

Quadratic equation

Sum and product of roots
(हलों का जोड़ एवं योग)

$$ax^2 + bx + c = 0, \quad a \neq 0$$

$$\text{Sum of roots} = -\frac{b}{a}$$

$$\text{Prod of roots} = \frac{c}{a}$$

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

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

$$a^5 + b^5 = (a^2 + b^2)(a^3 + b^3) - a^2 b^2 (a+b)$$

coaching center

1. If 'a' and 'b' are the roots of the equation $x^2 - 14x + 11 = 0$, find $a^2 + b^2$?

अगर a और b समीकरण $x^2 - 14x + 11 = 0$ के मूल हैं तो $a^2 + b^2$ ज्ञात करें।

~~a) 174~~

b) 196

c) 218

d) None

$$a + b = 14$$

$$ab = 11$$

$$\begin{array}{r} 196 \\ -22 \\ \hline 174 \end{array}$$

coaching center

2. If α and β are the roots of the equation $x^2 - 6x + 6 = 0$, then what is

$\alpha^3 + \beta^3 + \alpha^2 + \beta^2 + \alpha + \beta$ equal to ?

यदि α और β समीकरण $x^2 - 6x + 6 = 0$ के मूल हैं, तो $\alpha^3 + \beta^3 + \alpha^2 + \beta^2 + \alpha + \beta$ किसके बराबर है ?

a) 150

~~b) 138~~

c) 128

d) 124

$$216 - \underline{3 \cdot 6 \cdot 6} + 36 - 12 + 6$$

$$= 108 + 30 = 138$$

$$\alpha + \beta = 6$$

$$\alpha\beta = 6$$

coaching center

3. If α and β are the roots of the quadratic equation $ax^2 + bx + c = 0$, then the value of $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ is:

$\alpha=1$
 $\beta=2$

$x^2 - 3x + 2 = 0$

$a=1, b=-3, c=2$

अगर समीकरण $ax^2 + bx + c = 0$ के मूल α और β हैं तो $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ का मान ज्ञात करें।

a) $\frac{3bc - a^3}{b^2c}$

~~b) $\frac{3abc - b^3}{a^2c}$~~

c) $\frac{3abc + b^3}{a^2c}$

d) $\frac{ab - b^2c}{2b^2c}$

$\alpha + \beta = -\frac{b}{a}$
 $\alpha\beta = \frac{c}{a}$

$$\frac{3abc - b^3}{a^2 \cdot \frac{c}{\alpha}} = \frac{-\frac{b^3}{a^3} + 3 \frac{c}{a} \frac{b}{a} \frac{a}{a}}{\frac{c}{a}} = \frac{\alpha^3 + \beta^3}{\alpha\beta}$$

$\frac{9}{2}$

coaching center

4. If α and β are the roots of equation $x^2 - x + 1 = 0$, then which equation will have roots α^3 and β^3 ?

यदि α तथा β समीकरण $x^2 - x + 1 = 0$ के मूल हैं, तो किसी समीकरण के मूल α^3 तथा β^3 होंगे?

~~a) $x^2 + 2x + 1 = 0$~~

b) $x^2 - 2x - 1 = 0$

c) $x^2 + 3x - 1 = 0$

d) $x^2 - 3x + 1 = 0$

$$\alpha + \beta = 1$$

$$\alpha\beta = 1$$

$$x^2 + 2x + 1 = 0 \left\{ \begin{array}{l} \text{Sol} = \alpha^3 + \beta^3 = 1 - 3 = -2 \\ \text{Por} = \alpha^3 \beta^3 = 1 \end{array} \right.$$

coaching center

5. α and β are the roots of the quadratic equation $x^2 - x - 1 = 0$
what is the value of $\alpha^8 + \beta^8$?

α तथा β द्विघात समीकरण $x^2 - x - 1 = 0$ के मूल हैं। $\alpha^8 + \beta^8$ का मान क्या है?

