Top-20 RRB NTPC Algebra Questions

Instructions

For the following questions answer them individually

Question 1

The smallest positive integer n with 24 divisors considering 1 and n as divisors is

A 420

B 240

C 360

D 480

Answer: C

Explanation:

For any given number, that can be represented as $A^x \times B^y$, etc

The number of factors is denoted by (x+1) x (y+1), etc

360 = $2^3 \times 3^2 \times 5^1$

So the number of factors = (3 +1) x (2+ 1) (1+ 1) = 4x3x2 = 24

For 240, it is $2^4 \times 3^1 \times 5^1$

Number of factors = 5 x 2 x 2 = 20 only

Question 2

In an election a candidate gets 40% of votes polled and is defeated by the winning candidate by 298 votes. Find the total number of votes polled.

A 1360

B 1490

C 1520

D 1602

Answer: B

Explanation:

There is an assumption in the question that there are only two candidates participating in the election. One candidate got 40% votes and the other candidate got 60% votes. The difference is 20% votes which are 298. If 298 votes are 20%, 100% is how much.

= 298/20% = 1490

Question 3

Two numbers are less than the third number by 30% and 37% respectively. By what percent is the second number less than the first number?

A 15%

B 10%

C 25%

D 20%

Answer: B

Explanation:

Let the third number be x. So, the first number is .7x

The second number is .63x

So, the second number is less than the first number by .7 ie 10% of the first number.

Question 4

If 15 boys earn Rs.900 in 5 days, how much will 20 boys earn in 7 days ?

A Rs. 1980

B Rs. 1820

C Rs. 1780

D Rs. 1680

Answer: D

Explanation:

Amount of money earned by a boy in a day = $\frac{900}{15*5}$ = Rs. 12

Hence, amount of money earned by 20 boys in 7 days = 20*7*12 = Rs. 1680

Question 5

Srinivas is four times as old as his daughter. Five years ago, Srinivas was nine times as old as his daughter was at that time. His daughter's present age is:

A 10 years

B 8 years

C 6 years

D 5 years

Answer: B

Question 6

If a is positive and $a^2 + \frac{1}{a^2} = 7$, then $a^3 + \frac{1}{a^3} = ?$

A 21

B $3\sqrt{7}$

C 18

D $7\sqrt{7}$

Answer: C

Explanation:

$a^2 + \frac{1}{a^2} = 7$

Addition 2 in both sides of equation.

$a^2 + \frac{1}{a^2} + 2 = 7 + 2$

$a^2 + \frac{1}{a^2} + 2 = 9$ Eq.(1)

Eq.(1) is making the formula of $(a+\frac{1}{a})^2$.

After removing the square got $(a+\frac{1}{a}) = \pm 3$

In question, it is mentioned that value of **a** is positive.

So $(a+\frac{1}{a}) = 3$ Eq.(2)

In Eq.(2) apply formula $(a+\frac{1}{a})^3$.

So $(a+\frac{1}{a})^3 = a^3 + (\frac{1}{a})^3 + 3 \times a \times (\frac{1}{a})[a+\frac{1}{a}]$

$(a+\frac{1}{a})^3 = a^3 + (\frac{1}{a})^3 + 3[a+\frac{1}{a}]$ Eq.(3)

Put Eq.(2) in Eq.(3).

$(3)^3 = a^3 + (\frac{1}{a})^3 + 3 \times 3$

$27 = a^3 + (\frac{1}{a})^3 + 9$

$27 - 9 = a^3 + (\frac{1}{a})^3$

$18 = a^3 + (\frac{1}{a})^3$

$a^3 + (\frac{1}{a})^3 = 18$

Question 7

Which of the following statement is sufficient to answer the question? Find the values of x, y, z from the given statements.
Statements:
I. x + y = 12 ; x + z = 4
II: x - y = 6

A Only II is sufficient while I is not

B Neither I nor II is sufficient

C Both I and II are sufficient

D Only I is sufficient while II is not

Answer: D

Question 8

$If a+\frac{1}{a} = 1$, **find the value of** $a^3 + \frac{1}{a^3}$

A 2

B -2

C 0

D 1.5

Answer: B

Explanation:
Given, $a+\frac{1}{a} = 1$

Cubing on both sides we get,

$a^3 + \frac{1}{a^3} + 3(a+\frac{1}{a}) = 1$

$a^3 + \frac{1}{a^3} = -2$ (as we know $a + \frac{1}{a} = 1$)

Hence, option B is the correct answer.

