Number System Questions For SSC GD PDF

Instructions

For the following questions answer them individually

Question 1

If $x = \sqrt{7} - \sqrt{6}$, then find the value of $(\frac{1}{x^3} - x^3)$.

A $44\sqrt{6}$

B $50\sqrt{6}$

C $54\sqrt{6}$

D $58\sqrt{6}$

Answer: C

Explanation:

Given that, $x = \sqrt{7} - \sqrt{6}$.

$\Rightarrow \frac{1}{x} = \frac{1}{\sqrt{7} - \sqrt{6}}$

$\Rightarrow \frac{1}{x} = \frac{(\sqrt{7} + \sqrt{6})}{(\sqrt{7} - \sqrt{6}) * (\sqrt{7} + \sqrt{6})}$

$\Rightarrow \frac{1}{x} = \sqrt{7} + \sqrt{6}$ ... (1)

We know that $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$\Rightarrow (x - \frac{1}{x})^3 = x^3 - \frac{1}{x^3} - 3x * \frac{1}{x}(x - \frac{1}{x})$

$\Rightarrow [(\sqrt{7} - \sqrt{6}) - (\sqrt{7} - \sqrt{6})]^3 = x^3 - \frac{1}{x^3} - 3[(\sqrt{7} - \sqrt{6}) - (\sqrt{7} - \sqrt{6})]$

$\Rightarrow [-2\sqrt{6}]^3 = x^3 - \frac{1}{x^3} - 3[-2\sqrt{6}]$

$\Rightarrow \frac{1}{x^3} - x^3 = 48\sqrt{6} + 6\sqrt{6} = 54\sqrt{6}$

Therefore, option C is the correct answer.

Question 2

If $x = \sqrt{8} - \sqrt{7}$, then find the value of $(\frac{1}{x^3} - x^3)$.

A $56\sqrt{7}$

B $46\sqrt{7}$

C $62\sqrt{7}$

D $66\sqrt{7}$

Answer: C

Explanation:

Given that, $x = \sqrt{8} - \sqrt{7}$.

$\Rightarrow \frac{1}{x} = \frac{1}{\sqrt{8} - \sqrt{7}}$

$\Rightarrow \frac{1}{x} = \frac{(\sqrt{8} + \sqrt{7})}{(\sqrt{8} - \sqrt{7}) * (\sqrt{8} + \sqrt{7})}$

$\Rightarrow \frac{1}{x} = \sqrt{8} + \sqrt{7}$ ... (1)

We know that $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$\Rightarrow (x - \frac{1}{x})^3 = x^3 - \frac{1}{x^3} - 3x * \frac{1}{x}(x - \frac{1}{x})$

$\Rightarrow [(\sqrt{8} - \sqrt{7}) - (\sqrt{8} + \sqrt{7})]^3 = x^3 - \frac{1}{x^3} - 3[(\sqrt{8} - \sqrt{7}) - (\sqrt{8} + \sqrt{7})]$

$\Rightarrow [-2\sqrt{7}]^3 = x^3 - \frac{1}{x^3} - 3[-2\sqrt{7}]$

$\Rightarrow \frac{1}{x^3} - x^3 = 56\sqrt{7} + 6\sqrt{7} = 62\sqrt{7}$

Therefore, option C is the correct answer.

Question 3

If $x = \sqrt{6} - \sqrt{5}$, then find the value of $(\frac{1}{x^3} - x^3)$.

A $46\sqrt{5}$

B $40\sqrt{5}$

C $56\sqrt{5}$

D $50\sqrt{5}$

Answer: A

Explanation:

Given that, $x = \sqrt{6} - \sqrt{5}$.

