QUADRATIC EQUATION FACTOR & REMAINDER THEOREM

$$ax^2+bx+c=0$$

c → constant term.

$$x^2+4x+4=0$$

$\Rightarrow (x+2)^2=0$

$\Rightarrow (x+2)=0$

$\Rightarrow x=-2$

$x=-2$ → root of eqn.

$ax^2+bx+c=0$

let its two root be α & β

✓ $\therefore$ Sum of roots

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

✓ $\therefore$ product of roots

$$(\alpha\cdot\beta)=\frac{c}{a}$$

Ex:- $3x^2+4x+5=0$

$\therefore \alpha+\beta=-\frac{4}{3}$

$\alpha\beta=\frac{5}{3}$

$$ax^2+bx+c=0$$

$$\alpha,\beta = \boxed{\frac{-b\pm\sqrt{b^2-4ac}}{2a}}$$

$$\alpha = \frac{-b+\sqrt{b^2-4ac}}{2a}$$

$$\beta = \frac{-b-\sqrt{b^2-4ac}}{2a}$$

$$\frac{\alpha+\beta}{\alpha\beta} = \frac{-b/a}{c/a} = -\frac{b}{c} = -\frac{3}{7}$$

1. If α and β are the roots of $4x^2 + 3x + 7 = 0$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is:

यदि α तथा β समीकरण $4x^2 + 3x + 7 = 0$ के मूल हो तो $\frac{1}{\alpha} + \frac{1}{\beta}$ का मान ज्ञात कीजिए।

(a) $\frac{4}{7}$

(b) $\frac{-3}{7}$

(c) $\frac{3}{7}$

(d) $\frac{-3}{4}$

$\therefore (\alpha+\beta)^2 - 2\alpha\beta$

$= \left(\frac{-b}{a}\right)^2 - 2\times\frac{c}{a}$

$= \left(\frac{1}{1}\right)^2 - 2\times\frac{1}{1}$

$= 1-2$

$= -1$

$a=1 \quad b=-1 \quad c=1$

2. If α and β are roots of the equation $x^2 - x + 1 = 0$, then write the value of $\alpha^2 + \beta^2$.

यदि α तथा β समीकरण $x^2 - x + 1 = 0$ के मूल हो तो $\alpha^2 + \beta^2$ का मान ज्ञात कीजिए।

(a) 1 **(b) −1**

(c) 0 **(d) None of these**

$(\alpha+\beta)^2 = \alpha^2+\beta^2+2\alpha\beta$

$\Rightarrow (\alpha+\beta)^2 - 2\alpha\beta = \alpha^2+\beta^2$

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

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

$= \frac{\left(\frac{7}{2}\right)^2 - 7\times\frac{12}{2}}{\frac{12}{2}}$

$= \frac{\frac{49}{4}-12}{6}$

$= \frac{\frac{1}{4}}{6} = \frac{1}{24}$

3. **If the equation $2x^2 - 7x + 12 = 0$ has two roots α & β, then the value of $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$.**

$a=2 \quad b=-7 \quad c=12$

यदि α तथा β समीकरण $2x^2 - 7x + 12 = 0$ के मूल हो तो $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ का मान ज्ञात कीजिए।

(a) $\frac{97}{24}$ (b) $\frac{7}{2}$

(c) $\frac{1}{24}$ (d) $\frac{7}{24}$

$x^2 - kx + 27 = 0$

$\Rightarrow (3)^2 - k \times 3 + 27 = 0$

$\Rightarrow 9 - 3k + 27 = 0$

$\Rightarrow 12^{} 36 = 3k$

$\Rightarrow k = 12$

4. One root of quadratic equation $x^2 - kx + 27 = 0$ is 3, then find the value of 'k'.

द्विघात समीकरण $x^2 - kx + 27 = 0$ का एक मूल 3 है, तो k का मान ज्ञात कीजिए।

(a) 10 (b) 12

(c) –12 (d) 16

α $\beta\beta$

$\alpha = 2\beta$

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

$\Rightarrow 3\beta = -\frac{(-9)}{1}$

$\Rightarrow \beta = +3$

$\beta = 3$

Put the value of β in the eqn

$x^2 - 9x + k = 0$

$\Rightarrow 9 - 27 + k = 0$

$\Rightarrow k = 18$

5. Find the value of k if one root of the equation: $x^2 - 9x + k = 0$ is twice the other root.

k का वह मान ज्ञात कीजिए जिसके लिए समीकरण $x^2 - 9x + k = 0$ के एक मूल का मान दूसरे मूल के दो गुने बराबर हो।