~~a) 47~~

b) 54

c) 59

d) 68

$$\alpha + \beta = 1$$

$$\alpha\beta = -1$$

$$\alpha^2 + \beta^2 = 1 + 2 = 3$$

$$\alpha^2\beta^2 = 1$$

$$\alpha^4 + \beta^4 = 9 - 2 = 7$$

$$\alpha^4\beta^4 = 1$$

$$\alpha^8 + \frac{1}{\alpha^8} = 47 \quad \alpha^4 + \frac{1}{\alpha^4} = 7 \quad \alpha^2 + \frac{1}{\alpha^2} = 3$$

~~$\alpha^8 + \beta^8 = 47$~~

$$\alpha^8 + \beta^8 = 49 - 2 = 47$$

6. If α and β are the roots of equation $x^2 - 2x + 4 = 0$, then what is the equation whose roots are $\frac{\alpha^3}{\beta^2}$ and $\frac{\beta^3}{\alpha^2}$?

यदि α तथा β समीकरण $x^2 - 2x + 4 = 0$ के मूल हैं तो वह समीकरण क्या है जिसके मूल $\frac{\alpha^3}{\beta^2}$ तथा $\frac{\beta^3}{\alpha^2}$ हैं?

~~a) $x^2 - 4x + 8 = 0$~~
~~c) $x^2 - 2x + 4 = 0$~~

b) $x^2 - 32x + 4 = 0$

d) $x^2 - 16x + 4 = 0$

$\alpha + \beta = 2$

$\alpha\beta = 4$

$$\begin{aligned} \alpha^5 \beta^5 &= (\alpha^2 + \beta^2)(\alpha^3 + \beta^3) - \alpha^2 \beta^2 (\alpha + \beta) \\ &= -4 \times (8 - 24) - 16 \times 2 \\ &= 64 - 32 = 32 \end{aligned}$$

$$S_oR = \frac{\alpha^3}{\beta^2} + \frac{\beta^3}{\alpha^2} = \frac{\alpha^5 + \beta^5}{\alpha^2 \beta^2} = \frac{32}{16} = 2$$

$$P_oR = \frac{\alpha^3}{\beta^2} \times \frac{\beta^3}{\alpha^2} = \alpha\beta = 4$$

$$a+b = \frac{q}{p} \quad ab = \frac{r}{p}$$

$$a^2+b^2 = \frac{q^2}{p^2} - \frac{2r}{p} = \frac{q^2 - 2pr}{p^2}$$

$$\frac{q^2 - 2pr}{p^2 \cdot \frac{r^2}{p^2}} + \frac{q^2 - 2pr}{p^2 \cdot \frac{r}{p}}$$

$$= (q^2 - 2pr) \left(\frac{1}{r^2} + \frac{1}{pr} \right) \rightarrow \frac{p+r}{pr^2}$$

7. If a and b are the roots of the equation $px^2 - qx + r = 0$, then what is the value of $\left(\frac{1}{a^2}\right) + \left(\frac{1}{b^2}\right) + \left(\frac{a}{b}\right) + \left(\frac{b}{a}\right)$?

यदि a तथा b समीकरण $px^2 - qx + r = 0$ के मूल हैं, तो $\left(\frac{1}{a^2}\right) + \left(\frac{1}{b^2}\right) + \left(\frac{a}{b}\right) + \left(\frac{b}{a}\right)$ का मान क्या है?

← $\frac{(q^2 - 2pr)(2r + p)}{pr^2}$ $\frac{a^2 + b^2}{a^2 b^2} + \frac{a^2 + b^2}{ab}$

b) $\frac{(q^2 - 2pr)(r + p)}{p^2 r}$

c) $\frac{(q^2 - 2pr)(2r + 2p)}{p^2 r^2}$

~~d) $\frac{(q^2 - 2pr)(r + p)}{pr^2}$~~

$a=1, b=2$

$x^2 - 3x + 2 = 0$

$p=1, q=3, r=2$

$$a+b = -\frac{b}{a}, \quad ab = \frac{c}{a}$$

$$\text{So } R = ab + a + b + ab - a - b = 2ab = 2 \frac{c}{a} (ab - a - b)?$$

$$\begin{aligned} \text{PoR} &= [ab + (a+b)][ab - (a+b)] = a^2 b^2 - (a+b)^2 \\ &= \frac{c^2}{a^2} - \frac{b^2}{a^2} \end{aligned}$$

$$x^2 - \frac{2c}{a}x + \frac{c^2 - b^2}{a^2} = 0$$

$$\Rightarrow a^2 x^2 - 2acx + c^2 - b^2 = 0$$

8. If a and b are roots of the equation $ax^2 + bx + c = 0$, then which equation will have roots $(ab + a + b)$ and $(ab - a - b)$?

