

Frequently asked Fixed patterns

eLL coaching center

$$\frac{1}{\text{diff}}(f - l):$$

$$\frac{1}{2} - \frac{1}{3} = \frac{3-2}{2 \times 3} = \frac{\cancel{\text{diff}}}{\text{prod.}} = \frac{1}{2 \times 3} \rightarrow \frac{1}{2} - \frac{1}{3}$$

$$\frac{1}{5} - \frac{1}{7} = \frac{7-5}{5 \times 7} = \frac{\cancel{\text{diff}}}{\text{prod}} = \frac{2}{5 \times 7} \rightarrow \frac{1}{5} - \frac{1}{7}$$

$$\frac{1}{10} - \frac{1}{13} = \frac{13-10}{10 \times 13} = \frac{\cancel{\text{diff}}}{\text{prod}} = \frac{3}{10 \times 13} = \frac{1}{10} - \frac{1}{13}$$

$$\frac{5}{24} = \frac{5}{3 \times 8} = \frac{1}{3} - \frac{1}{8}$$

$$\frac{1}{12 \times 13} = \frac{1}{12} - \frac{1}{13}$$

$$\frac{2}{10 \times 12} = \frac{1}{10} - \frac{1}{12}$$

$$\frac{7}{100 \times 107} = \frac{1}{108} - \frac{1}{107}$$

$$\frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \frac{1}{4} - \frac{1}{5} + \frac{1}{5} - \frac{1}{6} + \dots + \frac{1}{11} - \frac{1}{12} = \frac{1}{2} - \frac{1}{12} = \frac{5}{12}$$

$$\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \dots + \frac{1}{11 \times 12} = \frac{1}{1} \left[\frac{1}{2} - \frac{1}{12} \right] =$$

$$\frac{2}{15} + \frac{2}{35} + \frac{2}{63} + \frac{2}{99} = \left[\frac{1}{1^4} - \frac{1}{last} \right] = \frac{1}{3} - \frac{1}{11} = \frac{8}{3 \times 11}$$

$$\frac{2}{2} \times \left[\frac{2}{15} + \frac{2}{35} + \frac{2}{63} + \frac{2}{99} \right] = \frac{1}{2} \left[\frac{1}{3} - \frac{1}{11} \right] = \frac{1}{2} \times \frac{8}{11} = \frac{4}{11} \quad \frac{1}{3} \times \frac{9}{20} = \frac{3}{20}$$

$$\frac{1}{10} + \frac{1}{40} + \frac{1}{88} + \dots + \frac{1}{17 \times 20} = \frac{1}{diff} [f-l] = \frac{1}{3} \left[\frac{1}{2} - \frac{1}{20} \right]$$

$$\begin{aligned}& \frac{2}{5 \times 9} + \frac{2}{9 \times 13} + \frac{2}{13 \times 17} + \frac{2}{17 \times 21} \\&= 2 \left[\frac{1}{5 \times 9} + \frac{1}{9 \times 13} + \frac{1}{13 \times 17} + \frac{1}{17 \times 21} \right] \\&= 2 \times \frac{1}{4} \times \left[\frac{1}{5} - \frac{1}{21} \right]\end{aligned}$$

$$1. \frac{1}{\frac{30}{5 \times 6}} + \frac{1}{\frac{42}{6 \times 7}} + \frac{1}{\frac{56}{7 \times 8}} + \frac{1}{\frac{72}{8 \times 9}} + \frac{1}{\frac{90}{9 \times 10}} + \frac{1}{\frac{110}{10 \times 11}} = ?$$

a) $\sqrt{2} \frac{6}{27}$

b) $\frac{1}{9}$

c) $\frac{5}{27}$

d) ~~$\frac{6}{55}$~~

$$\frac{1}{5} - \frac{1}{11} = \frac{6}{55}$$

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2 . Find the sum of the following:

जोड़फल जात कीजिए:

$$\frac{1}{9} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72}$$

a) $\frac{12 \times 3}{2}$ b) 0 c) $\frac{1}{9}$ d) $\frac{1}{2520}$

$$\frac{1}{9} + \frac{1}{2} - \frac{1}{9} = \frac{1}{2}$$

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3. $\left(\frac{1}{1 \cdot 4} + \frac{1}{4 \cdot 7} + \frac{1}{7 \cdot 10} + \frac{1}{10 \cdot 13} + \frac{1}{13 \cdot 16} \right)$ is equal to
- a) $\frac{1}{3}$ ~~b) $\frac{5}{16}$~~ c) $\frac{3}{8}$ d) $\frac{41}{7280}$

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

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

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4. $\left(\frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} + \frac{1}{7 \cdot 9} + \frac{1}{9 \cdot 11} + \frac{1}{11 \cdot 13} + \frac{1}{13 \cdot 15} \right)$ is equal to

a) $\frac{2}{45}$

b) $\frac{4}{45}$

c) $\frac{7}{45}$

d) $\frac{2}{15}$

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

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

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5. What is the value of $\frac{1}{3 \times 7} + \frac{1}{7 \times 11} + \frac{1}{11 \times 15} + \dots + \frac{1}{899 \times 903}$?

$\frac{1}{3 \times 7} + \frac{1}{7 \times 11} + \frac{1}{11 \times 15} + \dots + \frac{1}{899 \times 903}$ का मान क्या है?

a) $\frac{21}{509}$ b) $\frac{18}{403}$ c) $\frac{25}{301}$ d) $\frac{29}{31}$

$$\frac{1}{4} \times \left[\frac{1}{3} - \frac{1}{903} \right]$$

$$= \frac{1}{4} \times \frac{300}{3 \times 903}$$

6. Which of the following statement(s) is/are TRUE?

निम्नलिखित में से कौन सा/से कथन सत्य है/हैं?

~~X~~ I. $\frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \dots + \frac{1}{11 \times 13} = \frac{12}{13}$

~~2~~ III. $\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \dots + \frac{1}{12 \times 13} = \frac{12}{13}$

a) Only I

b) Only II

c) Both I and II

d) Neither I nor II

$$\rightarrow \frac{1}{2} \left[1 - \frac{1}{13} \right] = \frac{1}{2} \times \cancel{\frac{12}{13}}$$

$$1 - \frac{1}{13} = \frac{12}{13}$$

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7. If $A = \frac{1}{1 \times 2} + \frac{1}{1 \times 4} + \frac{1}{2 \times 3} + \frac{1}{4 \times 7} + \frac{1}{3 \times 4} + \frac{1}{7 \times 10} \dots$ upto 20 terms, then what is the value of A?

यदि $A = \frac{1}{1 \times 2} + \frac{1}{1 \times 4} + \frac{1}{2 \times 3} + \frac{1}{4 \times 7} + \frac{1}{3 \times 4} + \frac{1}{7 \times 10} \dots$ 20 पदों तक हो, तो A का मान क्या हैं?

a) $\frac{379}{308}$

b) $\frac{171}{140}$

c) $\frac{379}{310}$

d) $\frac{420}{341}$

$$\left(1 - \frac{1}{11}\right) + \frac{1}{3} \left[1 - \frac{1}{31}\right]$$

$$10 \text{ terms} = \frac{1}{|10 \times 1|}$$

$$10 \text{ terms} = \frac{1}{|+27|}$$

$$= \frac{10}{11} + \frac{1}{3} \times \frac{30}{31} = 10 \times \frac{42}{11 \times 31}$$

$\rightarrow 341$

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8. If $a = \text{sum of the first } \underline{20} \text{ terms of } \frac{1}{4 \times 5} + \frac{1}{5 \times 6} + \frac{1}{6 \times 7} + \dots$, and $b = \text{sum of the first } 22 \text{ terms of } \frac{1}{3 \times 4} + \frac{1}{4 \times 3} + \frac{1}{4 \times 5} + \frac{1}{5 \times 6} + \frac{1}{6 \times 7} + \dots$, then the value of $(ab)^{-1}$ is:

$$\frac{6}{6} \times \frac{1}{4} - \frac{1}{24} = \frac{5}{24} = a$$

$$22^{\text{nd}} = \frac{1}{24 \times 25}$$

$$\frac{1}{3} - \frac{1}{25} = \frac{22}{75} = b$$

$$16\frac{4}{11} = \frac{180}{11} = \frac{\cancel{24}}{\cancel{5}} \times \frac{\cancel{75}}{\cancel{22}} \frac{12}{11} \frac{15}{11} \frac{1}{ab}$$

