- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
  $= a^2 + b^2 + c^2 + 2[ab + bc + ca]$

- $(a - b + c)^2 = a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$

- $(a + b - c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$

$$\left(\sqrt{5}+\sqrt{6}+\sqrt{7}\right)^2 = 5+6+7+2\sqrt{30}+2\sqrt{42}+2\sqrt{35}$$

$$= 18+2\left(\sqrt{30}+\sqrt{42}+\sqrt{35}\right)$$

$$\sqrt{18+2\left(\sqrt{30}+\sqrt{42}+\sqrt{35}\right)} = \sqrt{5}+\sqrt{6}+\sqrt{7}\ \checkmark$$

$\sqrt{30} = \sqrt{5}\times\sqrt{6}$, $\sqrt{42} = \sqrt{6}\times\sqrt{7}$, $\sqrt{35} = \sqrt{5}\times\sqrt{7}$

57. If $\sqrt{15+\sqrt{60}+\sqrt{84}+\sqrt{140}}=\sqrt{a}+\sqrt{b}+\sqrt{c}$, then the value of a+b+c?

$2(\sqrt{3}\times\sqrt{5}+\sqrt{7}\times\sqrt{3}+\sqrt{7}\times\sqrt{5})$

$3+5+7$

[A] 5 [B] 20

[C] 10 [D] 15

$=\sqrt{3}+\sqrt{5}+\sqrt{7}$

58. The expression $\sqrt{10+2(\sqrt{6}-\sqrt{15}-\sqrt{10})}$ is equal to:

$\sqrt{10+2(\sqrt{6}-\sqrt{15}-\sqrt{10})}$ का मान है :

[A] $\sqrt{3}-\sqrt{2}-\sqrt{5}$

[B] $(\sqrt{3}-\sqrt{2}+\sqrt{5})^2$

[C] $\sqrt{2}-\sqrt{3}-\sqrt{5}$

[D] $\sqrt{3}+\sqrt{2}-\sqrt{5}$

(CGL MAINS 2018)

option से

$\sqrt{25}=5 \Rightarrow 5^2=25$

59. If $\sqrt{24+4\sqrt{21}-2\sqrt{35}-4\sqrt{15}}+\sqrt{21+8\sqrt{5}}=\sqrt{a}+\sqrt{b}+\sqrt{c}$, then $a^2+b^2+c^2$=?

[A] 449 [B] 330

[C] 705 [D] 593

$2\times(2\sqrt{3}\times\sqrt{7}-\sqrt{5}\times\sqrt{7}-2\sqrt{3}\times\sqrt{5})$

$2\times4\times\sqrt{5}$

$2\sqrt{3}+\sqrt{7}-\sqrt{5}+4+\sqrt{5}$

$=\sqrt{12}+\sqrt{7}+\sqrt{16}$

$=12^2+7^2+16^2$

$=449$

63. Let $x = \sqrt[6]{27} - \sqrt{6\frac{3}{4}}$ and $y = \frac{\sqrt{45}+\sqrt{605}+\sqrt{245}}{\sqrt{80}+\sqrt{125}}$, then the value of $x^2 + y^2$ is :

यदि $x = \sqrt[6]{27} - \sqrt{6\frac{3}{4}}$ और $y = \frac{\sqrt{45}+\sqrt{605}+\sqrt{245}}{\sqrt{80}+\sqrt{125}}$ है, तो $x^2 + y^2$ का मान क्या होगा?

[A] $\frac{227}{9}$

[B] $\frac{221}{36}$

[C] $\frac{221}{9}$

[D] $\frac{223}{36}$

$= \frac{3}{4} + \frac{49}{9} = \frac{223}{36}$ #

$x = \sqrt{3} - \frac{3\sqrt{3}}{2} = -\frac{\sqrt{3}}{2}$

$y = \frac{3\sqrt{5}+11\sqrt{5}+7\sqrt{5}}{4\sqrt{5}+5\sqrt{5}} = \frac{21}{9} = \frac{7}{3}$

मान लो $x^2 = \left(\sqrt{a+\sqrt{b}} \pm \sqrt{a-\sqrt{b}}\right)^2$ #

64. Find the value of $\sqrt{2+\sqrt{3}}+\sqrt{2-\sqrt{3}}$.

माना $x = \sqrt{2+\sqrt{3}}+\sqrt{2-\sqrt{3}}$ का मान ज्ञात कीजिए।

[A] $\sqrt{6}$ [B] $2\sqrt{3}$

[C] $2\sqrt{2}$ [D] 6

$$x^2 = \left(\sqrt{2+\sqrt{3}}+\sqrt{2-\sqrt{3}}\right)^2$$

$\sqrt{n}^2 = n$

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

$$x^2 = 6 \Rightarrow x = \sqrt{6}$$

65. Simplify $\sqrt{25+10\sqrt{6}}+\sqrt{25-10\sqrt{6}}$?

माना $x=\sqrt{25+10\sqrt{6}}+\sqrt{25-10\sqrt{6}}$?

