

Solutions for Algebra Questions

Question 1: square root of $(500 \times 501 \times 502 \times 503 + 1) = ?$

Explanation: let x be 500

So, $501 = x+1$

$502 = x+2$

$503 = x+3$

Square root of $1 + x(x+1)(x+2)(x+3)$

Then you have to divide it into 2 pairs

i.e. square root of $1 + x(x+3)(x+1)(x+2)$

Square root of $(1 + (x^2 + 3x)(x^2 + 3x + 2))$

Let $(x^2 + 3x)$ be Y

Then, square root of $1 + Y(Y+2)$

Square root of $Y^2 + 2Y + 1$

Square root of $(Y+1)^2$

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

$\Rightarrow Y + 1 = x^2 + 3x + 1$ ----- equation no. 1

Now, put the value of x in equation no. 1

$\Rightarrow 500^2 + 3(500) + 1 = 25000 + 1500 + 1$

\Rightarrow **251501**

Question 2: $N^2 = 1 + 2014 \times 2015 \times 2016 \times 2017$ What is the value of N?

Answer: (b) 4062239

Explanation: Let N = square of $1 + 2014 \times 2015 \times 2016 \times 2017$

Let x be 2014

So, 2015 = x+1

2016 = x+2

2017 = x +3

Square root of $1 + x(x + 1)(x + 2)(x + 3) = N$

Then you have to divide it into 2 pairs

i.e. square root of $1 + x(x + 3)(x + 1)(x + 2) = N$

Square root of $(1 + (x^2 + 3x))(x^2 + 3x + 2) = N$

Let $(x^2 + 3x)$ be Y

Then, square root of $1 + Y(Y + 2) = N$

Square root of $Y^2 + 2Y + 1 = N$

Square root of $(Y + 1)^2 = N$

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

=> $Y + 1 = x^2 + 3x + 1$ ----- equation no. 1

Now, put the value of x in equation no. 1

=> $2014^2 + 3(2014) + 1 = N$

=> $4056196 + 6042 + 1 = N$

=> **4062239 = N**

Question 3: $x^2 - 15/x = 4$ and $x \neq 3$ find $x(x + 1)(x + 2)(x + 3)$?

Answer: (b) 15

Explanation: see in the question it is given that $x \neq 3$ that means if x -3 will come and it will become 0.

So, let us evaluate

=> $x^2 - 15/x = 4$

$$\Rightarrow x^3 - 15 = 4x \text{ ----- equation no. 1}$$

Now, subtract 12 from both the sides in equation no. 1

$$\Rightarrow x^3 - 15 - 12 = 4x - 12$$

$$\Rightarrow x^3 - 27 = 4x - 12$$

$$\Rightarrow x^3 - 3^3 = 4(x - 3)$$

$$\Rightarrow (x - 3)(x^2 + 9 + 3x) = 4(x - 3)$$

$$\Rightarrow x^2 + 9 + 3x = 4 \quad \{(x - 3) \text{ will be deducted from both the sides because it is mentioned that } x \neq 3\}$$

$$\Rightarrow x^2 + 3x = 4 - 9$$

$$\Rightarrow x^2 + 3x = -5 \text{ ----- equation no. 2}$$

Now we will see on this equation

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

$$\Rightarrow (x^2 + 3x)(x^2 + 3x + 2) \text{ ----- equation no. 3}$$

Put the value of $(x^2 + 3x)$ from equation no. 2 in equation no. 3

$$\Rightarrow (-5)(-5 + 2)$$

$$\Rightarrow (-5)(-3)$$

$$\Rightarrow \mathbf{15}$$

Question 4: $x^3 + 4x - 8 = 0$, then $x^7 + 64x^2 = ?$

Answer: (b) 128

Explanation: let us evaluate

$$\Rightarrow x^3 + 4x - 8 = 0$$

$$\Rightarrow x^3 = 8 - 4x \text{ ----- equation no. 1}$$

Squaring both the sides

$$\Rightarrow (x^3)^2 = (8 - 4x)^2$$

$$\Rightarrow x^6 = (8 - 4x)^2$$

$$\Rightarrow x^6 = 64 + 16x^2 - 64x$$

$$\Rightarrow x^6 + 64x = 64 + 16x^2 \text{ ----- equation no. 2}$$

Now see what you require

So, now we will multiply X in equation no. 2

$$\Rightarrow x^6 (x) + 64x (x) = 64 (x) + 16x^2 (x)$$

$$\Rightarrow x^7 + 64x^2 = 64x + 16x^3 \text{ ----- equation no. 3}$$

Now put the value of x^3 in equation no. 3 from equation no. 1

$$\Rightarrow x^7 + 64x^2 = 64x + 16(8 - 4x)$$

$$\Rightarrow x^7 + 64x^2 = 64x + 128 - 64x$$

$$\Rightarrow x^7 + 64x^2 = 128$$

Question 5: If $x^4 + x^{-4} = 194$, ($x > 0$), then the value of $(2x - 4)^2$ is:

Answer: (c) 12

Explanation: I think you know this that

$$\Rightarrow x + 1/x = N$$

$$\Rightarrow x^2 + 1/x^2 = N^2 - 2 = K$$

$$\Rightarrow x^4 + 1/x^4 = K^2 - 2$$

In this question have to go reverse so see below

$$\Rightarrow x^4 + 1/x^4 = 194$$

$$\Rightarrow x^4 + 1/x^4 = 194 = N^2 - 2$$

$$\Rightarrow x^2 + 1/x^2 = N$$

$$\Rightarrow x^4 + 1/x^4 = 194 + 2 = N^2$$

$$\Rightarrow x^4 + 1/x^4 = 196 = N^2$$

$$\text{So, } N^2 = 196$$

$$N = 14$$

$$\Rightarrow x + 1/x = K$$

So,

$$\Rightarrow x^2 + 1/x^2 = N = 14 = K^2 - 2 \text{ ----- equation no. 1}$$

Let us evaluate equation no. 1

$$\Rightarrow x^2 + 1/x^2 = N = 14 = K^2 - 2$$

$$\Rightarrow x^2 + 1/x^2 = N = 14 + 2 = K^2$$

$$\Rightarrow x^2 + 1/x^2 = N = 16 = K^2$$

$$\text{So, } K = 4$$

$$\text{And } x^2 + 1 = 4$$

$$\Rightarrow x^2 - 4x = -1 \text{ ----- equation no. 2}$$

Let us see the question now

$$\Rightarrow (2x - 4)^2 \text{ ----- equation no. 3}$$

Taking 4 common from equation no. 3

$$\Rightarrow 4(x - 2)^2$$

$$\Rightarrow 4(x^2 - 4x + 4)$$

Now put the value of $x^2 - 4x$ from equation no. 2

$$\Rightarrow 4(-1 + 4)$$

$$\Rightarrow 4 \times 3 = \mathbf{12}$$

Question 6: If $x^4 + x^{-4} = 2207$, ($x > 0$), then the value of $(x - 2)(x - 3)(x - 4)(x - 5)$ is:

Answer: (b) 99

Explanation: I think you know this that

$$\Rightarrow x + 1/x = N$$

$$\Rightarrow x^2 + 1/x^2 = N^2 - 2 = K$$

$$\Rightarrow x^4 + 1/x^4 = K^2 - 2$$

In this question have to go reverse so see below

$$\Rightarrow x^4 + 1/x^4 = 2207$$

$$\Rightarrow x^4 + 1/x^4 = 2207 = N^2 - 2$$

$$\Rightarrow x^2 + 1/x^2 = N$$

$$\Rightarrow x^4 + 1/x^4 = 2207 + 2 = N^2$$

$$\Rightarrow x^4 + 1/x^4 = 2209 = N^2$$

$$\text{So, } N^2 = 2209$$

$$N = 47$$

$$\Rightarrow x + 1/x = K$$

So,

$$\Rightarrow x^2 + 1/x^2 = N = 47 = K^2 - 2 \text{ ----- equation no. 1}$$

Let us evaluate equation no. 1

$$\Rightarrow x^2 + 1/x^2 = N = 47 = K^2 - 2$$

$$\Rightarrow x^2 + 1/x^2 = N = 47 + 2 = K^2$$

$$\Rightarrow x^2 + 1/x^2 = N = 49 = K^2$$

$$\text{So, } K = 7$$

And $x^2 + 1 = 7x$

$\Rightarrow x^2 - 7x = -1$ ----- equation no. 2

Let us see the question now

$\Rightarrow (x - 2)(x - 3)(x - 4)(x - 5)$

$\Rightarrow (x - 2)(x - 5)(x - 3)(x - 4)$

$\Rightarrow (x^2 - 7x + 10)(x^2 - 7x + 12)$

Now put the value of $x^2 - 7x$ from equation no. 2

$\Rightarrow (-1 + 10)(-1 + 12)$

$\Rightarrow (9)(11)$

$\Rightarrow 9 \times 11 = 99$

Question 7: If $\sqrt{x} + 1/\sqrt{x} = 4$, $x > 0$ then $x^3(x - 14)(x^2 - 194)$

