MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

HCF AND LCM

Solved Examples

1. What is the least number which when divided by 15, 18 and 21 leaves remainders 2, 5 and 8 respectively?

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2. There are three numbers the HCF of each pair is 15 and the LCM of all the three numbers is 1890. What is the product of the number?

3. What is the least number which when divided by 4,6,8 and 9 leaves zero remainder in each case but when divided by 13 leaves a remainder of 7?
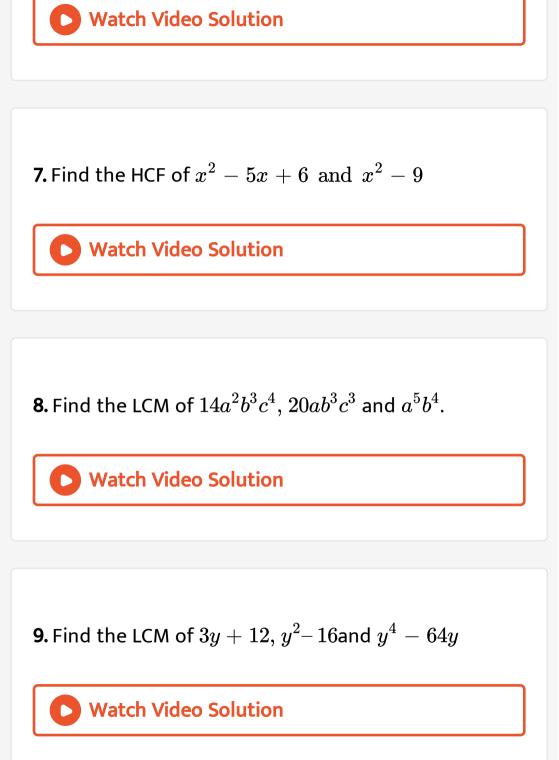
4. Find the least number which when dividded by 12, 16, 18, 30 leaves remainder 4 in each case but it is completely divisible by 7 ?

5. The LCM and HCF of two positive numbers are 175 and 5 respectively. If the sum of the numbers is 60 what is the difference between them?

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

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

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

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

10. 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.

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

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

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

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

15. Simplify the expression :

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

1. Find the number of pairs of natural numbers with LCM as 56

    A. 3

    B. 4

    C. 10

    D. Can't be determined

Answer: C

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2. A general can draw up his soldiers in the rows of 10, 15 and 18 soldiers and he can also draw them up in the form of a solid square. Find the least number of soldiers with the general

A. 100

B. 3600

C. 900

D. 90

Answer: C

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3. The cicumferences of a fore and hind wheels of a carriage are $6\frac{3}{14}$m and $8\frac{1}{18}$m respectively. At any given moment, a chalk mark is put on the point of contact of each wheel with the ground. Find the distance travlled by the carriage so that both the chalk marks are again on the ground at the same time

    A. 218m

    B. 217.5m

    C. 218.25m

    D. 217m

Answer: B

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4. The LCM of two numbers is 28 times of their HCF. The sum of their LCM and HCF is 1740. If one of the numbers is 240, find the other number.

A. 240

B. 620

C. 540

D. 420

Answer: D

5. Find the two largest numbers of four digits having 531 as their HCF:

    A. 9231, 9762

    B. 9027, 9558

    C. 9037,9568

    D. 9127,9658

Answer: B

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6. Find the greatest number of five digits which become exactly divisible by 10, 12, 15 and 18 when 3769

is added to it

A. 99819

B. 99911

C. 99900

D. 99111

Answer: B

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7. Two numbers, both greater than 29, have H.C.F. 29 and L.C.M. 4147. The sum of the numbers is (a) 666 (b) 669 (c) 696 (d) 966

A. 666

B. 669

C. 696

D. 966

Answer: C

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8. The HCF of two numbers each consisting of 4 digits

is 103 and their LCM is 19261. The numbers are

A. 1133, 1751

B. 10531657

C. 10611111

D. 15911377

Answer: A

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9. Four prime numbers are written in ascending order of their magnitudes. The product of the first three is 715 and that of the last three is 2431. What is the largest given prime number?

A. 5

B. 19

C. 17

D. 23

Answer: C

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10. A number lying between 1000 and 2000 is such that on division by 2,3,4,5,6,7 and 8 leaves remainder 1,2,3,4,5,6 and 7 respectively. The number is

A. 518

B. 416

C. 364

D. 1679

Answer: D

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11. Find the greatest number of five digits which when divided by 4,6,14 and 20 leaves respectively 1,3, 11 and 17 as remainders
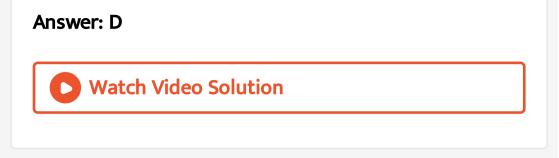
A. 99930

B. 99960

C. 99997

D. 99957

Answer: D

12. Find the least number which when divided by 12, 24, 36 and 40 leaves a remainder 1, but when divided by 7 leaves no remainder.