यदि a तथा b समीकरण $ax^2 + bx + c = 0$ के मूल हैं, तो किस समीकरण के मूल $(ab + a + b)$ तथा $(ab - a - b)$ होंगे?

~~a) $a^2 x^2 + 2acx + c^2 + b^2 = 0$~~

~~b) $a^2 x^2 - 2acx + c^2 - b^2 = 0$~~

~~c) $a^2 x^2 - 2acx + c^2 + b^2 = 0$~~

~~d) $a^2 x^2 + 2acx + c^2 - b^2 = 0$~~

9. If the sum of the roots of the equation $x^2 + ax + 1 = 0$ is equal to the sum of the squares of their reciprocals, then which of the following is a possible value of a ? α, β

अगर समीकरण $x^2 + ax + 1 = 0$ के मूलों का जोड़ उनके परस्परिकों के वर्गों के जोड़ के बराबर है तो निम्न में से कौन सा a का संभव मान होगा?

a) -1

b) 2

~~c) 1~~

d) None of these

$$\alpha + \beta = \frac{1}{\alpha^2} + \frac{1}{\beta^2} \rightarrow -a = \frac{a^2 - 2}{1}$$

$$\Rightarrow \alpha + \beta = \frac{\alpha^2 + \beta^2}{\alpha^2 \beta^2}$$

$$\Rightarrow a^2 + a - 2 = 0$$

$$P \& R = -2 < -2$$

$$S \& R = -1$$

$$\alpha + \beta = -a$$

$$\alpha \beta = 1$$

$$\alpha + \beta = 8, \quad \alpha - \beta = 2\sqrt{5}$$

$$\alpha\beta = \frac{(\alpha + \beta)^2 - (\alpha - \beta)^2}{4}$$
$$= \frac{64 - 20}{4} = 11$$

$$\alpha^2 + \beta^2 = 64 - 22 = 42$$

$$\alpha^2\beta^2 = 121$$

$$\text{SOR} = \alpha^4 + \beta^4 = 42^2 - 2 \times 121 = 1522$$

$$\text{PoR} = \alpha^4 \cdot \beta^4 = 11^4 = 14641$$

$$\begin{array}{r} 1764 \\ -242 \\ \hline 1522 \end{array}$$

10. If α and β are the roots of quadratic equation. If $\alpha + \beta = 8$ and $\alpha - \beta = 2\sqrt{5}$, then which of the following equation will have roots α^4 and β^4 ?

(HW)

α तथा β द्विघात समीकरण के मूल हैं। $\alpha + \beta = 8$ तथा $\alpha - \beta = 2\sqrt{5}$ है तो, α^4 तथा β^4 निम्नलिखित में से किस समीकरण के मूल हैं?

~~a) $x^2 - 1522x + 14641 = 0$~~

b) $x^2 + 1921x + 14641 = 0$

c) $x^2 - 1764x + 14641 = 0$

d) $x^2 + 2520x + 14641 = 0$

11. If α and β are roots of quadratic equation

$8x^2 - 3x + 27 = 0$ then the value of

(HW)

$$\frac{\alpha + \beta}{(\alpha\beta)^{\frac{1}{3}}} = \frac{\alpha^{\frac{2}{3}} \cdot \alpha^{\frac{1}{3}} + \beta^{\frac{2}{3}} \cdot \beta^{\frac{1}{3}}}{\alpha^{\frac{1}{3}} \cdot \beta^{\frac{1}{3}}} \leftarrow \frac{\alpha^{\frac{2}{3}}}{\beta^{\frac{1}{3}}} + \frac{\beta^{\frac{2}{3}}}{\alpha^{\frac{1}{3}}}$$

$$\left(\frac{\alpha^2}{\beta}\right)^{\frac{1}{3}} + \left(\frac{\beta^2}{\alpha}\right)^{\frac{1}{3}} \text{ is}$$