RRB JE 2019

[A] $2\sqrt{15}$ ✓

[B] $2\sqrt{5}$

[C] $\sqrt{55}$

[D] $\sqrt{50}$

$x^2 = 25+10\sqrt{6}+25-10\sqrt{6}+2\times5$

$x^2 = 60$

$x=\sqrt{60}=2\sqrt{15}$

66. If $x = \sqrt{1+\frac{\sqrt{3}}{2}} - \sqrt{1-\frac{\sqrt{3}}{2}}$ then the value of $\frac{\sqrt{3}-x}{\sqrt{3}+x}$ (correct to one decimal place) is?

यदि $x = \sqrt{1+\frac{\sqrt{3}}{2}} - \sqrt{1-\frac{\sqrt{3}}{2}}$ तो $\frac{\sqrt{3}-x}{\sqrt{3}+x}$ का मान क्या होगा (दशमलव के एक स्थान तक सही)?

[A] 0.25 [B] 0.17

[C] 0.19 [D] 0.27 ✓

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

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

$x^2 = 1$

$\Rightarrow x = 1$

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

$= 2-\sqrt{3}$

$\approx 2-1.73 \approx .27$

67. $x = \sqrt{2 + \frac{\sqrt{7}}{2}} - \sqrt{2 - \frac{\sqrt{7}}{2}}$ then find the value of $\frac{3+x}{3-x}$?

$x = \sqrt{2 + \frac{\sqrt{7}}{2}} - \sqrt{2 - \frac{\sqrt{7}}{2}}$ तो $\frac{3+x}{3-x}$ का मान ज्ञात करें?

[A] 2

[B] 1.5

[C] 1

[D] 0

(CGL 2025 Pre)

68. Let $x = \sqrt{35 + 5\sqrt{13}} - \sqrt{35 - 5\sqrt{13}}$ and $y = \frac{3-\sqrt{10}}{3+\sqrt{10}}$ If $x - y = A+B\sqrt{10}$, then what is the value of (A–B)?

माना कि $x = \sqrt{35 + 5\sqrt{13}} - \sqrt{35 - 5\sqrt{13}}$ और $y = \frac{3-\sqrt{10}}{3+\sqrt{10}}$ है। यदि $x - y = A+B\sqrt{10}$ हो, तो (A – B) का मान कितना होगा?

(ICAR Technician 2023)

[A] 31 [B] 25

[C] 29 [D] 24

$$y = \frac{(3-\sqrt{10})^2}{-1}$$

$$= \frac{19-6\sqrt{10}}{-1}$$

$$y = 6\sqrt{10} - 19$$

$$x^2 = 35 + 5\sqrt{13} + 35 - 5\sqrt{13} - 2x30$$

$$x^2 = 10$$

$$x = \sqrt{10}$$

$$x - y = \sqrt{10} - (6\sqrt{10} - 19)$$

$$= 19 - 5\sqrt{10} = A + B\sqrt{10}$$

69. $\dfrac{\sqrt{\sqrt{5}+2}+\sqrt{\sqrt{5}-2}}{\sqrt{\sqrt{5}+1}} - \sqrt{3-2\sqrt{2}} = ?$

$2\times\sqrt{2}\times 1$

[A] 1

[B] −1

[C] 2

[D] −2

$\dfrac{\sqrt{2}\cdot(\sqrt{5}+1)}{\sqrt{\sqrt{5}+1}} = \sqrt{2} - (\sqrt{2}-1)$

$= 1$

माना $x = \sqrt{\sqrt{5}+2} + \sqrt{\sqrt{5}-2}$

$x^2 = \sqrt{5}+2+\sqrt{5}-2+2\times 1$

$x^2 = 2\sqrt{5}+2$

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

70. माना $x = \left(\sqrt[3]{(26+15\sqrt{3})} + \sqrt[3]{(26-15\sqrt{3})}\right) = ?$

a b

[A] 6 ✗

[B] 5

[C] 4 ✓ $= x$

[D] 3

$$x^3 = (26+15\sqrt{3}) + (26-15\sqrt{3}) + 3 \times 1 \times x$$

$$\boxed{x^3 = 52 + 3x}$$

$$\therefore 64 = 52 + 12$$

$$(a+b)^3 = a^3 + b^3 + 3ab(a+b)$$

$$a^2 - ab + b^2 = \frac{a^3 + b^3}{a + b}$$

&

$$a^2 + ab + b^2 = \frac{a^3 - b^3}{a - b}$$

$$(\sqrt[3]{7}+1)\cdot(\sqrt[3]{49}-\sqrt[3]{7}+1)=(\sqrt[3]{7}+1)\left((\sqrt[3]{7})^2-\sqrt[3]{7}\times 1+1^2\right)=$$