$\Rightarrow \frac{1}{x} = \frac{1}{\sqrt{6} - \sqrt{5}}$

$\Rightarrow \frac{1}{x} = \frac{(\sqrt{6} + \sqrt{5})}{(\sqrt{6} - \sqrt{5}) * (\sqrt{6} + \sqrt{5})}$

$\Rightarrow \frac{1}{x} = \sqrt{6} + \sqrt{5}$ ... (1)

We know that $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$\Rightarrow (x - \frac{1}{x})^3 = x^3 - \frac{1}{x^3} - 3x * \frac{1}{x}(x - \frac{1}{x})$

$\Rightarrow [(\sqrt{6} - \sqrt{5}) - (\sqrt{6} + \sqrt{5})]^3 = x^3 - \frac{1}{x^3} - 3[(\sqrt{6} - \sqrt{5}) - (\sqrt{6} + \sqrt{5})]$

$\Rightarrow [-2\sqrt{5}]^3 = x^3 - \frac{1}{x^3} - 3[-2\sqrt{5}]$

$\Rightarrow \frac{1}{x^3} - x^3 = 40\sqrt{5} + 6\sqrt{5} = 46\sqrt{5}$

Therefore, option A is the correct answer.

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Question 4

If $x = \sqrt{10} - 3$, then find the value of $(\frac{1}{x^3} - x^3)$.

A 128

B 234

C 192

D 196

Answer: B

Explanation:

Given that, $x = \sqrt{10} - 3$.

$\Rightarrow \frac{1}{x} = \frac{1}{\sqrt{10} - 3}$

$\Rightarrow \frac{1}{x} = \frac{(\sqrt{10} + 3)}{(\sqrt{10} - 3) * (\sqrt{10} + 3)}$

$\Rightarrow \frac{1}{x} = \sqrt{10} + 3$ ... (1)

We know that $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$\Rightarrow (x - \frac{1}{x})^3 = x^3 - \frac{1}{x^3} - 3x * \frac{1}{x}(x - \frac{1}{x})$

$\Rightarrow [(\sqrt{10} - 3) - (\sqrt{10} + 3)]^3 = x^3 - \frac{1}{x^3} - 3[(\sqrt{10} - 3) - (\sqrt{10} + 3)]$

$\Rightarrow [-6]^3 = x^3 - \frac{1}{x^3} - 3[-6]$

$\Rightarrow \frac{1}{x^3} - x^3 = 216 + 18 = 234$

Therefore, option B is the correct answer.

Question 5

If $x = \sqrt{5} - 2$, then find the value of $(\frac{1}{x^3} - x^3)$.

A 22

B 44

C 66

D 76

Answer: D

Explanation:

Given that, $x = \sqrt{5} - 2$.

$\Rightarrow \frac{1}{x} = \frac{1}{\sqrt{5} - 2}$

$\Rightarrow \frac{1}{x} = \frac{(\sqrt{5} + 2)}{(\sqrt{5} - 2) * (\sqrt{5} + 2)}$

$\Rightarrow \frac{1}{x} = \sqrt{5} + 2$ ... (1)

We know that $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$\Rightarrow (x - \frac{1}{x})^3 = x^3 - \frac{1}{x^3} - 3x * \frac{1}{x}(x - \frac{1}{x})$

$\Rightarrow [(\sqrt{5} - 2) - (\sqrt{5} + 2)]^3 = x^3 - \frac{1}{x^3} - 3[(\sqrt{5} - 2) - (\sqrt{5} + 2)]$

$\Rightarrow [-4]^3 = x^3 - \frac{1}{x^3} - 3[-4]$

$\Rightarrow \frac{1}{x^3} - x^3 = 64 + 12 = 76$

Therefore, option D is the correct answer.

Question 6

Find the square root of $39 + 12\sqrt{3}$.

A $6 + \sqrt{3}$

B $4 + \sqrt{3}$

C $2 + \sqrt{3}$

D $3 + \sqrt{3}$

Answer: A

Explanation:

We have to figure out the square root of $39 + 12\sqrt{3}$. Let us assume that (a+b) is the square root of the given number.

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

Comparing this with the given number,

$a^2 + b^2 + 2ab = 39 + 12\sqrt{3}$.

