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8. The rational expression

$$\frac{\left(x^2 - xy - 12y^2\right)\left(x^2 - xy - 12y^2\right)}{(x^2 - 16y^2)(x^2 - 9y^2)}$$ when simplified equals.

A. 1

B. xy

C. $(x + y)$

D. $(x - y)$

Answer: A

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9. $\left[\frac{x+1}{x-1}-\frac{x-1}{x+1}-\frac{4x}{x^2+1}\right] \div \frac{4}{x^4-1}$ when simplified is equal to :

A. 1

B. 0

C. x^2-1

D. 2

Answer: D

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10. The positive square root of the rational expression.

$$\left[y^3 - \frac{1}{y^3} - 3\left(y - \frac{1}{y}\right)\right] \div \left(y - \frac{1}{y}\right) \text{ is}$$

A. $y + \frac{1}{y}$

B. 1

C. $y - \frac{1}{y}$

D. 2

Answer: C

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