A. 361

B. 1080

C. 721

D. 371

Answer: C

13. What is the least number which when divided by the numbers 3,5,6,8,10 and 12 leaves in each case a remainder 2 but when divided by 13 leaves no remainder.

A. 312

B. 962

C. 1562

D. 1586

Answer: B

14. A heap of stones can be made up into groups of 21. When made up into groups of 16, 20, 25 and 45, there are 3 stones left in each case. How many stones at least can there be in the heap?

A. 7203

B. 2403

C. 3603

D. 4803

Answer: A

15. Find the least number which when divided by 2,3,4,5 and 6 leaves 1,2,3,4 and 5 as remainders respectively, but when divided by 7 leaves no remainders

A. 210

B. 119

C. 126

D. 154

Answer: B

16. The HCF and LCM of two numbers are 12 and 72 respectively. If the sum of the two numbers is 60, then one of the numbers will be

A. 12

B. 24

C. 60

D. 72

Answer: B

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17. The difference of two numbers is 20 and their product is 56.25 times their difference. Find the LCM of the numbers.

A. 70

B. 1125

C. 225

D. 5

Answer: C

18. There are 4 numbers. The HCF of each pair is 7 and the LCM of all the numbers is 1470. What is the product of the 4 numbers?
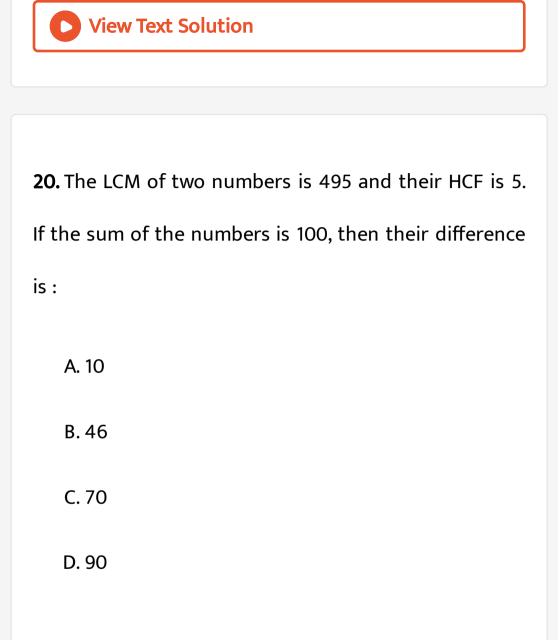
A. 504210

B. 502410

C. 504120

D. 501420

Answer: A

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19. Two persons A and B walk round a circle whose diameter is 1.4 km. A walks at a speed of 165 metres per minute while B walks at a speed of 110 metres per minute. If they both start at the same time from the same point and walk in the same direction at what interval of time would they both be at the same starting point again

A. 1h

B. $1\frac{1}{3}$ h

C. $1\frac{1}{3}$ h

D. $1\frac{1}{2}$ h

Answer: B

20. The LCM of two numbers is 495 and their HCF is 5.

If the sum of the numbers is 100, then their difference

is :

A. 10

B. 46

C. 70

D. 90

Answer: A

1. What is the greatest number of 4-digits that which when divided by any of the numbers 6,9,12 and 17 leaves a remainder of 1?

    A. 9997

    B. 9793

    C. 9895

    D. 9487

Answer: B

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2. Find the greatest number that will divide 55, 127 and 175, so as to leave the same remainder in each case

A. 1

B. 16

C. 24

D. 16

Answer: C

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3. The sum of two numbers is 1215 and their HCF is 81. How many such pairs of numbers can be formed ?

A. 2

B. 6

C. 4

D. None

Answer: C

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4. How many numbers between 200 and 600 are exactly divisible by 4 ,5 and 6?

A. 5

B. 16

C. 10

D. 6

Answer: D

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5. The HCF of two numbers of same number of digits is 45 and their LCM is 540. The numbers are

    A. 270, 540

    B. 135, 270

    C. 180, 270

    D. 135, 180

Answer: D

6. Find the least number which on being divided by 5,6,8,9,12 leaves in each case a remainder 1 but when divided by 13 leaves no remainder?

A. 3601

B. 1469

C. 2091

D. 4879

Answer: A

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7. If x=103, then the LCM of $x^2 - 4$ and $x^2 - 5x + 6$ is

A. 105105

B. 1051050

C. 106050

D. 1060500

Answer: D

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8. The LCM of two numbers is 12 times their HCF. The sum of HCF and LCM is 403. If one of the numbers is

93, then the other number is

A. 124

B. 128

C. 134

D. 138

Answer: A

9. The HCF and LCM of two numbers x and y is 6 and 210 respectively. If $x + y = 72$, which of the following relation is correct?