On comparing we get, $a^2 + b^2 = 39\ ab = 6\sqrt{3}$

We can see that this is possible when $a = 6$ and $b = \sqrt{3}$. Therefore, we can say that the square root = $6 + \sqrt{3}$. Hence, option A is the correct answer.

Question 7

Find the square root of $27 + 10\sqrt{2}$.

A $4+\sqrt{2}$

B $2+\sqrt{2}$

C $5+\sqrt{2}$

D $3+\sqrt{2}$

Answer: C

Explanation:
We have to figure out the square root of $27+10\sqrt{2}$. Let us assume that (a+b) is the square root of the given number.
$(a+b)^2=a^2+b^2+2ab$
Comparing this with the given number,
$a^2+b^2+2ab=27+10\sqrt{2}$
On comparing we get, $a^2+b^2=27\ ab=5\sqrt{2}$
We can see that this is possible when $a=5$ and $b=\sqrt{2}$. Therefore, we can say that the square root = $5+\sqrt{2}$. Hence, option C is the correct answer.

Question 8

Find the square root of $16+6\sqrt{7}$.

A $3+\sqrt{7}$

B $4+\sqrt{7}$

C $5+\sqrt{7}$

D $1+\sqrt{7}$

Answer: A

Explanation:
We have to figure out the square root of $16+6\sqrt{7}$. Let us assume that (a+b) is the square root of the given number.
$(a+b)^2=a^2+b^2+2ab$
Comparing this with the given number,
$a^2+b^2+2ab=16+6\sqrt{7}$
On comparing we get, $a^2+b^2=16\ ab=3\sqrt{7}$
We can see that this is possible when $a=3$ and $b=\sqrt{7}$. Therefore, we can say that the square root = $3+\sqrt{7}$. Hence, option A is the correct answer.

Question 9

Find the square root of $9+4\sqrt{5}$.

A $2+\sqrt{3}$

B $3+\sqrt{5}$

C $4+\sqrt{5}$

D $2+\sqrt{5}$

Answer: D

Explanation:
We have to figure out the square root of $9+4\sqrt{5}$. Let us assume that (a+b) is the square root of the given number.
$(a+b)^2=a^2+b^2+2ab$
Comparing this with the given number,
$a^2+b^2+2ab=9+4\sqrt{5}$
On comparing we get, $a^2+b^2=9\ ab=2\sqrt{5}$
We can see that this is possible when $a=2$ and $b=\sqrt{5}$. Therefore, we can say that the square root = $2+\sqrt{5}$. Hence, option D is the correct answer.

Question 10

Find the square root of $19+8\sqrt{3}$.

A $5+\sqrt{3}$

B $4+\sqrt{3}$

C $2+\sqrt{3}$

D $3+\sqrt{3}$

Answer: C

Explanation:
We have to figure out the square root of $19+8\sqrt{3}$. Let us assume that (a+b) is the square root of the given number.
$(a+b)^2=a^2+b^2+2ab$
Comparing this with the given number,
$a^2+b^2+2ab=19+8\sqrt{3}$
On comparing we get, $a^2+b^2=19, ab=4\sqrt{3}$
We can see that this is possible when $a=4$ and $b=\sqrt{3}$. Therefore, we can say that the square root = $4+\sqrt{3}$. Hence, option C is the correct answer.

Question 11

Find the number of prime factors of 108900.

A 4

B 3

C 5

D 6

Answer: A

Explanation:
We can factorize the number in form of prime factors.
$108900 = 2^2 * 3^2 * 5^2 * 11^2$
Therefore, the number of prime factors = 4. Hence, option A is the correct answer.

Question 12

Find the number of prime factors of 44100.

A 4

B 3

C 5

D 6

Answer: A

Explanation:
We can factorize the number in form of prime factors.
$44100 = 2^2 * *3^2 * 5^2 * 7^2$
Therefore, the number of prime factors = 4. Hence, option A is the correct answer.