Question 9

If $12x^2 - ax + 7 = ax^2 + 9x + 3$ has only one (repeated) solution, then the positive integral solution of a is:

A 2

B 4

C 3

D 5

Answer: C

Explanation:
Given, $12x^2 - ax + 7 = ax^2 + 9x + 3$
$(a - 12)x^2 + (a + 9)x - 4 = 0$
If $ax^2 + bx + c = 0$ has equal roots, then $b^2 = 4ac$
$(a + 9)^2 = 4(a - 12)(-4)$
$a^2 + 81 + 18a = 192 - 16a$
$a^2 + 34a - 111 = 0$
On solving above equation, we get a = 3 and a = -37.
Here, The positive integral solution will be 3.

Question 10

If $\frac{x}{x^2-1} = \frac{A}{x-1} + \frac{B}{x+1}$ then find the values of A and B

A 2,2

B 2,-2

C $\frac{1}{2}, \frac{-1}{2}$

D $\frac{1}{2}, \frac{1}{2}$

Answer: D

Question 11

Find the value of $\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + \frac{1}{4\times5} + \frac{1}{5\times6} + ... + \frac{1}{9\times10}$

A $\frac{1}{10}$

B $\frac{9}{10}$

C $\frac{5}{11}$

D $\frac{2}{5}$

Answer: B

Question 12

simplify $\sqrt{0.01+\sqrt{0.0225}}$

A 16

B 0.4

C 4

D 0.04

Answer: B

Question 13

Simplify $12\frac{1}{2}\frac{1}{3} + 9\frac{2}{1}\frac{1}{3}$ **?**

A $43\frac{11}{19}$

B $41\frac{12}{13}$

C $40\frac{13}{11}$

D $45\frac{6}{11}$

Answer: D

Question 14

If x^3 = n and the units digit of 'n' is a prime number, what are the possible choices for 'x' among the numbers from 1 to 9.

A 3, 5, 7, 8

B 3, 5 ,7

C 2, 3, 4, 5

D 1, 5, 3

Answer: A

Question 15

simplify $\sqrt{10+\sqrt{25}+\sqrt{108}+\sqrt{154}+\sqrt{225}}$**?**

A 3

B 8

C 4

D 6

Answer: C

Question 16

If $\frac{a}{b}+\frac{b}{a}=1$ **then find** a^3+b^3

A 2

B -1

C 0

D 1

Answer: C

Question 17

Evaluate $1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\ldots\ldots$ **?**

A $\frac{1}{50}$

B 3

C $\frac{1}{22}$

D 2

Answer: D

Explanation:

$1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\ldots\ldots$

Use GP formula as

$\frac{(1-r^n)}{(1-r)}$

here $n=\infty$

therefore, $\left(\frac{1-\left(\frac{1}{2}\right)^{\infty}}{1-\left(\frac{1}{2}\right)}\right)$

$\left(\frac{1}{1-\frac{1}{2}}\right)=2$

Question 18

Simplify: $\frac{1\frac{1}{4}\div 1\frac{1}{2}}{\frac{1}{15}+1-\frac{9}{10}}$

A 2

B 5

C 3

D 4

Answer: B

Question 19

If A + B = C, D - C = A and E - B = C,then what does D + F stand for?

A C

B F

C J

D Q

Answer: C

Question 20

Evaluate: $\left[\frac{\sqrt{3}+1}{\sqrt{3}-1}\right]^2 + \left[\frac{\sqrt{3}-1}{\sqrt{3}+1}\right]^2$

A 16

B 12

C 14

D 24

Answer: C

Explanation:
Using the identities

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

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

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

Rationalizing the denominator,

$\left[\frac{\sqrt{3}+1}{\sqrt{3}-1}\right] = \frac{\sqrt{3}+1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$

Solving the equation using identities we get

$\frac{\sqrt{3}+1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{4+2\sqrt{3}}{2}$

$= 2 + \sqrt{3}$

$\left[\frac{\sqrt{3}+1}{\sqrt{3}-1}\right]^2 = (2+\sqrt{3})^2$

$= 7 + 4\sqrt{3}$

Rationalizing the denominator,

$\left[\frac{\sqrt{3}-1}{\sqrt{3}+1}\right] = \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$

Solving the equation using identities we get

$\frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1} = \frac{4-2\sqrt{3}}{2}$

$= 2 - \sqrt{3}$

$\left[\frac{\sqrt{3}-1}{\sqrt{3}+1}\right]^2 = (2-\sqrt{3})^2$

$= 7 - 4\sqrt{3}$

Thus,

$\left[\frac{\sqrt{3}+1}{\sqrt{3}-1}\right]^2 + \left[\frac{\sqrt{3}-1}{\sqrt{3}+1}\right]^2 = 7 + 4\sqrt{3} + 7 - 4\sqrt{3}$

$= 14$