Algebra Questions For SSC GD PDF

Instructions
For the following questions answer them individually

Question 1

Find the number of even factors of 15680.

A 42

B 21

C 36

D 24

Answer: C

Explanation:
We have to factorise the number into prime factors i.e
15680=$2^6 * 5 * 7^2$
No of even factors =6*(1+1)*(2+1)
=36

Question 2

Find the number of prime factors of 14560

A 3

B 4

C 5

D 6

Answer: B

Explanation:
We have to factorise the number into prime factors i.e
14560=$2^5 * 5 * 13 * 7$
There are 4 different prime factors namely 2,5,7 and 13.

Question 3

What is the square root of 97-16$\sqrt{3}$

A 9-4$\sqrt{3}$

B 9+4$\sqrt{3}$

C 7-4$\sqrt{3}$

D $7+4\sqrt{3}$

Answer: C

Explanation:
we have $(a-b)^2$=a^2+b^2-2ab
Comparing this with 97-56$\sqrt{3}$=a^2+b^2-2ab
We have 97=a^2+b^2
For a=7 and b=4$\sqrt{3}$ it gets satisfied and also 2ab=2*7*4$\sqrt{3}$
So the $(7-4\sqrt{3})^2$=$7^2+(4\sqrt{3})^2-2*7*4*\sqrt{3}$
And so required answer is 7-4$\sqrt{3}$

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Question 4

Find the value of $\frac{\frac{1}{3}\cdot\frac{1}{3}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{9}\cdot\frac{1}{9}\cdot\frac{1}{9}-3.\frac{1}{3}\cdot\frac{1}{4}\cdot\frac{1}{9}}{\frac{1}{3}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{9}\cdot\frac{1}{9}-(\frac{1}{3}\cdot\frac{1}{4}+\frac{1}{4}\cdot\frac{1}{9}+\frac{1}{3}\cdot\frac{1}{9})}$

A $\frac{25}{36}$

B $\frac{19}{36}$

C $\frac{24}{35}$

D $\frac{17}{26}$

Answer: A

Explanation:
The given equation is in the form of
$\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-(ab+bc+ca)}$
We know that $a^3+b^3+c^3-3abc=(a+b+c)(a^2+b^2+c^2-(ab+bc+ca))$
=> $\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-(ab+bc+ca)}=a+b+c$
Then, $\frac{\frac{1}{3}\cdot\frac{1}{3}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{9}\cdot\frac{1}{9}\cdot\frac{1}{9}-3.\frac{1}{3}\cdot\frac{1}{4}\cdot\frac{1}{9}}{\frac{1}{3}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{9}\cdot\frac{1}{9}-(\frac{1}{3}\cdot\frac{1}{4}+\frac{1}{4}\cdot\frac{1}{9}+\frac{1}{3}\cdot\frac{1}{9})}=\frac{1}{3}+\frac{1}{4}+\frac{1}{9}=\frac{12+9+4}{36}=\frac{25}{36}$

Question 5

Find the value of $\frac{\frac{1}{2}\cdot\frac{1}{2}\cdot\frac{1}{2}+\frac{1}{4}\cdot\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{5}\cdot\frac{1}{5}\cdot\frac{1}{5}-3.\frac{1}{2}\cdot\frac{1}{4}\cdot\frac{1}{5}}{\frac{1}{2}\cdot\frac{1}{2}+\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{5}\cdot\frac{1}{5}-(\frac{1}{2}\cdot\frac{1}{4}+\frac{1}{4}\cdot\frac{1}{5}+\frac{1}{2}\cdot\frac{1}{5})}$

A $\frac{17}{20}$

B $\frac{19}{20}$

C $\frac{13}{20}$

D $\frac{11}{20}$

Answer: B

Explanation:
The given equation is in the form of
$\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-(ab+bc+ca)}$

We know that $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - (ab + bc + ca))$