Question 13

Find the number of prime factors of 90090.

A 4

B 3

C 5

D 6

Answer: D

Explanation:
We can factorize the number in form of prime factors. 21 x 32 x 51 x 71 x 111 x 131
$90090 = 2^1 * 3^2 * 5^1 * 7^1 * 11^1 * 13^1$

Therefore, the number of prime factors = 6. Hence, option D is the correct answer.

Question 14

Find the number of prime factors of 11550.

A 4

B 3

C 5

D 6

Answer: C

Explanation:
We can factorize the number in form of prime factors.
$11550 = 2^1 * *3^1 * 5^2 * 7^1 * 11^1$
Therefore, the number of prime factors = 5. Hence, option C is the correct answer.

Question 15

Find the number of prime factors of 12400.

A 4

B 3

C 5

D 6

Answer: B

Explanation:
We can factorize the number in form of prime factors.
$12400 = 2^4 * 5^2 * 31^1$
Therefore, the number of prime factors = 3. Hence, option B is the correct answer.

Question 16

Find the number of odd factors of 9450.

A 24

B 27

C 36

D 18

Answer: A

Explanation:
We can factorize the number in form of prime factors.
$9450 = 2^1 * 3^3 * 5^2 * 7^1$
Therefore, the number of odd factors = (1)*(3+1)*(2+1)*(1+1) = 24. Hence, option A is the correct answer.

Question 17

Find the number of even factors of 13440.

A 56

B 64

C 44

D 32

Answer: A

Explanation:
We can factorize the number in form of prime factors.
$13440 = 2^7 * 3^1 * 5^1 * 7^1$
Therefore, the number of even factors = (7)*(1+1)*(1+1)*(1+1) = 56. Hence, option A is the correct answer.

Question 18

Find the number of even factors of 3750.

A 8

B 16

C 12

D 10

Answer: D

Explanation:
We can factorize the number in form of prime factors.
$3750 = 2^1 * 3^1 * 5^4$
Therefore, the number of even factors = (1)*(1+1)*(4+1) = 10. Hence, option D is the correct answer.

Question 19

Find the number of odd factors of 2700.

A 24

B 16

C 12

D 8

Answer: C

Explanation:
We can factorize the number in form of prime factors.
$2700 = 2^2 * 3^3 * 5^2$
Therefore, the number of odd factors = (1)*(3+1)*(2+1) = 12. Hence, option C is the correct answer.

Question 20

Find the number of even factors of 1800.

A 24

B 27

C 36

D 18

Answer: B

Explanation:
We can factorize the number in form of prime factors.
$1800 = 2^3 * 3^2 * 5^2$
Therefore, the number of even factors = (3)*(2+1)*(2+1) = 27. Hence, option B is the correct answer.

Question 21

Find the unit digit of 69^{175}.

A 1

B 3

C 9

D 5

Answer: C

Explanation:
We can see that
9^1 = 9

9^2 = 81
9^3 = 729
We can see that the unit digit gets repeated after 2 terms. Therefore, cyclicity of 9 = 2
Hence, we can say that unit digit of 69^{175} = unit digit of 69^{174+1} = unit digit of 69^1 = 9
Therefore, option C is the correct answer.

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Question 22

Find the unit digit of 92^{613}.

A 4

B 6

C 8

D 2

Answer: D

Explanation:
We can see that
2^1 = 2
2^2 = 4
2^3 = 8
2^4 = 16
2^5 = 32
We can see that the unit digit gets repeated after 4 terms. Therefore, cyclicity of 2 = 4
Hence, we can say that unit digit of 92^{613} = unit digit of 92^{612+1} = unit digit of 92^1 = 2
Therefore, option D is the correct answer.

Question 23

Find the unit digit of 76^{12}.