यदि $a = \frac{1}{4 \times 5} + \frac{1}{5 \times 6} + \frac{1}{6 \times 7} + \dots$ के पहले 20 पदों का योग है तथा $b = \frac{1}{4 \times 3} + \frac{1}{4 \times 5} + \frac{1}{5 \times 6} + \frac{1}{6 \times 7} + \dots$ के पहले 22 पदों का योग है, तो $(ab)^{-1}$ का मान कितना है?

- a) $22\frac{3}{11}$
- b) $19\frac{4}{11}$
- c) $25\frac{3}{11}$
- d) $16\frac{4}{11}$

$$7 \times \left[1 - \frac{1}{13}\right] = \frac{7 \times 12}{13}$$

$$11 \times \frac{1}{2} \left[1 - \frac{1}{25}\right] = \frac{11 \times 24}{25}$$

$$12 \left[\frac{7}{13} + \frac{11}{25} \right] = \frac{12 \times 318}{325}$$

9. What is the value of $\frac{7}{2} + \frac{11}{3} + \frac{7}{6} + \frac{11}{15} + \frac{7}{12} + \dots + \frac{11}{575}$?

$$\frac{7}{2} + \frac{11}{3} + \frac{7}{6} + \frac{11}{15} + \frac{7}{12} + \dots + \frac{11}{35} + \dots + \frac{7}{156} + \frac{11}{575}$$

का मान क्या है?

1x2
1

1x3
2

a) $3917/355$
c) $3714/345$

2x3
3x4
3x5

5x7

b) $3816/325$
d) $3216/315$

25x23

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$$x = \frac{1}{12} - \frac{1}{24} = \frac{1}{24}$$

$$y = \frac{1}{36} - \frac{1}{72} = \frac{1}{72}$$

$$\frac{x}{y} = \frac{1 \times 72}{24 \times 1} = 3$$

10. If $x = \frac{1}{12 \cdot 13} + \frac{1}{13 \cdot 14} + \frac{1}{14 \cdot 15} + \dots + \frac{1}{23 \cdot 24}$,
 $y = \frac{1}{36 \cdot 37} + \frac{1}{37 \cdot 38} + \frac{1}{38 \cdot 39} + \dots + \frac{1}{71 \cdot 72}$, then
 $\frac{x}{y}$ is equal to:

यदि $x = \frac{1}{12 \cdot 13} + \frac{1}{13 \cdot 14} + \frac{1}{14 \cdot 15} + \dots + \frac{1}{23 \cdot 24}$, $y = \frac{1}{36 \cdot 37} + \frac{1}{37 \cdot 38} + \frac{1}{38 \cdot 39} + \dots + \frac{1}{71 \cdot 72}$, तो $\frac{x}{y}$ का मान
ज्ञात कीजिये:

- a) $\frac{1}{3}$
- b) $\frac{1}{24}$
- c) $\frac{1}{72}$
- ~~d) 3~~

$$\frac{1}{3 \times 5 \times 7} + \frac{1}{5 \times 7 \times 9} + \frac{1}{7 \times 9 \times 11} = ?$$

$$= \frac{1}{4} \left[\frac{1}{3 \times 5} - \frac{1}{9 \times 11} \right]$$

$$= \frac{1}{4} \left[\frac{99 - 15}{3 \times 5 \times 9 \times 11} \right]$$

$$\frac{1}{3} - \frac{1}{5} = \frac{2}{3 \times 5}$$

$$\frac{1}{3 \times 5} - \frac{1}{5 \times 7} = \frac{7 - 3}{3 \times 5 \times 7}$$