अगर α और β समीकरण $8x^2 - 3x + 27 =$

0 के मूल हैं तो $\left(\frac{\alpha^2}{\beta}\right)^{\frac{1}{3}} + \left(\frac{\beta^2}{\alpha}\right)^{\frac{1}{3}}$ का मान ज्ञात करें।

a) $\frac{1}{3}$

~~b) $\frac{1}{4}$~~

c) $\frac{7}{2}$

d) 4

$$\frac{\frac{3}{8}}{\frac{3}{2}} = \frac{3}{8} \times \frac{2}{3} = \frac{1}{4}$$

$$\alpha + \beta = \frac{3}{8}, \quad \alpha\beta = \frac{27}{8}$$

coaching center

$$\alpha, 2\alpha$$

$$3\alpha = \frac{-b}{a}$$

$$2\alpha^2 = \frac{c}{a}$$

$$\frac{b^2}{9a^2} = \frac{c}{2\alpha}$$

$$\Rightarrow 2b^2 = 9ac$$

1, 2

$$x^2 - 3x + 2 = 0$$

$$a=1, b=-3, c=2$$

12. If one root of the equation $ax^2 + bx + c = 0$ is double the other root, then,

अगर समीकरण $ax^2 + bx + c = 0$ का एक मूल दूसरे मूल से दोगुना है तो:

a) $b^2 = 9ac$

b) $2b^2 = 3ac$

c) $b = 2a$

~~d) $2b^2 = 9ac$~~

coaching center

$$2\alpha, 5\alpha$$

$$7\alpha = \frac{-b}{a}$$

$$10\alpha^2 = \frac{c}{a}$$

$$\frac{b^2}{49a^2} = \frac{c}{10a}$$

$$\Rightarrow 10b^2 = 49ac$$

13. If one root of the equation $ax^2 + bx + c = 0$ is two and a half times the others, then which of the following is TRUE?

यदि समीकरण $ax^2 + bx + c = 0$ का एक मूल दूसरे से ढाई गुणा है, तो निम्नलिखित में से कौन सा सत्य है?

a) $7b^2 = 3ca$

b) $7b^2 = 4ca$

c) $7b^2 = 36ca$

d) $10b^2 = 49ca$

coaching center

14. The positive value of m for which the roots of equation $12x^2 + mx + 5 = 0$ are in ratio 3: 2 is:

m का धनात्मक मान जिसके लिए समीकरण $12x^2 + mx + 5 = 0$ के मूल 3:2 अनुपात में हैं :

~~a) $5\sqrt{10}$~~ b) $-\frac{5\sqrt{10}}{2}$ c) $-5\sqrt{10}$ d) $\frac{12}{5}$

$3a, 2a$

$$5a = -\frac{m}{12} \quad 6a^2 = \frac{5}{12}$$

$$\Rightarrow \frac{m^2}{25 \times \frac{144}{4}} = \frac{5}{6 \times 12}$$

$\frac{12}{2}$

$$\Rightarrow m = \pm 5\sqrt{10}$$

$$\alpha-2, \alpha+2$$

$$2\alpha = \frac{B}{A} \quad \alpha^2 - 4 = \frac{C}{A}$$

$$\Rightarrow \frac{B^2}{4A^2} = \frac{C}{A} + 4 = \frac{C+4A}{A}$$

$$\Rightarrow B^2 = 16A^2 + 4AC$$

0, 4

$$x^2 - 4x = 0$$

$$A=1, B=4, C=0$$

15. If the difference between the roots of the equation $Ax^2 - Bx + C = 0$ is 4, then which of the following is TRUE?

यदि समीकरण $Ax^2 - Bx + C = 0$ के मूलों का अंतर 4 है, तो निम्नलिखित में से कौन सा सत्य है?