(a) 18 **(b) 16**

(c) 12 **(d) 9**

$\alpha+\beta=\alpha\beta$

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

$\Rightarrow -(2k+1)=-k-5$

$\Rightarrow -2k-1=-k-5$

$\Rightarrow \boxed{4=k}$

6. Find the value of k so that the sum of the roots of equation $3x^2 + (2k + 1)x - k - 5 = 0$ is equal to the product of the roots :

k का वह मान ज्ञात कीजिए जिसके लिए समीकरण $3x^2 + (2k + 1)x - k - 5 = 0$ के मूलों का योगफल उनके गुणनफल के बराबर हो।

(a) 4 (b) –4

(c) 2 (d) 8

$$x^2 - (\text{Sum of roots})x + \text{product of roots} = 0$$

$$x^2 - (\alpha+\beta)x + \alpha\beta = 0$$

Proof $x^2 - \left(\frac{-b}{a}\right)x + \frac{c}{a} = 0$

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

$\Rightarrow ax^2 + bx + c = 0$

$ax^2 + bx + c = 0$

$S = \frac{-b}{a}$

$P = \frac{c}{a}$

2, 3

* $x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$\Rightarrow x^2 - 5x + 6 = 0$

$\frac{1}{2}, \frac{1}{3}$

$x^2 - \left(\frac{1}{2}+\frac{1}{3}\right)x + \frac{1}{2}\times\frac{1}{3} = 0$

$\Rightarrow x^2 - \frac{5}{6}x + \frac{1}{6} = 0$

$\Rightarrow 6x^2 - 5x + 1 = 0$

3, 4

$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$\Rightarrow x^2 - 7x + 12 = 0$

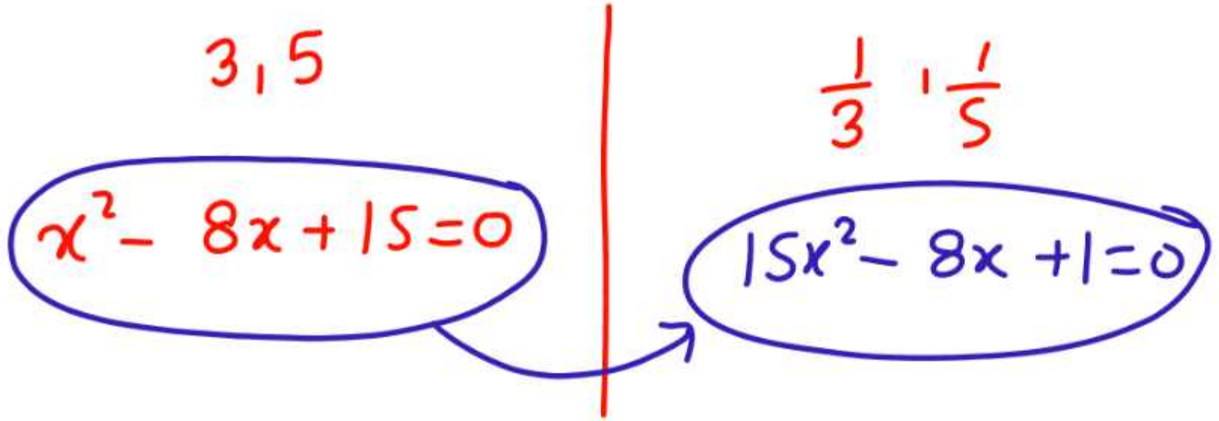
$\frac{1}{3} \cdot \frac{1}{4}$

$\therefore x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$\Rightarrow x^2 - \left(\frac{1}{3}+\frac{1}{4}\right)x + \frac{1}{3} \times \frac{1}{4} = 0$

$\Rightarrow x^2 - \frac{7}{12}x + \frac{1}{12} = 0$

$\Rightarrow 12x^2 - 7x + 1 = 0$


3, 5
$x^2 - 8x + 15 = 0$
$\frac{1}{3}$, $\frac{1}{5}$
$15x^2 - 8x + 1 = 0$

$\alpha+\beta = 1 \qquad \alpha\beta = -20$

$\therefore \quad x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$\Rightarrow x^2 - x - 20 = 0$

7. If sum of the roots of a quadratic equation is 1 and product of the roots is -20, find the quadratic equations

यदि द्विघात समीकरण के मूलों का योग 1 है और मूलों का गुणनफल -20 है। द्विघात समीकरण ज्ञात कीजिए।