Answer: (c) 1

Explanation:

$\Rightarrow \sqrt{x} + 1/\sqrt{x} = 4$

$\Rightarrow x + 1/x = 16 - 2 = 14 = K$

$\Rightarrow x - 14 = -1/x$ ----- equation no. 1

$\Rightarrow x^2 + 1/x^2 = K^2 - 2$

$\Rightarrow x^2 + 1/x^2 = (14)^2 - 2$

$\Rightarrow x^2 + 1/x^2 = 196 - 2$

$\Rightarrow x^2 + 1/x^2 = 194$

$\Rightarrow (x^2 - 194) = -1/x^2$ ----- equation no. 2

Let us see the question now

$$\Rightarrow x^3 (x - 14) (x^2 - 194)$$

Now put the value of $(x - 14)$ from equation no.1 and value of $(x^2 - 194)$ from equation no. 2.

$$\Rightarrow x^3 (-1/x) (-1/x^2)$$

$$\Rightarrow 1$$

Question 8: If $x^4 + x^{-4} = 1154$, ($x > 0$), then the value of $2(x - 3)^2$ is:

Answer: (a) 16

Explanation:

$$\Rightarrow x^4 + 1/x^4 = 1154$$

$$\Rightarrow x^4 + 1/x^4 = 1154 = N^2 - 2$$

$$\Rightarrow x^2 + 1/x^2 = N$$

$$\Rightarrow x^4 + 1/x^4 = 1154 + 2 = N^2$$

$$\Rightarrow x^4 + 1/x^4 = 1156 = N^2$$

$$\text{So, } N^2 = 1156$$

$$N = 34$$

$$\Rightarrow x + 1/x = K$$

So,

$$\Rightarrow x^2 + 1/x^2 = N = 34 = K^2 - 2 \text{ ----- equation no. 1}$$

Let us evaluate equation no. 1

$$\Rightarrow x^2 + 1/x^2 = N = 34 = K^2 - 2$$

$$\Rightarrow x^2 + 1/x^2 = N = 34 + 2 = K^2$$

$$\Rightarrow x^2 + 1/x^2 = N = 36 = K^2$$

$$\text{So, } K = 6$$

And $x^2 + 1 = 6x$

$\Rightarrow x^2 - 6x = -1$ ----- equation no. 2

Let us see the question now

$\Rightarrow 2(x - 3)^2$

$\Rightarrow 2(x^2 - 6x + 9)$

Now put the value of $x^2 - 6x$ from equation no. 2

$\Rightarrow 2(-1 + 9)$

$\Rightarrow (2)(8)$

$\Rightarrow 2 \times 8 = 16$

Question 9: If $x^4 + 1/x^4 = 527$, ($x > 0$), then the value of $(x - 1)(x - 2)(x - 3)(x - 4)$ is:

Answer: (b) 15

Explanation:

$\Rightarrow x^4 + 1/x^4 = 527$

$\Rightarrow x^4 + 1/x^4 = 527 = N^2 - 2$

$\Rightarrow x^2 + 1/x^2 = N$

$\Rightarrow x^4 + 1/x^4 = 527 + 2 = N^2$

$\Rightarrow x^4 + 1/x^4 = 529 = N^2$

So, $N^2 = 529$

$N = 23$

$\Rightarrow x + 1/x = K$

So,

$\Rightarrow x^2 + 1/x^2 = N = 23 = K^2 - 2$ ----- equation no. 1

Let us evaluate equation no. 1

$$\Rightarrow x^2 + 1/x^2 = N = 23 = K^2 - 2$$

$$\Rightarrow x^2 + 1/x^2 = N = 23 + 2 = K^2$$

$$\Rightarrow x^2 + 1/x^2 = N = 25 = K^2$$

So, $K = 5$

And $x^2 + 1 = 5x$

$$\Rightarrow x^2 - 5x = -1 \text{ ----- equation no. 2}$$

Let us see the question now

$$\Rightarrow (x - 1)(x - 2)(x - 3)(x - 4)$$

$$\Rightarrow (x - 1)(x - 4)(x - 2)(x - 3)$$

$$\Rightarrow (x^2 - 5x + 4)(x^2 - 5x + 6)$$

Now put the value of $x^2 - 5x$ from equation no. 2

$$\Rightarrow (-1 + 4)(-1 + 6)$$

$$\Rightarrow (3)(5)$$

$$\Rightarrow 3 \times 5 = \mathbf{15}$$