~~a) $B^2 - 16A^2 = 4AC + 4b^2$~~

~~b) $B^2 - 10A^2 = 4AC + 6A^2$~~

c) $B^2 - 8A^2 = 4AC + 10A^2$

d) $B^2 - 16A^2 = 4AC + 8B^2$

16. In solving a problem, one student makes a mistake in the coefficient of the first degree term and obtains -9 and -1 for the roots. Another student makes a mistake in the constant term of the equation and obtains 8 and 2 for the roots. The correct equation was

एक समस्या को हल करने में, एक छात्र एक घात के पद के गुणांक में गलती करता है और मूल -9 और -1 प्राप्त करता है। एक अन्य छात्र की समीकरण में अचर पद में गलती होती है और मूल 8 और 2 प्राप्त करता है। सही समीकरण था ?

a) $x^2 + 10x + 9 = 0$

b) $x^2 + 10x - 9 = 0$

~~c) $x^2 - 10x + 9 = 0$~~

d) None of these

$$\begin{array}{cccc} ax^2 + bx + c = 0 \\ \checkmark & \times & \checkmark & \end{array}$$

$$\begin{array}{cccc} ax^2 + bx + c = 0 \\ \checkmark & \checkmark & \times & \end{array}$$

$$P \circ R = 9$$

$$S \circ R = 10$$

coaching center

17. When the roots of the quadratic equation $ax^2 + bx + c = 0$ are negative of reciprocals of each other, then which one of the following is correct?

जब द्विघात समीकरण $ax^2 + bx + c = 0$ के मूल एक दूसरे के व्युत्क्रम के नकारात्मक हैं, तो निम्न में से कौन सा सही है?

a) $b = 0$

b) $c = 0$

c) $a = c$

~~d) $a = -c$~~

$$\alpha, -\frac{1}{\alpha}$$

$$P \& R = \alpha x - \frac{1}{\alpha} = \frac{c}{a}$$

$$-1 = \frac{c}{a}$$

coaching center

18. If α and β are the roots of the equation $x^2 - 3kx + k^2 = 0$ find k if
(HW) $\alpha^2 + \beta^2 = \frac{7}{4}$

यदि α और β समीकरण $x^2 - 3kx + k^2 = 0$ के मूल हैं और $\alpha^2 + \beta^2 = \frac{7}{4}$ है तो k ज्ञात करो।

~~a) $\pm \frac{1}{2}$~~

b) $\frac{1}{2}$

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

d) none of these

$$(\alpha + \beta)^2 - 2\alpha\beta = \frac{7}{4}$$

$$\alpha + \beta = 3k, \quad \alpha\beta = k^2$$

$$\Rightarrow 9k^2 - 2k^2 = \frac{7}{4}$$

$$\Rightarrow 7k^2 = \frac{7}{4}$$

$$\Rightarrow k^2 = \frac{1}{4} \longrightarrow k = \pm \frac{1}{2}$$

19. For what value of p , the sum of the cubes of the roots of the equation

(HW) $2x^2 - 5x + p = 1$ be zero?

p के किस मान के लिए, समीकरण $2x^2 - 5x + p = 1$ के मूलों के घन का जोड़ शून्य के समान होगा?

a) $\frac{19}{6}$

b) $\frac{31}{6}$

~~c) $\frac{25}{6}$~~

d) None Let α, β be roots.

$\alpha + \beta = \frac{5}{2}, \alpha\beta = \frac{p}{2}$

$\alpha^3 + \beta^3 = 0$

$\Rightarrow \frac{125}{8} - 3 \cdot \frac{p}{2} \cdot \frac{5}{2} = 0$

$\Rightarrow \frac{3 \cdot 15}{4} p = \frac{125}{8} \cdot 25$

$\Rightarrow p = \frac{25}{6}$

Let roots be α, β
 $\therefore \alpha + \beta = 2, \alpha\beta = 4$

double

So, roots of required eqn. be $2\alpha, 2\beta$.

