

22. If  $x = 999$ , the value of  $\sqrt[3]{x(x^2 + 3x + 3) + 1}$  will be-

यदि  $x = 999$  हो, तो  $\sqrt[3]{x(x^2 + 3x + 3) + 1}$  का मान होगा-

(A) 1003

(B) 1001

(C) 1000

(D) 1002

$$\sqrt[3]{x(x^2 + 3x + 3) + 1}$$

$$x^3 + 3x^2 + 3x + 1$$

$$\sqrt[3]{(x+1)^3}$$

$$= x+1$$

$$= 999+1$$

$$= 1000$$

23. The sum of cubes of two numbers is 793 the sum of numbers is 13, find out the difference between two numbers-

दो संख्याओं के घनों का योग 793 है। संख्याओं का योग 13 है, तो दोनों संख्याओं का अन्तर बताइये-

- (A) 6 (B) 8  
(C) 7 (D) 5

$$a-b = \sqrt{25}$$

$$a-b = 5$$

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

$$a^3 + b^3 = (a+b) [ (a+b)^2 - 3ab ]$$

$$a^3 + b^3 = (a+b) [ a^2 - ab + b^2 ]$$

$$a^3 + b^3 = \overset{13^3}{(a+b)^3} - 3ab \times 13$$

$$\cancel{793} = \frac{\cancel{2197}}{169} - 3ab \times \frac{1}{13}$$

$$61$$

$$3ab = 169 - 61 = 108$$

$$ab = 36$$

$$a^3 + b^3 = 793$$

$$a + b = 13$$

$$ab = 36$$

$$(a-b)^2 = (a+b)^2 - 4ab$$

$$169 - 144 = 25$$

$$a=9$$

$$b=4$$

24. The product of two numbers is 36 and sum is 13, accordingly how much positive difference will be between those two numbers?

दो संख्याओं का गुणनफल 36 है और योग 13 है, तदनुसार उन दोनों संख्याओं का धनात्मक अंतर कितना होगा?

(A) 9

(B) 3

(C) 1

(D) 5

$$a + b = 13$$

$$a \times b = 36$$

Value put

$$\begin{aligned} a &= 9 \\ b &= 4 \end{aligned}$$

$$(a-b)^2 = (a+b)^2 - 4ab$$

$$\begin{aligned} (a-b)^2 &= (13)^2 - 4 \times 36 \\ &= 169 - 144 = 25 \end{aligned}$$

$$(a-b)^2 = 25$$

$$a-b = \sqrt{25} = 5$$

$$\# \textcircled{i} (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$$

$$\textcircled{ii} (a+b)^2 - (a-b)^2 = 4ab$$

$$\textcircled{i} \frac{(a+b)^2 + (a-b)^2}{a^2 + b^2} = 2$$

$$\textcircled{ii} \frac{(a+b)^2 - (a-b)^2}{ab} = 4$$

$$\# a^3 + b^3 + c^3 - 3abc = (a+b+c)[a^2 + b^2 + c^2 - ab - bc - ca] \textcircled{iii} \frac{a^3 + b^3}{a^2 - ab + b^2} = (a+b)$$

$$\text{gf} \rightarrow a+b+c=0$$

$$\boxed{a^3 + b^3 + c^3 = 3abc}$$

$$\# a^3 + b^3 + c^3 - 3abc = (a+b+c)[(a+b+c)^2 - 3(ab+bc+ca)] \textcircled{iv} \frac{a^3 - b^3}{a^2 + ab + b^2} = (a-b)$$

$$\# a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a+b+c)[(a-b)^2 + (b-c)^2 + (c-a)^2]$$

$$\# a^2 + b^2 + c^2 - ab - bc - ca = \frac{1}{2}[(a-b)^2 + (b-c)^2 + (c-a)^2]$$

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

Q①  $a = 999$   
 $b = 997$   
 $c = 994$

2  
3

$(999 - 997)^2$   
 $(997 - 994)^2$   
 $(994 - 999)^2$

#  $a = 999$   
 $b = 996$   
 $c = 993$

3  
3

$$a^2 + b^2 + c^2 - ab - bc - ca = 3d^2 = 3 \times 3^2 = 27$$

$$a^2 + b^2 + c^2 - ab - bc - ca = \frac{1}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2]$$

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

$$= \frac{1}{2} [4 + 9 + 25] = 19 \text{ Ans}$$

~~$\frac{1}{2} \times 38$~~

25.  $\frac{20.3 \times 20.3 \times 20.3 + 1}{20.3 \times 20.3 - 20.3 + 1}$  is equal to—