(a) $x^2 - x - 20 = 0$ (b) $x^2 + x + 20 = 0$

(c) $x^2 + x - 20 = 0$ (d) $x^2 - x + 20 = 0$

7. If sum of the roots of a quadratic equation is 1 and product of the roots is -20. find the quadratic equations

यदि द्विघात समीकरण के मूलों का योग 1 है और मूलों का गुणनफल -20 है। द्विघात समीकरण ज्ञात कीजिए।

(a) $x^2 - x - 20 = 0$ **(b) $x^2 + x + 20 = 0$**

(c) $x^2 + x - 20 = 0$ **(d) $x^2 - x + 20 = 0$**

Sum = $\frac{-(-1)}{1} = \frac{1}{1}$

Product = $\frac{-20}{1} = -20$

$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$\Rightarrow x^2 - (-8)x + 15 = 0$

$\Rightarrow x^2 + 8x + 15 = 0$

8. Which of the following quadratic equation has roots –3 and –5.

निम्न में से किसी द्विघात समीकरण के मूल –3 तथा –5 है।

(a) $x^2 - 8x + 15 = 0$

(b) $x^2 - 8x - 15 = 0$

(c) $x^2 + 8x + 15 = 0$

(d) $x^2 + 8x - 15 = 0$

α, β | $\frac{1}{\alpha}, \frac{1}{\beta}$

$x^2 - 5x + 6 = 0$ | $6x^2 - 5x + 1 = 0$

9. If α, β are roots of the equations $x^2 - 5x + 6 = 0$ then find the quadratic equation whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}$

यदि α और β समीकरण $x^2 - 5x + 6 = 0$ के मूल हैं, तो द्विघात समीकरण जिसका मूल $\frac{1}{\alpha}$ और $\frac{1}{\beta}$ है।

(a) $6x^2 - 5x + 1 = 0$
(b) $6x^2 + 5x + 1 = 0$
(c) $6x^2 - 5x - 1 = 0$
(d) $6x^2 + 5x - 1 = 0$

$x^2 - x + 1 = 0$

$\alpha + \beta = \frac{-b}{a} = \frac{-(-1)}{1} = 1$

$\alpha\beta = \frac{c}{a} = \frac{1}{1} = 1$

$x^2 - (\alpha^3 + \beta^3)x + (\alpha\beta)^3 = 0$

$\Rightarrow x^2 - (-2)x + 1 = 0$

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

10. 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 और β समीकरण $x^2 - x + 1 = 0$ के मूल हैं, तो द्विघात समीकरण जिसका मूल α^3 और β^3 है।

(a) $x^2 + 2x + 1 = 0$
(b) $x^2 - 2x + 1 = 0$
(c) $x^2 + 3x + 1 = 0$
(d) $x^2 - 3x + 1 = 0$

$\alpha^3 + \beta^3 = (\alpha + \beta)[(\alpha + \beta)^2 - 3\alpha\beta]$

$= 1[1 - 3]$

$= 1 \times (-2)$

$= -2$

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

$(\alpha+\beta) = -\frac{b}{a} = -\frac{(-3)}{1} = 3$

$(\alpha\beta) = \frac{c}{a} = \frac{2}{1} = 2$

$x^2 - (\text{Sum of roots})x + \text{product of roots} = 0$

$\Rightarrow x^2-(\alpha+1+\beta+1)x+(\alpha+1)(\beta+1)=0$

$\Rightarrow x^2-(\alpha+\beta+2)x+\alpha\beta+\alpha+\beta+1=0$

$\Rightarrow x^2-5x+2+3+1=0$

$\Rightarrow x^2-5x+6=0$

11. If α and β are the roots of the equation $x^2 - 3x + 2 = 0$, then the quadratic equation whose roots ar (α + 1) and (β + 1) is.

यदि α और β समीकरण $x^2 - 3x + 2 = 0$ के मूल हैं, तो द्विघात समीकरण जिसका मूल (α + 1) और (β + 1) है।

(a) $x^2 - 5x + 6 = 0$ (b) $x^2 + 5x - 6 = 0$

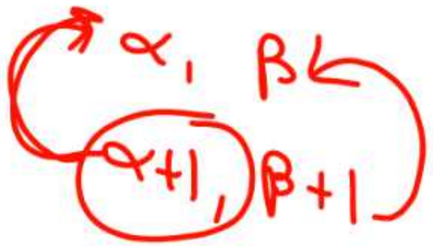
(c) $x^2 + 5x + 6 = 0$ (d) $x^2 - 5x - 6 = 0$

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

ans $(x-1)^2-3(x-1)+2=0$

$\Rightarrow x^2+1-2x-3x+3+2=0$

$\Rightarrow x^2-5x+6=0$



11. If α and β are the roots of the equation $x^2 - 3x + 2 = 0$, then the quadratic equation whose roots ar (α + 1) and (β + 1) is.