$$\therefore \text{SoR} = 2(\alpha + \beta) = 4$$

$$\text{PoR} = 4\alpha\beta = 16$$

$$\therefore \text{Eqn} \rightarrow x^2 - 4x + 16 = 0$$

20. The equation whose roots are twice the roots of the equation $x^2 - 2x + 4 = 0$, is

(HW)

समीकरण जिसके मूल, समीकरण $x^2 - 2x + 4 = 0$ के मूल से दो गुने हैं :

a) $x^2 - 2x + 4 = 0$

b) $x^2 - 2x + 16 = 0$

c) $x^2 - 4x + 8 = 0$

~~d) $x^2 - 4x + 16 = 0$~~

coaching center

21. If one root of $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice the other,

(HW) then what is the value of 'a'?

यदि $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ का एक मूल दुसरे से दोगुना है, तो 'a' का मान क्या है?

~~a) $\frac{2}{3}$~~

b) $-\frac{2}{3}$

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

d) $-\frac{1}{3}$

Let roots be $\alpha, 2\alpha$.

$$\Rightarrow 3\alpha = \frac{1-3a}{a^2-5a+3}, \quad 2\alpha^2 = \frac{2}{a^2-5a+3}$$

Equating the value of α^2 from both eqns.

$$\frac{(1-3a)^2}{9(a^2-5a+3)^2} = \frac{1}{(a^2-5a+3)}$$
$$\Rightarrow 1+9a^2-6a = 9a^2-45a+27$$
$$\Rightarrow 39a = 26$$

$$\Rightarrow a = \frac{2}{3}$$

22. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 - bx + c = 0$, then which one of the following is correct ?

(HW)

यदि $\sin\theta$ और $\cos\theta$ समीकरण $ax^2 - bx + c = 0$ के मूल हैं, तो निम्न में से कौन - सा सही है ?

a) $a^2 + b^2 + 2ac = 0$

~~b) $a^2 - b^2 + 2ac = 0$~~

c) $a^2 + c^2 + 2ab = 0$

d) $a^2 - b^2 - 2ac = 0$

SOR
↓

$$\sin\theta + \cos\theta = \frac{b}{a}$$

POK →

$$\sin\theta \cdot \cos\theta = \frac{c}{a}$$

$$(\sin\theta + \cos\theta)^2 - 2 \cdot \sin\theta \cdot \cos\theta$$

$$\boxed{\sin^2\theta + \cos^2\theta = 1}$$

⇓

$$\frac{b^2}{a^2} - \frac{2c \cdot a}{a \cdot a} = 1$$

$$\Rightarrow b^2 - 2ac = a^2$$

coaching center

23. If the equations $x^2 + 2x - 3 = 0$ and $x^2 + 3x - k = 0$ have a common root then the non zero value of k is:

यदि समीकरण $x^2 + 2x - 3 = 0$ और $x^2 + 3x - k = 0$ का एक समान मूल है तो k का गैर शून्य मान है:

a) 1

b) 2

c) 3

~~d) 4~~

-3 < -3
-2 1

Sol: $x = -3$

$\text{II} \rightarrow 0$

$P_0R = -3 \times 0 = 0$

Sol: $x = -3$

$\text{II} \rightarrow -3 - 1 = -4$

$P_0R = -4 \times 1 = -4$

-4

coaching center

24. If the equations $x^2 + 5x + 6 = 0$ and $x^2 + kx + 1 = 0$ have a common root, then what is the value of k ?

यदि समीकरण $x^2 + 5x + 6 = 0$ और $x^2 + kx + 1 = 0$ का एक समान मूल है, तो k का मान क्या होगा?

a) $-\frac{5}{2}$ or $-\frac{10}{3}$

~~b) $\frac{5}{2}$ or $\frac{10}{3}$~~

c) $\frac{5}{2}$ or $-\frac{10}{3}$

d) $-\frac{5}{2}$ or $\frac{10}{3}$

$6 \begin{cases} -3 \\ -2 \end{cases}$

-5

$P_0 R = 1$

$-3, -\frac{1}{3} \Rightarrow -\frac{10}{3} = -k$

$-2, -\frac{1}{2} \Rightarrow -\frac{5}{2} = -k$

coaching center

25. If the equations $x^2 - px + q = 0$ and $x^2 + qx - p = 0$ have a common root, then which one of the following is correct ?