$\frac{20.3 \times 20.3 \times 20.3 + 1}{20.3 \times 20.3 - 20.3 + 1}$  बराबर है—  $\frac{a^3 - b^3}{a^2 + ab + b^2} = a - b$

(A) 19.3

(B) 20.3

~~(C) 21.3~~

(D) 12.3

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

$$= 20.3 + 1$$

$$= 21.3$$

$$\frac{20.3^3 + 1^3}{20.3^2 - 20.3 \times 1 + 1^2}$$

$$\frac{0,123}{1000}$$

$$\frac{0,123}{10}$$

$$\frac{0,123}{100}$$

$$26. \quad \frac{2.34 \times 23.4 - 0.66 \times 6.6}{23.4 - 6.6}$$

is equal to  $\frac{a^2 - b^2}{a - b} = (a+b)(a-b)$

$$\frac{23.4 \times 23.4 - 6.6 \times 6.6}{23.4 - 6.6}$$

बराबर है  $-\frac{1}{10} \frac{[23.4^2 - 6.6^2]}{23.4 - 6.6}$

(A) 3

(B) 3.5

(C) 4  $\frac{23.4 \times 23.4}{10} - \frac{6.6 \times 6.6}{10}$

(D) 1

$$\frac{23.4 \times 23.4 - 6.6 \times 6.6}{10}$$

$$\frac{1}{10} \frac{(23.4 + 6.6)(23.4 - 6.6)}{(23.4 - 6.6)} = 3$$

$$\frac{2.44 \times 24.4 - 0.56 \times 5.6}{24.4 - 5.6}$$

$$= \frac{\frac{1}{10} [24.4^2 - 5.6^2]}{24.4 - 5.6} = \frac{1}{10} \times (24.4 + 5.6)$$

~~$\frac{1}{10} \times 30$~~

③

$$\frac{2.44 \times 24.4}{10} - \frac{0.56 \times 5.6}{10}$$

$$\frac{24.4^2 - 5.6^2}{10}$$

$$\frac{27.3 \times 27.3 - 7.3 \times 7.3}{27.3 + 7.3} = \frac{\frac{1}{10} [27.3^2 - 7.3^2]}{27.3 + 7.3} = \frac{1}{10} (27.3 - 7.3)$$

~~$\frac{1}{10} \times 20$~~   
②

27. The value of  $\frac{(2.586 - 0.575)^2 + (2.586 + 0.575)^2}{2.586 \times 2.586 + 0.575 \times 0.575}$  is -

$\frac{(2.586 - 0.575)^2 + (2.586 + 0.575)^2}{2.586 \times 2.586 + 0.575 \times 0.575}$  का मान है-

(A) 4

(B) 2

(C) 3

(D) 1

$$\frac{(a+b)^2 + (a-b)^2}{a^2 + b^2} = 2$$

28.  $\frac{(3.697 - 0.498)^2 + (3.697 + 0.498)^2}{3.697 \times 3.697 + 0.498 \times 0.498}$  is equal to

$$\frac{(3.697 - 0.498)^2 + (3.697 + 0.498)^2}{3.697 \times 3.697 + 0.498 \times 0.498}$$

- (A) 3  
(C) 5

- (B) 2  
(D) 1

बराबर है-

$$\frac{(a+b)^2 + (a-b)^2}{a^2 + b^2} = 2$$

29. Simplify  $\frac{0.07 \times 0.07 \times 0.07 - 0.03 \times 0.03 \times 0.03}{0.07 \times 0.07 + 0.07 \times 0.03 + 0.03 \times 0.03}$  -

$$\frac{0.07 \times 0.07 \times 0.07 - 0.03 \times 0.03 \times 0.03}{0.07 \times 0.07 + 0.07 \times 0.03 + 0.03 \times 0.03}$$

(A) 0.03

(B) 0.05

(C) 0.02

~~(D) 0.04~~

को सरल करें।

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

$$0.07 - 0.03 = 0.04$$

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

30. What is the value of

$$\frac{2.75 \times 2.75 \times 2.75 - 2.25 \times 2.25 \times 2.25}{2.75 \times 2.75 + 2.75 \times 2.25 + 2.25 \times 2.25}$$

$$\frac{2.75 \times 2.75 \times 2.75 - 2.25 \times 2.25 \times 2.25}{2.75 \times 2.75 + 2.75 \times 2.25 + 2.25 \times 2.25}$$

क्या है?