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

$$\left(10^{\frac{2}{3}}+7^{\frac{2}{3}}+70^{\frac{1}{3}}\right)=\frac{3}{\left(10^{\frac{1}{3}}-7^{\frac{1}{3}}\right)}$$

Test RanKING

71. Evaluate $64^{1/3} + 25^{1/3} + 40^{1/3}$?

$64^{1/3} + 25^{1/3} + 40^{1/3}$ का मूल्यांकन कीजिये?

[A] $\frac{13}{\sqrt[3]{8}+\sqrt[3]{5}}$

[B] $\frac{3}{\sqrt[3]{8}+\sqrt[3]{5}}$

[C] $\frac{13}{\sqrt[3]{8}-\sqrt[3]{5}}$

[D] $\frac{3}{\sqrt[3]{8}-\sqrt[3]{5}}$

$\sqrt[3]{64} + \sqrt[3]{25} + \sqrt[3]{40} = ?$

$(\sqrt[3]{8})^2 + (\sqrt[3]{5})^2 + \sqrt[3]{8} \times \sqrt[3]{5} = \frac{3}{\sqrt[3]{8}-\sqrt[3]{5}}$

72. What is the value of $\frac{5}{3^{2/3}-6^{1/3}+2^{2/3}}$?

$\frac{5}{3^{2/3}-6^{1/3}+2^{2/3}}$ का मान क्या है?

[A] $3^{1/3}+2^{1/3}$ **[B]** $3^{1/3}-2^{1/3}$

[C] $2^{1/3}-3^{1/3}$ **[D]** $3^{2/3}+2^{2/3}$

$$\frac{\left(3^{\frac{1}{3}}+2^{\frac{1}{3}}\right)\times 5}{\left(3^{\frac{1}{3}}+2^{\frac{1}{3}}\right)\left[\left(3^{\frac{1}{3}}\right)^2-3^{\frac{1}{3}}2^{\frac{1}{3}}+\left(2^{\frac{1}{3}}\right)^2\right]}$$

73. If $\frac{1}{\sqrt[3]{25}-\sqrt[3]{5}+1} = a\sqrt[3]{25} + b\sqrt[3]{5} + c$, and a, b, c are rational numbers then 2a+3b+5c =?

[A] 0 [B] 1

[C] 2 [D] $\frac{4}{3}$

$$\frac{(\sqrt[3]{5}+1)\times 1}{(\sqrt[3]{5}+1)\cdot[(\sqrt[3]{5})^2-\sqrt[3]{5}+1^2]}$$

$$= \frac{\sqrt[3]{5}+1}{6}$$

$$= \frac{1}{6}\cdot\sqrt[3]{5}+\frac{1}{6}$$

$a=0$

$b=\frac{1}{6}$

$c=\frac{1}{6}$

$= \frac{9}{6}$

74. If $\frac{1}{\sqrt[3]{25}+\sqrt[3]{15}+\sqrt[3]{9}} = \sqrt[3]{a} - \sqrt[3]{b}$, then find a+b?

यदि $\frac{1}{\sqrt[3]{25}+\sqrt[3]{15}+\sqrt[3]{9}} = \sqrt[3]{a} - \sqrt[3]{b}$ है, तो a+b ज्ञात कीजिये?

[A] $\sqrt{15}$

[B] 1/4

[C] 1

[D] 8

$= \frac{5}{8} + \frac{3}{8}$

$\frac{(\sqrt[3]{5}-\sqrt[3]{3})\times}{(\sqrt[3]{5}-\sqrt[3]{3})\left[(\sqrt[3]{5})^2+\sqrt[3]{5}\times\sqrt[3]{3}+(\sqrt[3]{3})^2\right]}$

$= \frac{\sqrt[3]{5}-\sqrt[3]{3}}{\sqrt[3]{8}} = \sqrt[3]{\frac{5}{8}} - \sqrt[3]{\frac{3}{8}}$