$$\frac{1}{1 \times 2 \times 3} + \frac{1}{2 \times 3 \times 4} + \dots + \frac{1}{8 \times 9 \times 10} = ?$$

$$= \frac{1}{2} \left[\frac{1}{1 \times 2} - \frac{1}{9 \times 10} \right]$$

$$= \frac{1}{2} \times \frac{\frac{22}{44}}{\frac{90}{45}}$$

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$$\frac{1}{3 \times 5 \times 7 \times 9} + \frac{1}{5 \times 7 \times 9 \times 11} = ?$$

$$= \frac{1}{6} \left[\frac{1}{3 \times 5 \times 7} - \frac{1}{7 \times 9 \times 11} \right]$$

II. What is the value of $\frac{1}{1 \times 5 \times 9} + \frac{1}{5 \times 9 \times 13} + \frac{1}{9 \times 13 \times 17}$?

$\frac{1}{1 \times 5 \times 9} + \frac{1}{5 \times 9 \times 13} + \frac{1}{9 \times 13 \times 17}$ का मान क्या है?

- 8 a) $\frac{216}{5 \times 13 \times 17}$ b) $\frac{54}{5 \times 13 \times 17}$ c) $\frac{27}{5 \times 13 \times 17}$ d) None of these

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$$\frac{1}{8} \left[\frac{1}{1 \times 5} - \frac{1}{13 \times 17} \right]$$

$$= \frac{1}{8} \left(\frac{\cancel{216}}{5 \times 13 \times 17} \right)$$

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12. What is the value of $\frac{2}{3 \times 5 \times 7} + \frac{2}{5 \times 7 \times 9} + \frac{2}{7 \times 9 \times 11} + \dots \dots \dots$ up to 10 terms?

$$\frac{2}{3 \times 5 \times 7} + \frac{2}{5 \times 7 \times 9} + \frac{2}{7 \times 9 \times 11} + \dots \dots \dots \text{ का 10 पदों तक मान क्या है?}$$

a) $\frac{112}{1725}$
 b) $\frac{56}{1725}$
 c) $\frac{28}{1725}$
 d) None of

4
 these

$$10^{\text{th}} = \frac{1}{21 \times 23 \times 25}$$

$$\cancel{2} \times \frac{1}{2} \left[\frac{1}{3 \times 5} - \frac{1}{23 \times 25} \right]$$

$$= \frac{1}{2} \times \frac{1}{5} \left[\frac{56}{15 \times 23} \right]$$

115 1725

13. What is the value of $S = \frac{1}{1 \times 3 \times 5} + \frac{1}{1 \times 4} + \frac{1}{3 \times 5 \times 7} + \frac{1}{4 \times 7} + \frac{1}{5 \times 7 \times 9} + \frac{1}{7 \times 10} + \dots$ upto 20 terms, then what is the value of S ?

$S = \frac{1}{1 \times 3 \times 5} + \frac{1}{1 \times 4} + \frac{1}{3 \times 5 \times 7} + \frac{1}{4 \times 7} + \frac{1}{5 \times 7 \times 9} + \frac{1}{7 \times 10} + \dots$ 20 पदों तक हैं, तो S का मान क्या है?

a) $\frac{6179}{15275}$

b) $\frac{6070}{14973}$

c) $\frac{7191}{15174}$

d) $\frac{5183}{16423}$

$$10^{th} = \frac{1}{28 \times 61}$$

$$\frac{1}{3} \left(1 - \frac{1}{31} \right) = \frac{1}{3} \times \frac{10}{31}$$

$$\frac{483}{124} \overline{)607}$$

$$10^{th} = \frac{1}{19 \times 21 \times 23}$$

$$\frac{1}{4} \left(\frac{1}{1 \times 3} - \frac{1}{21 \times 23} \right) = \frac{1}{12} \times \frac{40}{161}$$