$$(2.75)^3 - (2.25)^3$$

(A) 1

$$(2.75)^2 + 2.75 \times 2.25 + (2.25)^2$$

(B)

$$\frac{1}{2}$$

(C) 3

(D)  $\frac{3}{2}$

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

का मान

$$2.75 - 2.25 = .50 = \frac{1}{2}$$

$$\frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \frac{1}{4 \times 5} + \frac{1}{5 \times 6} + \frac{1}{6 \times 7} + \frac{1}{7 \times 8}$$

$$\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56}$$

$$\begin{aligned} & \rightarrow \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \frac{1}{4} - \frac{1}{5} + \frac{1}{5} - \frac{1}{6} + \frac{1}{6} - \frac{1}{7} + \frac{1}{7} - \frac{1}{8} \\ & \quad \quad \quad \frac{1}{2} - \frac{1}{8} = \frac{3}{8} \end{aligned}$$

$$\textcircled{i} \quad \frac{1}{a \times b} + \frac{1}{b \times c} + \frac{1}{c \times d} + \frac{1}{d \times e} + \frac{1}{e \times f}$$

$$\frac{1}{\text{diff.}} \left[ \frac{1}{a} - \frac{1}{f} \right]$$

$$\textcircled{ii} \quad \frac{1}{a \times b \times c} + \frac{1}{b \times c \times d} + \frac{1}{c \times d \times e} + \frac{1}{d \times e \times f}$$

$$\frac{1}{\text{diff.}} \left[ \frac{1}{a \times b} - \frac{1}{e \times f} \right]$$

$$\textcircled{iii} \quad \frac{1}{a \times b \times c \times d} + \frac{1}{b \times c \times d \times e} + \frac{1}{c \times d \times e \times f} + \frac{1}{d \times e \times f \times g}$$

$$\frac{1}{\text{diff.}} \left[ \frac{1}{a \times b \times c} - \frac{1}{e \times f \times g} \right]$$



32.  $\left( \frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \frac{1}{9.11} + \frac{1}{11.13} + \frac{1}{13.15} \right)$  is equal to -

$\left( \frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \frac{1}{9.11} + \frac{1}{11.13} + \frac{1}{13.15} \right)$  बराबर है -

(A)  $\frac{2}{45}$

(B)  $\frac{4}{25}$

(C)  $\frac{2}{15}$

(D)  $\frac{7}{45}$

(क)  $3 \times 5$   $3 \times 5$

$$\frac{1}{2} \left[ \frac{1}{3} - \frac{1}{15} \right]$$

$$\frac{1}{2} \times \left[ \frac{5-1}{15} \right]$$

$$\frac{1}{2} \times \frac{4}{15} = \frac{2}{15}$$

33. Find out the value of

$$\left( \frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \frac{1}{10.13} + \frac{1}{13.16} \right) -$$

$$\left( \frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \frac{1}{10.13} + \frac{1}{13.16} \right) \text{ का मान निकालें-}$$

$$\frac{1}{3} \left[ \frac{1}{1} - \frac{1}{16} \right]$$

$$\frac{1}{3} \times \frac{15}{16} = \frac{5}{16}$$

(A)  $\frac{1}{13}$

(B)  $\frac{3}{8}$

~~(C)  $\frac{5}{16}$~~

(D)  $\frac{41}{7280}$

$$\# \frac{1}{3 \times 5 \times 7} + \frac{1}{5 \times 7 \times 9} + \frac{1}{7 \times 9 \times 11} + \frac{1}{9 \times 11 \times 13} + \frac{1}{11 \times 13 \times 15}$$

(Note: In the original image, the denominators 3x5x7 and 11x13x15 are circled in red. The numbers 4, 4, and 4 are written below the fractions 1/(5x7x9), 1/(7x9x11), and 1/(9x11x13) respectively, with arrows pointing to the common denominator of the adjacent terms.)

$$\frac{1}{4} \left[ \frac{1}{3 \times 5} - \frac{1}{13 \times 15} \right]$$

$$\frac{1}{4} \left[ \frac{1}{15} - \frac{1}{13 \times 15} \right]$$

$$= \frac{1}{4} \times \left[ \frac{13 - 1}{13 \times 15} \right] = \frac{1}{4} \times \frac{12}{13 \times 15}$$

$$\frac{1}{65}$$



# # Ladder fraction / continued fraction (लानन भिन्न)

$$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{4}{5}}} \times \frac{5}{9}}$$

$$1 + \frac{1}{1 + \frac{1}{1 + \frac{5}{9}} \times \frac{9}{14}}$$

$$1 + \frac{1}{1 + \frac{9}{14} = \frac{23}{14}} = 1 + \frac{14}{23} = \frac{37}{23}$$