=> $\frac{a^3+b^3+c^3-3abc}{a^2+b^2+c^2-(ab+bc+ca)} = a + b + c$

Then, $\frac{\frac{1}{2}\cdot\frac{1}{2}\cdot\frac{1}{2}+\frac{1}{4}\cdot\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{5}\cdot\frac{1}{5}\cdot\frac{1}{5}-3.\frac{1}{2}\cdot\frac{1}{4}\cdot\frac{1}{5}}{\frac{1}{2}\cdot\frac{1}{2}+\frac{1}{4}\cdot\frac{1}{4}+\frac{1}{5}\cdot\frac{1}{5}-(\frac{1}{2}\cdot\frac{1}{4}+\frac{1}{4}\cdot\frac{1}{5}+\frac{1}{2}\cdot\frac{1}{5})} = \frac{1}{2} + \frac{1}{4} + \frac{1}{5} = \frac{10+5+4}{20} = \frac{19}{20}$

Question 6

The lines 2x+y = 3 and x+2y = 3 intersect at points

A (1,1)

B (-1,5)

C (0,3)

D (3,-3)

Answer: A

Explanation:
Given 2x+y = 3 and x+2y = 3
Solving above equations,
We get x = 1 and y = 1.
Hence, the lines intersect at (1,1)

Question 7

If If $(3^x)(3^y) = 9$ **and** $(5^x)(125^y) = 625$**, then find (x,y)**

A (4,-2)

B (0,2)

C (1,1)

D (6,-4)

Answer: C

Explanation:
Given $(3^x)(3^y) = 9$

=> $3^{x+y} = 3^2$

=> x+y = 2 -- (1)

$(5^x)(125^y) = 625$
=> $(5^x)((5^3)^y) = 5^4$
=> $(5^x)(5^3y) = 5^4$
=> $5^x + 3y = 5^4$
=> $x + 3y = 4$ -- (2)
Solving (1) and (2)

=> 2y = 2 => y = 1
Substituting y = 1 in (1) --> x = 1

Therefore, (x,y) = (1,1)

Question 8

If $(2^x)(2^y) = 16$ and $(3^x)(9^y) = 27$, then find (x,y)

A (4,0)

B (3,2)

C (5,-1)

D (6,-2)

Answer: C

Explanation:
Given $(2^x)(2^y) = 16$

=> $2^{x+y} = 2^4$

=> x+y = 4 -- (1)

$(3^x)(9^y) = 27$
=> $(3^x)((3^2)^y) = 3^3$
=> $(3^x)(3^2y) = 3^3$
=> $3^x + 2y = 3^3$
=> $x + 2y = 3$ -- (2)
Solving (1) and (2)

=> y = -1
Substituting y = -1 in (1) --> x = 5

Therefore, (x,y) = (5,-1)

Question 9

If a = 17, b = -4, c = -13, then find the value of $\frac{3a^3+3b^3+3c^3}{4abc}$

A 3

B $\frac{3}{4}$

C 1

D $\frac{9}{4}$

Answer: D

Explanation:
Given a = 17, b = -4, c = -13
Then a+b+c = 0.
We know that if a+b+c = 0, then $a^3 + b^3 + c^3 = 3abc$

Then, $\frac{3a^3+3b^3+3c^3}{4abc} = \frac{3(a^3+b^3+c^3)}{4abc} = \frac{3(3abc)}{4abc} = \frac{9}{4}$

Question 10

If a = 48, b = 16, c = -64, then find the value of $\frac{a^3+b^3+c^3}{abc}$

A 176

B 64

C 3

D 12

Answer: C

Explanation:
Given a = 48, b = 16, c = -64
Then, a+b+c = 48+16-64 = 0

We know that if a+b+c = 0, then $a^3 + b^3 + c^3 = 3abc$

Hence, $\frac{a^3+b^3+c^3}{abc} = \frac{3abc}{abc} = 3$

Question 11

Find the value of $1 + \frac{1}{1-\frac{1}{1+\frac{1}{1-\frac{1}{7}}}}$

A $\frac{15}{7}$

B $\frac{19}{8}$

C $\frac{20}{7}$

D $\frac{17}{8}$

Answer: C

Explanation:

$1+\frac{1}{1-\frac{1}{1+\frac{1}{1-\frac{1}{7}}}}$ = $1+\frac{1}{1-\frac{1}{1+\frac{1}{\frac{6}{7}}}}$

= $1+\frac{1}{1-\frac{1}{1+\frac{7}{6}}}$

= $1+\frac{1}{1-\frac{1}{\frac{13}{6}}}$

= $1+\frac{1}{1-\frac{6}{13}}$

= $1+\frac{1}{\frac{7}{13}}$

= $1+\frac{13}{7}$

= $\frac{20}{7}$

Question 12

If $x-\frac{1}{x}=3$, then $x^3-\frac{1}{x^3}=$?