A 2

B 4

C 8

D 6

Answer: D

Explanation:
We can see that
6^1 = 6

6^2 = 36
6^3 = 216
We can see that the unit digit is '6' in all cases.
Hence, we can say that unit digit of 76^{12} = 6.
Therefore, option D is the correct answer.

Question 24

Find the unit digit of 27^{42}.

A 7

B 9

C 1

D 3

Answer: B

Explanation:
We can see that
7^1 = 7
7^2 = 49
7^3 = 343
7^4 = 2401
7^5 = 16807
We can see that the unit digit gets repeated after 4 terms. Therefore, cyclicity of 7 = 4
Hence, we can say that unit digit of 27^{42} = unit digit of 27^{40+2} = unit digit of 27^2 = unit digit of 729 = 9
Therefore, option B is the correct answer.

Question 25

Find the unit digit of 44^{17}.

A 4

B 6

C 8

D 2

Answer: A

Explanation:
We can see that
4^1 = 4

4^2 = 16
4^3 = 64
4^4 = 256
We can see that the unit digit gets repeated. Therefore, cyclicity of 4 = 2
Hence, we can say that unit digit of 44^{17} = unit digit of 44^{16+1} = unit digit of 44^1
Therefore, option A is the correct answer.

Question 26

The product of two numbers is 1083 and their HCF is 19. Then find their LCM

A 63

B 49

C 57

D 85

Answer: C

Explanation:
Product of two numbers = Product of LCM and HCF

LCM $\times$ 19 = 1083

=> LCM = $$\frac{1083}{19} = 57

Question 27

What is the remainder obtained when 4^{128} is divided by 15 ?

A 14

B 1

C 4

D 8

Answer: B

Explanation:
4^{128} can be written as 16^{64} and it can also be written as
$(15+1)^{64}$
In the binomial expansion of $(15+1)^{64}$ each and every term other than the last term contains 15 and the last term is 1.
So all the terms other than the last term i.e 1 are divisible by 15 and so the remainder obtained is 1.

Question 28

How many numbers less than 31 are co-prime to 31 ?

A 30

B 15

C 29

D 28

Answer: A

Explanation:
coprime or relatively prime means the same, the GCD of both the numbers must be 1.
As the given number is a prime number all the numbers less than that number will not have any common factor and so all the numbers less than 31 will be relatively prime to 31.
Therefore required answer is 31-1=30.

Question 29

The difference between a two-digit number and the number obtained by interchanging the digits is 27. What is the differences between the digits of the number ?

A 3

B 5

C 6

D Can't be determined

Answer: A

Explanation:
Let the unit's digit of the number be y and ten's digit = x

=> Number = $10x + y$

After interchanging the digits, new number = $10y + x$

According to ques,

=> $(10x + y) - (10y + x) = 27$

=> $9x - 9y = 27$

=> $9(x - y) = 27$

=> $(x - y) = \frac{27}{9} = 3$

$\therefore$ Differences between the digits of the number = **3**

=> Ans - (A)

Question 30

How many numbers between 400 and 800 are divisible by 4, 5 and 6 ?

A 7

B 8

C 9

D 10

Answer: A

Explanation:
L.C.M. of (4,5,6) = 60

Numbers between 400 and 800 that are divisible by 60 are : 420, 480, ..., 780

The above series is an arithmetic progression with first term $= a = 420$, common difference $= d = 60$ and last term $= l = 780$

Let number of terms be n

Thus, last term of an A.P. = $l = a + (n-1)d$

=> $420 + (n-1) \times (60) = 780$

=> $(n-1) \times (60) = 780 - 420 = 360$

=> $(n-1) = \frac{360}{60} = 6$

=> $n = 6 + 1 = 7$

$\therefore$ Numbers between 400 and 800 are divisible by 4, 5 and 6 = **7**

=> Ans - (A)

Question 31

The sum of all natural numbers from 75 to 97 is:

A 1598

B 1978

C 1798

D 1958

Answer: B

Explanation:

t_n=a+(n-1)d where
$t_n = n^{th}$ term,
a= first term
n=no. of terms
d= difference between terms