A. $\dfrac{1}{x} + \dfrac{1}{y} = \dfrac{3}{35}$

B. $\dfrac{1}{x} + \dfrac{1}{y} = \dfrac{2}{35}$

C. $\dfrac{1}{x} + \dfrac{1}{y} = \dfrac{35}{2}$

D. not sufficient

Answer: B

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10. If the HCF of $x^2 - x - 6$ and $x^2 + 9x + 14$ is $(x + m)$. Then the value of m is

A. 1

B. 2

C. -2

D. -1

Answer: B

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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

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

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

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 $6(x^2 + xy), 8(xy - y^2), 12(x^2 - y^2)$

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 $\{x^4 - y^4\}$ and $(x^6 - y^6)$ 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. $(x^2 + 1)(x - 1)^2$

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

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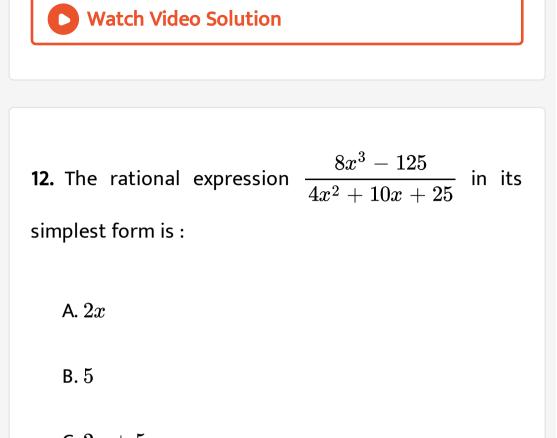
A. $x + 1$

B. $x - 4$

C. $x + 2$

D. $x - 1$

Answer: D

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

A. $12x(x^2 - 4)$

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

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

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

Answer: C

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

A. $2x$

B. 5

C. $2x + 5$

D. $2x - 5$

Answer: D

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

A. $x(x + 1)$

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

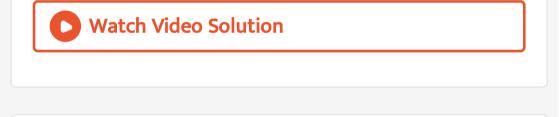C. $\dfrac{x}{x + 2}$

D. $x(x + 2)$

Answer: B

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14. If $A = \dfrac{2x + 1}{2x - 1}$ and $B = \dfrac{2x - 1}{2x + 1}$ then A - B is

equal to:

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

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

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

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

Answer: B

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

A. 0

B. 1

C. 2

D. -2

Answer: C

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

A. xy

B. y/x

C. x/y

D. 1

Answer: B

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

A. x

B. y

C. xy

D. 1

Answer: D

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

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

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

Answer: C

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

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

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

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

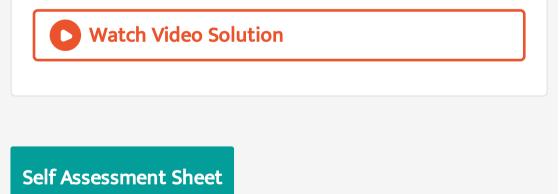D. $\dfrac{-2ab}{b^2 - a^2}$

Answer: C

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20. Simplify ⋮

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

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

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

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

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

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

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

C. $x(x - 2)(x - 3)(x^2 - 1)$

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

Answer: C

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 :

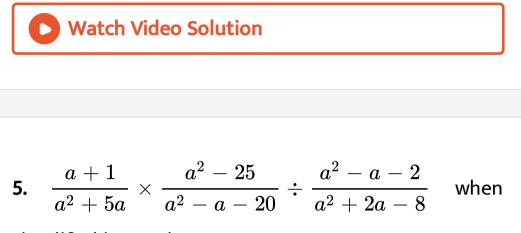A. $4a^2+20a+5$

B. $4a^2-25$

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

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

Answer: D

5. $\dfrac{a+1}{a^2+5a} \times \dfrac{a^2-25}{a^2-a-20} \div \dfrac{a^2-a-2}{a^2+2a-8}$ when

simplified is equal to :

A. 1

B. a

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

D. a^2

Answer: C

6. The value of $\dfrac{x+y}{x-y} + \dfrac{x-y}{x+y} - \dfrac{2(x^2-y^2)}{x^2-y^2}$ 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

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

equals.

A. 1

B. xy

C. $(x + y)$

D. $(x - y)$

Answer: A

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9. $\left[\dfrac{x+1}{x-1} - \dfrac{x-1}{x+1} - \dfrac{4x}{x^2+1} \right] \div \dfrac{4}{x^4-1}$ 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. $y + \dfrac{1}{y}$

B. 1

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

D. 2

Answer: C

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