A 24

B 28

C 36

D 42

Answer: C

Explanation:

Given $x-\frac{1}{x}=3$

Cubing on both sides

$x^3 - \frac{1}{x^3}$ $$-3\timesx\times\large\frac{1}{x}$$ $\left(x - \frac{1}{x}\right) = 27$

=> $x^3 - \frac{1}{x^3} - 3 \times 3 = 27$

=> $x^3 - \frac{1}{x^3} - 9 = 27$

=> $x^3 - \frac{1}{x^3} = 36$

Question 13

If $(a-b)^2 = 16$ and $(a+b)^2 = 36$, then find the value of $\frac{ab}{a+b}$

A $\frac{5}{6}$

B $\frac{8}{11}$

C $\frac{6}{7}$

D $\frac{7}{6}$

Answer: A

Explanation:
Given $(a-b)^2 = 16$ and $(a+b)^2 = 36$
$(a+b)^2 = (a-b)^2 + 4ab$
$36 = 16 + 4ab$
=> $4ab = 20$
$ab = 5$

$(a+b)^2 = 36$
=> $a + b = 6$

Hence, $\frac{ab}{a+b} = \frac{5}{6}$

Question 14

If a+b = 5 and a-b = 1, Then find the value of ab

A 4

B 6

C 8

D 12

Answer: B

Explanation:
Given, a+b = 5
a-b = 1

Then, 2a = 6 ==> a = 3

Substituting a = 3 in above equation
==> b = 2

Hence, ab = 3*2 = 6

Question 15

If $3X + \frac{3}{X} = 6$, then find the value of $X^6 + \frac{1}{X^6}$

A 4

B 3

C 9

D 2

Answer: D

Explanation:
Given $3X + \frac{3}{X} = 6$

$\Rightarrow 3(X + \frac{1}{X}) = 6$

$\Rightarrow X + \frac{1}{X} = 2$

Squaring on both sides

$(x + \frac{1}{x})^2 = 4$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = 4$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 = 4$

$\Rightarrow x^2 + \frac{1}{x^2} = 2$

Cubing on both sides

$(x^2 + \frac{1}{x^2})^3 = 8$

$x^6 + \frac{1}{6} + 3 \times x^2 \times \frac{1}{x^2} \times (x^2 + \frac{1}{x^2}) = 8$

$\Rightarrow x^6 + \frac{1}{6} + 3 \times 2 = 8$

$\therefore x^6 + \frac{1}{6} = 8 - 6 = 2$

Question 16

If $2X + \frac{2}{X} = 6$, then find the value of $X^5 + \frac{1}{X^5}$

A 123

B 121

C 116

D 107

Answer: A

Explanation:

Given $2X + \frac{2}{X} = 6$

$\Rightarrow 2(X + \frac{1}{X}) = 6$

$\Rightarrow X + \frac{1}{X} = 3$ --> (1)

Squaring (1) on both sides

$(x + \frac{1}{x})^2 = 9$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = 9$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 = 9$

$\Rightarrow x^2 + \frac{1}{x^2} = 7$ --> (2)

Cubing (1) on both sides

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

$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times x \times \frac{1}{x} \times (x + \frac{1}{x}) = 27$

$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times 3 = 27$

$\Rightarrow x^3 + \frac{1}{x^3} = 27 - 9 = 18$ --> (3)

Multiplying (2) and (3)

$x^2 + \frac{1}{x^2} \times x^3 + \frac{1}{x^3} = 18 \times 7$

$\Rightarrow x^5 + \frac{1}{x^5} + x^2 \times \frac{1}{x^3} + x^3 \times \frac{1}{x^2} = 126$

$\Rightarrow x^5 + \frac{1}{x^5} + x + \frac{1}{x} = 126$

Substituting $x + \frac{1}{x} = 3$ in above equation

$\Rightarrow x^5 + \frac{1}{x^5} + 3 = 126$

$\Rightarrow x^5 + \frac{1}{x^5} = 123$

Question 17

Find the value of $\sqrt{56-\sqrt{56-\sqrt{56-.....}}}$

A 9

B 8

C 11

D 14

Answer: B

Explanation:

Let $\sqrt{56-\sqrt{56-\sqrt{56-.....}}}$ = X

Then, $\sqrt{56-X}=X$

Squaring on both sides,
$56-X=X^2$
$\Rightarrow X^2+X-56=0$
$\Rightarrow X^2-8X+7X-56=0$
$\Rightarrow X(X-8)+7(X-8)=0$
$\Rightarrow (X-8)(X+7)=0$
$\Rightarrow X=8$ or $X=-7$
Hence, Option B is correct answer.

Question 18

Find the value of $\sqrt{20-\sqrt{20-\sqrt{20-.....}}}$

A 8

B 4

C 6

D 10

Answer: B

Explanation:

Let $\sqrt{20-\sqrt{20-\sqrt{20-.....}}}$ = X

Then, $\sqrt{20-X}=X$

Squaring on both sides,
$20-X=X^2$
$\Rightarrow X^2+X-20=0$

$\Rightarrow X^2 - 4X + 5X - 20 = 0$
$\Rightarrow X(X - 4) + 5(X - 4) = 0$
$\Rightarrow (X - 4)(X + 5) = 0$
$\Rightarrow X = 4$ or $X = -5$

Hence, Option B is correct answer.

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Question 19

Find the value of $\sqrt{42 + \sqrt{42 + \sqrt{42 + ...}}}$

A 11

B 7

C 6

D 10

Answer: B

Explanation:

Let $\sqrt{42 + \sqrt{42 + \sqrt{42 + ...}}}$ = X

Then, $\sqrt{42 + X} = X$

Squaring on both sides,
$42 + X = X^2$
$\Rightarrow X^2 - X - 42 = 0$
$\Rightarrow X^2 - 7X + 6X - 42 = 0$
$\Rightarrow X(X - 7) + 6(X - 7) = 0$
$\Rightarrow (X - 7)(X + 6) = 0$
$\Rightarrow X = 7$ or $X = -6$

X cannot be negative when all the terms are positive.
Hence, $X = 7$

Question 20

Find the value of $\sqrt{30 + \sqrt{30 + \sqrt{30 + ...}}}$

A 12

B 15

C 6

D 18

Answer: C

Explanation:

Let $\sqrt{30+\sqrt{30+\sqrt{30+.....}}}$ = X

Then, $\sqrt{30+X}=X$

Squaring on both sides,
$30+X=X^2$
$\Rightarrow X^2-X-30=0$
$\Rightarrow X^2-6X+5X-30=0$
$\Rightarrow X(X-6)+5(X-6)=0$
$\Rightarrow (X-6)(X+5)=0$
$\Rightarrow X=6$ or $X=-5$

X cannot be negative when all the terms are positive.
Hence, $X=6$

Question 21

Find the value of $\sqrt{6+\sqrt{6+\sqrt{6+.....}}}$

A 9

B 3

C 27

D 16

Answer: B

Explanation:

Let $\sqrt{6+\sqrt{6+\sqrt{6+.....}}}$ = X

Then, $\sqrt{6+X}=X$

Squaring on both sides,
$6+X=X^2$
$\Rightarrow X^2-X-6=0$
$\Rightarrow X^2-3X+2X-6=0$
$\Rightarrow X(X-3)+2(X-3)=0$
$\Rightarrow (X-3)(X+2)=0$
$\Rightarrow X=3$ or $X=-2$

X cannot be negative when all the terms are positive.
Hence, $X=3$

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Question 22

Find the value of $\sqrt{7\sqrt{7\sqrt{7.....}}}$

A $\sqrt{7}$

B 49

C 7

D 2.64

Answer: C

Explanation:

Let $\sqrt{7\sqrt{7\sqrt{7.....}}}$ = X

Then, $\sqrt{7X} = X$

Squaring on both sides,
$7X = X^2$
$\Rightarrow X = 7$

Question 23

Find the value of $\sqrt{4\sqrt{4\sqrt{4.....}}}$

A 4

B 2

C 16

D 8

Answer: A

Explanation:

Let $\sqrt{4\sqrt{4\sqrt{4.....}}}$ = X

Then, $\sqrt{4X} = X$

Squaring on both sides,
$4X = X^2$
$\Rightarrow X = 4$

Question 24

Find the value of $\sqrt{3\sqrt{3\sqrt{3.....}}}$

A 9

B 3

C 27

D 1.2

Answer: B

Explanation:

Let $\sqrt{3\sqrt{3\sqrt{3.....}}}$ = X

Then, $\sqrt{3X} = X$

Squaring on both sides,

$3X = X^2$

$\Rightarrow X = 3$

Question 25

Find the value of $1 + \frac{1}{1+\frac{1}{1+\frac{3}{2}}}$

A $\frac{13}{5}$

B $\frac{17}{6}$

C $\frac{17}{5}$

D $\frac{12}{7}$

Answer: D

Explanation:

$1 + \frac{1}{1+\frac{1}{1+\frac{3}{2}}} = 1 + \frac{1}{1+\frac{1}{\frac{5}{2}}}$

$= 1 + \frac{1}{1+\frac{2}{5}}$

$= 1 + \frac{1}{\frac{7}{5}}$

= $1 + \frac{5}{7}$

= $\frac{12}{7}$

Question 26

Find the value of $1 + \frac{1}{1+\frac{1}{1+\frac{1}{6}}}$

A $\frac{17}{5}$

B $\frac{19}{6}$

C $\frac{20}{13}$

D $\frac{17}{13}$

Answer: C

Explanation:

$1 + \frac{1}{1+\frac{1}{1+\frac{1}{6}}}$ = $1 + \frac{1}{1+\frac{1}{\frac{7}{6}}}$

= $1 + \frac{1}{1+\frac{6}{7}}$

= $1 + \frac{1}{\frac{13}{7}}$

= $1 + \frac{7}{13}$

= $\frac{20}{13}$

Question 27

Find the value of $1 + \frac{1}{1+\frac{1}{1+\frac{1}{2}}}$

A $\frac{6}{5}$

B $\frac{8}{5}$

C $\frac{8}{7}$

D $\frac{7}{6}$

Answer: B

Explanation:

$1+\frac{1}{1+\frac{1}{1+\frac{1}{2}}}=1+\frac{1}{1+\frac{1}{\frac{3}{2}}}$

$=1+\frac{1}{1+\frac{2}{3}}$

$=1+\frac{1}{\frac{5}{3}}$

$=1+\frac{3}{5}$

$=\frac{8}{5}$

Question 28

If $x+\frac{1}{x}=3$**, then** $x^5+\frac{1}{x^5}=?$

A 123

B 121

C 116

D 107

Answer: A

Explanation:

Given $x+\frac{1}{x}=3$ --> (1)

Squaring (1) on both sides

$(x+\frac{1}{x})^2=9$

$\Rightarrow x^2+\frac{1}{x^2}+2\times x\times\frac{1}{x}=9$

$\Rightarrow x^2+\frac{1}{x^2}+2=9$

$\Rightarrow x^2+\frac{1}{x^2}=7$ --> (2)

Cubing (1) on both sides

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

$\Rightarrow x^3+\frac{1}{x^3}+3\times x\times\frac{1}{x}\times(x+\frac{1}{x})=27$

$\Rightarrow x^3+\frac{1}{x^3}+3\times 3=27$

$\Rightarrow x^3+\frac{1}{x^3}=27-9=18$ --> (3)

Multiplying (2) and (3)

$x^2 + \frac{1}{x^2} \times x^3 + \frac{1}{x^3} = 18 \times 7$

$\Rightarrow x^5 + \frac{1}{x^5} + x^2 \times \frac{1}{x^3} + x^3 \times \frac{1}{x^2} = 126$

$\Rightarrow x^5 + \frac{1}{x^5} + x + \frac{1}{x} = 126$

Substituting $x + \frac{1}{x} = 3$ in above equation

$\Rightarrow x^5 + \frac{1}{x^5} + 3 = 126$

$\Rightarrow x^5 + \frac{1}{x^5} = 123$

Question 29

If $x + \frac{1}{x} = 2$, then find the value of $x^6 + \frac{1}{x^6}$.