Here t_n= 97,a=74,d=1
97=74+(n-1)1
$\Rightarrow$97=73+n
$\Rightarrow$ n=23

Sum of natural numbers between 74 and 97 is
$S_n = \frac{n}{2}$[2a+(n-1)d]

Here n=23, a=74, d=1

$S_n = \frac{23}{2}$[74+(23-1)1]

= $\frac{23}{2} \times 172 = 23 \times 86$=1978

$\therefore$ Sum of natural numbers between 74 and 97 is 1978

Question 32

How many positive factors of 24 are there?

A 3

B 4

C 6

D 8

Answer: D

Explanation:
Prime factorization of $24 = (2)^3 \times (3)^1$

=> umber of positive factors = $(3+1) \times (1+1)$

= $4 \times 2 = 8$

=> Ans - (D)

Question 33

The sum of three consecutive even numbers is always divisible by ____.

A 12

B 6

C 18

D 24

Answer: B

Explanation:
Let the three consecutive even numbers be $(2n-2), (2n), (2n+2)$

=> Sum of numbers = $(2n-2)+(2n)+(2n+2) = 6n$

Thus, the sum is always divisible by **'6'**

=> Ans - (B)

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Question 34

$4^{11}+4^{12}+4^{13}+4^{14}$ **is divisible by_____.**

A 7

B 14

C 17

D 9

Answer: C

Explanation:
Expression : $4^{11}+4^{12}+4^{13}+4^{14}$

= $4^{11}(1+4+4^2+4^3)$

= $4^{11}\times(1+4+16+64)$

= $4^{11}\times(85)$

$\because 85$ is divisible by 17, hence the above expression is also divisible by **17**

=> Ans - (C)

Question 35

$3^{11}+3^{12}+3^{13}+3^{14}$ **is divisible by ____.**

A 7

B 8

C 11

D 14

Answer: B

Explanation:
Expression : $3^{11} + 3^{12} + 3^{13} + 3^{14}$

= $3^{11}(1 + 3 + 3^2 + 3^3)$

= $3^{11} \times (1 + 3 + 9 + 27)$

= $3^{11} \times (40)$

$\because 40$ is divisible by 8, hence the above expression is also divisible by **8**

=> Ans - (B)

Question 36

How many positive factors of 40 are there?

A 3

B 4

C 6

D 8

Answer: D

Explanation:
Prime factorization of $40 = (2)^3 \times (5)^1$

=> Number of factors = $(3 + 1) \times (1 + 1)$

= $4 \times 2 = 8$

=> Ans - (D)

Question 37

How many positive factors of 36 are there?

A 4

B 6

C 9

D 12

Answer: C

Explanation:
Number of positive factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, 36 i.e '9'

Hence, option C is the correct answer.

Question 38

The smallest five digit number which is divisible by 12, 18 and 21 is:

A 50321

B 10224

C 30256

D 10080

Answer: D

Explanation:
L.C.M. (12,18,21) = 252

Lowest five digit number = 10000

Now on dividing 10000 by 252, remainder = $10000\%252 = 172$

Thus, smallest five digit number which is divisible by 12, 18 and 21 = $1000 + (252 - 172) = 10080$

=> Ans - (D)

Question 39

The number $142^2 - 1$ is divisible by

A 19

B 9

C 13

D 7

Answer: C

Explanation:
Number = $(142)^2 - (1)^2$

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

= $(142 - 1)(142 + 1)$

= 141×143

= $(3 \times 47) \times (11 \times 13)$

Thus, it is divisible by 13.

=> Ans - (C)

Question 40

The difference between the greatest and least prime numbers which are less than 100 is

A 97

B 94

C 96

D 95

Answer: D

Explanation:
Greatest prime number less than 100 is 97 and least is 2.

Difference between greatest and least prime numbers below 100 = (97 - 2) = 95

Hence, option D is the correct answer.