# # Ladder fraction / continued fraction (लानन भिन्न)

$$\frac{1}{0} + \frac{1}{\frac{1}{0} + \frac{1}{1 + \frac{1}{1 + \frac{1}{\boxed{\frac{4}{5}}}}}}$$

4, 5

9 ✓

14 ✓

23 ✓  
 $\frac{37}{23}$

37 ✓

②

$$\begin{aligned} & 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{3}{4}}}}} \end{aligned}$$

3, 4

✓  
7

✓  
11

✓  
18

✓  
29

✓  
47

$$\frac{47}{29}$$

③

$$1 - \frac{1}{1 - \frac{1}{1 - \frac{1}{1 - \frac{4}{5}}}}$$

↖  
4, 5

✓  
(5-4)

✓  
(1-5)

✓  
(-4-1)

✓  
[-5 - (-4)]  
-5 + 4

1

-4

⓪ -5

-1

$$\frac{+1}{+5} = \text{⓪ } \frac{1}{5}$$

④

$$\begin{array}{r} \frac{1}{\cdot} - \frac{1}{\quad} \\ \frac{1}{\cdot} - \frac{1}{\quad} \\ \frac{1}{\cdot} - \frac{1}{\quad} \\ \frac{1}{\cdot} - \frac{1}{\quad} \\ \frac{1}{\cdot} - \frac{2}{5} \end{array}$$

2, 5

✓  
 $(5-2)$   
3

✓  
 $(3-5)$   
-2

✓  
 $-2-3$   
-5

✓  
 $-5+2$   
-3

✓  
 $-3+5$   
2

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

⑤

$$\begin{array}{r} 1 \oplus \frac{1}{1} \\ 1 \ominus \frac{1}{1} \\ 1 \oplus \frac{1}{1} \\ 1 \ominus \frac{1}{1} \\ 1 \ominus \frac{5}{5} \end{array}$$

4,5

$$\begin{array}{r} \checkmark \\ (5-4) \\ 1 \end{array}$$

$$\begin{array}{r} \checkmark \\ (1-5) \\ -4 \end{array}$$

$$\begin{array}{r} \checkmark \\ (-4+1) \\ -3 \end{array}$$

$$\begin{array}{r} \checkmark \\ -3+4 \\ 1 \end{array}$$

$$\begin{array}{r} \checkmark \\ 1+-3 \\ 1-3 \\ \textcircled{-2} \end{array}$$

$$\frac{-2}{-1} = \textcircled{2}$$

⑥

$$\begin{array}{r} 1 \oplus \frac{1}{\phantom{1}} \\ \cdot 1 \ominus \frac{1}{\phantom{1}} \\ \cdot 1 \oplus \frac{1}{\phantom{1}} \\ \cdot 1 \ominus \frac{5}{9} \end{array}$$

5, 9

$$\begin{array}{c} \checkmark \\ (9-5) \\ 4 \end{array}$$

$$\begin{array}{c} \checkmark \\ (4+9) \\ 13 \end{array}$$

$$\begin{array}{c} \checkmark \\ (13-4) \\ 9 \end{array}$$

$$\begin{array}{c} \checkmark \\ 9+13 \\ 22 \end{array}$$

$$\frac{22}{9}$$

⑦  $\underbrace{2}_{\cdot} + \frac{1}{\underbrace{3}_{\cdot} + \frac{1}{\underbrace{4}_{\cdot} + \frac{3}{2}}}$      3, 2

$\checkmark$   
 $(2 \times 4 + 3)$   
 11

$\checkmark$   
 $(11 \times 3 + 2)$   
 35

$\checkmark$   
 $(35 \times 2 + 11)$   
 81

$\frac{81}{35}$

⑧  $\underbrace{1}_{\cdot} + \frac{1}{\underbrace{2}_{\cdot} + \frac{1}{\underbrace{3}_{\cdot} + \frac{1}{\underbrace{4}_{\cdot} + \frac{5}{3}}}}$

5, 3  
 $\checkmark$   
 $(3 \times 4 + 5)$   
 17

$\checkmark$   
 $(17 \times 3 + 3)$   
 54

$\checkmark$   
 $(54 \times 2 + 17)$   
 125

$\checkmark$   
 $(125 \times 1 + 54)$   
 179

$\frac{179}{125}$