A 2

B 5

C 8

D 6

Answer: A

Explanation:

Given $x + \frac{1}{x} = 2$

Squaring on both sides

$(x + \frac{1}{x})^2 = 4$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = 4$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 = 4$

$\Rightarrow x^2 + \frac{1}{x^2} = 2$

Cubing on both sides

$(x^2 + \frac{1}{x^2})^3 = 8$

$x^6 + \frac{1}{6} + 3 \times x^2 \times \frac{1}{x^2} \times (x^2 + \frac{1}{x^2}) = 8$

$\Rightarrow x^6 + \frac{1}{6} + 3 \times 2 = 8$

$\therefore x^6 + \frac{1}{6} = 8 - 6 = 2$

Question 30

If $x + \frac{1}{x} = 4$, then find the value of $x^3 + \frac{1}{x^3}$.

A 48

B 56

C 52

D 64

Answer: C

Explanation:

Given $x + \frac{1}{x} = 4$

Cubing on both sides

$(x + \frac{1}{x})^3 = 64$

$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times x \times \frac{1}{x} \times (x + \frac{1}{x}) = 64$

$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times 4 = 64$

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

$\therefore x^3 + \frac{1}{x^3} = 52$

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Question 31

If $x + \frac{1}{x} = 3$, then find the value of $x^2 + \frac{1}{x^2}$.

A 6

B 7

C 9

D 8

Answer: B

Explanation:

Given $x + \frac{1}{x} = 3$

Squaring on both sides

$(x + \frac{1}{x})^2 = 9$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = 9$

$\Rightarrow x^2 + \frac{1}{x^2} + 2 = 9$

$\Rightarrow x^2 + \frac{1}{x^2} = 7$

Question 32

What is the units digit of $17^{17} * 33^{33}$

A 7

B 9

C 3

D 1

Answer: D

Explanation:
In the power cycle of 7 we get units digit for
$7^1 = 7$
$7^2 = 49$
$7^3 = 243$
$7^4 = 1701$
And this cycle repeats. Cyclicity =4
$17^{4(4)+1}$ has 7 as its unit digit.
In the power cycle of 3 we get units digit for
$3^1 = 3$
$3^2 = 9$
$3^3 = 27$
$3^4 = 81$
And this cycle repeats. Cyclicity =4
$33^{8(4)+1}$ has 3 as its unit digit.
So the product of 7 and 3 is 21 and so the units digit is 1.

Question 33

What is the units digit of 27^{27} ?

A 7

B 9

C 3

D 1

Answer: C

Explanation:
In the cycle of 7 power we get
$7^1 = 7$
$7^2 = 49$

$7^3 = 243$
$7^4 = 1701$
And this cycle repeats. Cyclicity =4
$27^{4(6)+3}$ has 3 as its unit digit.

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Question 34

If $x + \frac{1}{x} = -2$ then the value of $x^p + x^q$ is: (Where p is an even number and q is an odd number)

A -2

B 2

C 1

D 0

Answer: D

Explanation:
Given : $x + \frac{1}{x} = -2$
=> $\frac{x^2+1}{x} = -2$
=> $x^2 + 1 + 2x = 0$
=> $(x+1)^2 = 0$
=> $x + 1 = 0$
=> $x = -1$
$\therefore x^p + x^q$ (let $p = 2$ and $q = 1$)
=> $(-1)^2 + (-1)^1 = 1 - 1 = 0$
=> Ans - (D)

Question 35

If $p(x+y)^2 = 5$ and $q(x-y)^2 = 3$, then the simplified value of $p^2(x+y)^2 + 4\,pq\,xy - q^2(x-y)^2$ is:

A $-(p+q)$

B $2(p+q)$

C $p+q$

D $-2(p+q)$

Answer: B

Question 36

The simplified value of the following expression is: $\frac{1}{\sqrt{11-2\sqrt{30}}} - \frac{3}{\sqrt{7-2\sqrt{10}}} - \frac{4}{\sqrt{8+4\sqrt{3}}}$

A 0

B 1

C $\sqrt{2}$

D $\sqrt{3}$

Answer: A

Explanation:

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

=> $\sqrt{11 - 2\sqrt{30}} = \sqrt{(\sqrt{6})^2 + (\sqrt{5})^2 - 2\sqrt{6}\sqrt{5}} = (\sqrt{6} - \sqrt{5})$