$$10 \left(\frac{1}{31} + \frac{4}{483} \right)$$

$$= 10 \times \frac{607}{61 \times 483}$$

$$x = \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}$$

$\xrightarrow[+ve]{3 \times 2}$

$$\Rightarrow x = \sqrt{6+x}$$

$$\Rightarrow x^2 = 6+x$$

$$\Rightarrow x^2 - x - 6 = 0$$

$$\frac{1 \pm \sqrt{25}}{2} = \frac{1 \pm 5}{2} = 3, -2$$

$|+24|$

$$\sqrt{6 - \sqrt{6 - \sqrt{6 - \dots}}}$$

} +ve

$\checkmark 2, -3$

Under root patterns:

$$\sqrt{8 + \sqrt{8 + \sqrt{8 + \dots \infty}}} = x$$

$$\sqrt{8 + x} = x$$

$$\Rightarrow x^2 - x - 8 = 0$$

|+32

$$\frac{1 \pm \sqrt{33}}{2} = \frac{1 \pm \sqrt{33}}{2}$$

$$\sqrt{56 + \sqrt{56 + \sqrt{56 + \dots \infty}}} = 8$$

$$\sqrt{90 - \sqrt{90 - \sqrt{90 - \dots \infty}}} = 9$$

$$\sqrt{2 - \sqrt{2 - \sqrt{2 - \dots \infty}}} = 1$$

14.

$$\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}} \text{ is equal to}$$

a) $6^{\frac{2}{3}}$

b) 6

c) $3\frac{1}{2}$

d) 3

$\cancel{2 \times 3}$

$\checkmark \cancel{d) 3}$

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15. $\sqrt{72 - \sqrt{72 - \sqrt{72 - \dots}}}$ is equal to

a) $8^{\frac{2}{3}}$

b) 8

c) 9

d) 3

9×8

16. If $m = \sqrt{5 + \sqrt{5 + \sqrt{5 + \dots}}}$ and $n = \sqrt{5 - \sqrt{5 - \sqrt{5 - \dots}}}$ then the relation between m and n is $\chi(\chi+1)$

अगर $m = \sqrt{5 + \sqrt{5 + \sqrt{5 + \dots}}}$ और $n = \sqrt{5 - \sqrt{5 - \sqrt{5 - \dots}}}$ है तो m और n में क्या सम्बन्ध है?

- a) $m - n + 1 = 0$
- b) $m + n + 1 = 0$
- c) $m + n - 1 = 0$
- ~~d) $m - n - 1 = 0$~~

$$5 = \chi \times (\chi+1)$$

$$m = \chi + 1$$

$$n = \chi$$

$$m - n = 1$$

$$x = \sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}$$

$$x = \sqrt{1 + x}$$

$$\Rightarrow x^2 - x - 1 = 0$$

$$x = \frac{1 \pm \sqrt{5}}{2} = \frac{\sqrt{5} + 1}{2}$$

$\left\{ \begin{array}{l} 2.23 \\ 3.23 \end{array} \right.$
 $\left\{ \begin{array}{l} \frac{3+23}{2} \\ \sqrt{1+4} \end{array} \right.$

17. The value of $\sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}$

$\sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}$ का मान है :

- a) Equals to 1
- b) Lies between 0 and 1
- ~~c) Lies between 1 and 2~~
- d) is greater than 2

18. $\sqrt{3\sqrt{3\sqrt{3 \dots \infty}}}$ is

a) 9

b) ∞

~~$\sqrt[3]{3}$~~

c) $\sqrt{3}$

$$x = \sqrt{3\sqrt{3\sqrt{3 \dots \infty}}}$$

$$\Rightarrow x = \sqrt{3 \cdot x}$$

$$\Rightarrow x^2 = 3x$$

$$\sqrt{7\sqrt{7\sqrt{7 \dots \infty}}} = 7$$

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19. If $x = \sqrt[3]{a\sqrt{b\sqrt{a\sqrt[3]{b\dots}}}}$, then value of x is

अगर $x = \sqrt[3]{a\sqrt{b\sqrt{a\sqrt[3]{b\dots}}}}$ है तो x का मान:

- a) $\sqrt[5]{ab^3}$
- b) $\sqrt[3]{a^5b}$
- c) $\sqrt[3]{a^3b}$
- d) $\sqrt[5]{a^3b}$

$$\Rightarrow x = \sqrt[3]{a\sqrt{b \cdot x}}$$

$$\Rightarrow x^2 = a \cdot \sqrt[3]{b \cdot x}$$

$$\Rightarrow x^6 = a^3 \cdot b \cdot x$$

$$\Rightarrow x^5 = a^3 b$$

$$x = (a^3 b)^{\frac{1}{5}}$$

$$= \sqrt[5]{a^3 b}$$

20. Solve $\sqrt[3]{2\sqrt[3]{4\sqrt[3]{2^3 \cdot 4}}} = x$

~~a) 2~~ b) 4 c) 16 d) 32

$$\sqrt[3]{2\sqrt[3]{4 \cdot x}} = x$$

$$\Rightarrow 2 \cdot \sqrt[3]{4x} = x^2$$

$$\Rightarrow 8 \cdot 4x = x^6$$

$$\Rightarrow 32 = x^5$$

$$\Rightarrow 2 = x$$

$$\begin{aligned} 4^{\frac{1}{3}} &= 32^a \\ \Rightarrow 2^{\frac{2}{3}} &= 2^{5a} \\ \Rightarrow 5a &= \frac{2}{3} \\ \Rightarrow a &= \frac{2}{15} \end{aligned}$$

21. If $x = \sqrt[4]{4\sqrt[4]{4\sqrt[4]{4 \dots \dots \infty}}} = 32^a$, then $a = ?$

यदि $x = \sqrt[4]{4\sqrt[4]{4\sqrt[4]{4 \dots \dots \infty}}} = 32^a$ है, तो
 a का मान होगा : x

- ~~a) $\frac{2}{15}$~~ b) $\frac{4}{15}$ c) $\frac{2}{5}$ d) $\frac{1}{5}$

$$\Rightarrow x = \sqrt[4]{4 \cdot x}$$

$$\Rightarrow x^4 = 4 \cdot x$$

$$\Rightarrow x^3 = 4$$

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

• $\sqrt{a \pm \sqrt{a \pm \sqrt{a \pm \dots \dots \infty}}} = \frac{\sqrt{4a+1} \pm 1}{2}$

~~$$\sqrt{a + \sqrt{a + \sqrt{a + \dots \dots \infty}}} = \frac{\sqrt{4a+1} + 1}{2}$$~~

• $\sqrt{a + \sqrt{a - \sqrt{a + \sqrt{a - \dots \dots \infty}}}} = \frac{\sqrt{4a-3} + 1}{2}$

• $\sqrt{a - \sqrt{a + \sqrt{a - \sqrt{a + \dots \dots \infty}}}} = \frac{\sqrt{4a-3} - 1}{2}$

• $\sqrt{a \pm n\sqrt{a \pm n\sqrt{a \pm \dots \dots \infty}}} = \text{break into 2 numbers with gap of } n$

• $\sqrt{a \pm \sqrt[b]{a \pm \sqrt[b]{a \pm \dots \dots \infty}}} = \frac{\sqrt{4a+b^2} \pm b}{2}$

$$\Rightarrow m = \sqrt{6 + \sqrt{6 - m}}$$

$$\Rightarrow m^2 = 6 + \sqrt{6 - m}$$

$$\Rightarrow m^2 - 6 = \sqrt{6 - m}$$

$$\Rightarrow m^4 + 36 - 12m^2 = 6 - m$$

$$\Rightarrow m^4 - 12m^2 + m + 36 = 6$$

22. If $m = \sqrt{6 + \sqrt{6 - \sqrt{6 + \sqrt{6 - \dots \dots \infty}}}}$ then
 $m^4 - 12m^2 + m + 36 = ?$

अगर $m = \sqrt{6 + \sqrt{6 - \sqrt{6 + \sqrt{6 - \dots \dots \infty}}}}$ तो
 $m^4 - 12m^2 + m + 36 = ?$

a) 0 b) -6
c) 6 d) None of these