यदि समीकरण $x^2 - px + q = 0$ और $x^2 + qx - p = 0$ का एक मूल समान है तो निम्न में से कौन - सा सही है ?

a) $p - q = 0$

b) $p + q - 2 = 0$

c) $p + q - 1 = 0$

~~d) $p - q - 1 = 0$~~

$1 - p + q = 0$

~~$x^2 - px + q = x^2 + qx - p = 0$~~

~~$p + q = (p + q)x$~~

$1 = x$

$1 + q - p = 0$

coaching center

26. What is the value of α ($\alpha \neq 0$) for which $x^2 - 5x + \alpha$ and $x^2 - 7x + 2\alpha$ have a common factor?

α ($\alpha \neq 0$) का मान क्या होगा, जिससे $x^2 - 5x + \alpha$ और $x^2 - 7x + 2\alpha$ के एक समान गुणखंड हो ?

~~a) 6~~

b) 4

c) 3

d) 2

$x=1, 2$

$$x^2 - 3x + 2 = (x-1)(x-2) = 0$$
$$x^2 - 6x + 8 = (x-4)(x-2) = 0$$

$x=4, 2$

$$2x = \alpha$$

$$x = \frac{\alpha}{2}$$

$$\Rightarrow \frac{\alpha^2}{4} - 5\frac{\alpha}{2} + \alpha = 0$$
$$\Rightarrow \frac{\alpha}{4} = \frac{3}{2} \quad \Rightarrow \alpha = 6$$

27. What are the values of x in the equation $4^x - 3 \cdot 2^{x+2} + 32 = 0$?

समीकरण $4^x - 3 \cdot 2^{x+2} + 32 = 0$, में x के मान क्या हैं?

a) 1, 2

b) 3, 4

\downarrow
 $2^x \cdot 2^2$ ~~2, 3~~

d) 1, 3

i) Use options

$$(2^m)^n = 2^{mn} = (2^n)^m$$

$$ii) (2^2)^x - 3 \cdot 4 \cdot 2^x + 32 = 0$$

$$\Rightarrow (2^x)^2 - 12 \cdot 2^x + 32 = 0$$

$$2^m \cdot 2^n = 2^{m+n}$$

$$2^x = t$$

$$\Rightarrow t^2 - 12t + 32 = 0$$

$$8 \cdot 2^m = 2^m \cdot 2^3 = 2^{m+3}$$

$$2^x = 8, 4 \quad \begin{matrix} 8 & 4 \\ \swarrow & \searrow \end{matrix}$$
$$= 2^3, 2^2 \rightarrow x = 3, 2$$

28. Solve the equation for x , $2 \cdot x^{\frac{1}{3}} + 2 \cdot x^{-\frac{1}{3}} = 5$

$2 \cdot x^{\frac{1}{3}} + 2 \cdot x^{-\frac{1}{3}} = 5$ है तो x के मान ज्ञात करें:

- a) $2, \frac{1}{2}$ b) $4, \frac{1}{4}$ c) $6, \frac{1}{6}$ ~~d) $8, \frac{1}{8}$~~

$$2 \cdot x^{\frac{1}{3}} + 2 \cdot \frac{1}{x^{\frac{1}{3}}} = 5$$

$$\Rightarrow 2 \cdot (x^{\frac{1}{3}})^2 - 5x^{\frac{1}{3}} + 2 = 0$$

$$P_0R = 4 < \frac{4}{2} = 2$$

$$S_0R = 5 \quad \frac{1}{2} = \frac{1}{2}$$

$$x^{\frac{1}{3}} = 2, \frac{1}{2}$$

$$x = 8, \frac{1}{8}$$

$$\begin{aligned} x + \frac{1}{x} &= 5 \\ \Rightarrow x^2 - 5x + 1 &= 0 \end{aligned}$$