Similarly, $\sqrt{7 - 2\sqrt{10}} = (\sqrt{5} - \sqrt{2})$

and $\sqrt{8 + 4\sqrt{3}} = \sqrt{8 + 2\sqrt{12}} = (\sqrt{6} + \sqrt{2})$

To find : $\frac{1}{\sqrt{11-2\sqrt{30}}} - \frac{3}{\sqrt{7-2\sqrt{10}}} - \frac{4}{\sqrt{8+4\sqrt{3}}}$

= $\frac{1}{(\sqrt{6}-\sqrt{5})} - \frac{3}{(\sqrt{5}-\sqrt{2})} - \frac{4}{(\sqrt{6}+\sqrt{2})}$

Rationalizing the denominator, we get :

= $[\frac{1}{\sqrt{6}-\sqrt{5}} \times \frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}+\sqrt{5}}] - [\frac{3}{\sqrt{5}-\sqrt{2}} \times \frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}+\sqrt{2}}] - [\frac{4}{\sqrt{6}+\sqrt{2}} \times \frac{\sqrt{6}-\sqrt{2}}{\sqrt{6}-\sqrt{2}}]$

= $(\sqrt{6} + \sqrt{5}) - (\sqrt{5} + \sqrt{2}) - (\sqrt{6} - \sqrt{2})$

= 0

=> Ans - (A)

Question 37

The value of the following is: $\sqrt{12 + \sqrt{12 + \sqrt{12 + ...}}}$

A $2\sqrt{2}$

B $2\sqrt{3}$

C 2

D 4

Answer: D

Explanation:

Let $x = \sqrt{12 + \sqrt{12 + \sqrt{12 + ...}}}$

=> $x = \sqrt{12 + x}$

Squaring both sides, we get :

=> $x^2 = x + 12$

=> $x^2 - x - 12 = 0$

=> $x^2 - 4x + 3x - 12 = 0$

=> $x(x - 4) + 3(x - 4) = 0$

=> $(x - 4)(x + 3) = 0$

=> $x = 4, -3$

$\because$ x cannot be negative, => $x = 4$

=> Ans - (D)

Question 38

The value of x in the following equation is:

$0.\dot{3} + 0.\dot{6} + 0.\dot{7} + 0.\dot{8} = x$

A 5.3

B $2\frac{3}{10}$

C $2\frac{2}{3}$

D $2.\dot{3}\dot{5}$

Answer: C

Question 39

If $1^2 + 2^2 + 3^2 + ... + p^2 = \frac{p(p+1)(2p+1)}{6}$**, then** $1^2 + 3^2 + 5^2 + ... + 17^2$ **is equal to:**

A 1785

B 1700

C 980

D 969

Answer: D

Explanation:

Expression : $1^2 + 3^2 + 5^2 + ... + 17^2$

= $[1^2 + 2^2 + 3^2 + 4^2..... + 16^2 + 17^2] - [2^2 + 4^2 + ... + 16^2]$

= $[1^2 + 2^2 + 3^2 + 4^2..... + 16^2 + 17^2] - (2^2)[1^2 + 2^2 + 3^2..... + 8^2]$

= $[\frac{17(17+1)+(34+1)}{6}] - [4 \times \frac{8(8+1)(16+1)}{6}]$

= $[\frac{17(17+1)+(34+1)}{6}] - [4 \times \frac{8(8+1)(16+1)}{6}]$

= $[51 \times 35] - [48 \times 17]$

= $17 \times (105 - 48) = 969$

=> Ans - (D)

Question 40

Given $2^2 + 4^2 + 6^2 + ... + 40^2 = 11480$, then the value of $1^2 + 2^2 + 3^2 + ... + 20^2$ is:

A 2870

B 2868

C 2867

D 2869

Answer: A

Explanation:

Given : $2^2 + 4^2 + 6^2 + ... + 40^2 = 11480$

=> $2^2[1 + 2^2 + 3^2 + ... + 20^2] = 11480$

=> $1^2 + 2^2 + 3^2 + ... + 20^2 = \frac{11480}{4}$

=> $1^2 + 2^2 + 3^2 + ... + 20^2 = 2870$

=> Ans - (A)