यदि α और β समीकरण $x^2 - 3x + 2 = 0$ के मूल हैं, तो द्विघात समीकरण जिसका मूल (α + 1) और (β + 1) है।

(a) $x^2 - 5x + 6 = 0$ (b) $x^2 + 5x - 6 = 0$

(c) $x^2 + 5x + 6 = 0$ (d) $x^2 - 5x - 6 = 0$

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

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

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

a^4+b^4

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

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

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

$$\Rightarrow \left[(a+b)^2-2ab\right]^2-2(ab)^2 = a^4+b^4$$

$$\alpha^2 + \beta^2 = (\alpha+\beta)^2 - 2\alpha\beta$$

$$\alpha^3 + \beta^3 = (\alpha+\beta)\left[(\alpha+\beta)^2 - 3\alpha\beta\right]$$

$$\alpha^4 + \beta^4 = \left[(\alpha+\beta)^2 - 2\alpha\beta\right]^2 - 2(\alpha\beta)^2$$

✓ $\alpha+\beta$
✓ $\alpha\beta$

$x^2 - (\text{sum})x + \text{product} = 0$

$x^2 - (\alpha^2+\beta^2)x + (\alpha\beta)^2$

$(\alpha^3+\beta^3) \quad (\alpha\beta)^3$

$(\alpha^4+\beta^4) \quad (\alpha\beta)^4$

$x^2-5x+6=0$ roots α, β

$\alpha+\beta=5 \quad \alpha\beta=6$

⊙ α^2, β^2

$x^2-(\alpha^2+\beta^2)x+(\alpha\beta)^2=0$

$\Rightarrow x^2-13x+36=0$ ✓

$x^2-8x+15=0$ α, β

$\alpha+\beta=8 \quad \alpha\beta=15$

$x^2-(\alpha^2+\beta^2)x+(\alpha\beta)^2=0$

$\Rightarrow x^2-[(\alpha+\beta)^2-2\alpha\beta]x+(\alpha\beta)^2=0$

$\Rightarrow x^2-[64-30]x+225=0$

$\Rightarrow x^2-34x+225=0$

$\alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta$

$x^2 - 5x + 6 = 0$ roots α, β

α^3, β^3

$\alpha + \beta = 5$

$\alpha\beta = 6$

$x^2 - (\alpha^3 + \beta^3)x + (\alpha\beta)^3 = 0$

$\Rightarrow x^2 - \{(\alpha+\beta)[(\alpha+\beta)^2 - 3\alpha\beta]\}x + (\alpha\beta)^3 = 0$

$\Rightarrow x^2 - \{5[25-18]\}x + 216 = 0$

$\Rightarrow x^2 - 35x + 216 = 0$

$x^2 - 8x + 15 = 0$ α, β

α^3, β^3

$x^2 - 152x + 3375 = 0$

* $x^2-5x+6=0$ roots α, β

α^4, β^4

$\alpha+\beta=5$

$\alpha\beta=6$

$x^2-3x+2=0$ roots α, β

α^4, β^4

$x^2-(\alpha^4+\beta^4)x+(\alpha\beta)^4=0$

$\Rightarrow x^2-\left[\left[(\alpha+\beta)^2-2\alpha\beta\right]^2-2(\alpha\beta)^2\right]x+(\alpha\beta)^4=0$

$\Rightarrow x^2-\left[(25-12)^2-2\times 36\right]x+1296=0$

$\Rightarrow x^2-\left[169-72\right)x+1296=0$

$\Rightarrow x^2-97x+1296=0$

12. **α and β are the roots of quadratic equation. If α + β = 8 and α – β = 2√5, then which of the of the following equation will have roots α^4 and β^4?**

α तथा β द्विघातीय समीकरण के मूल है। यदि α + β = 8 तथा α – β = 2√5 हैं, 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) $x^2 + 2520x + 14641 = 0$

$\alpha + \beta = 8$
$\alpha - \beta = 2\sqrt{5}$
$\alpha\beta = 4^2 - 5 = 11$

$\alpha = \frac{8+2\sqrt{5}}{2} = 4+\sqrt{5}$ $\quad \beta = \frac{8-2\sqrt{5}}{2} = 4-\sqrt{5}$

$x^2 - (\alpha^4+\beta^4)x + (\alpha\beta)^4 = 0$

$\Rightarrow x^2 - \{[(\alpha+\beta)^2 - 2\alpha\beta]^2 - 2(\alpha\beta)^2\}x + (\alpha\beta)^4 = 0$

$\Rightarrow x^2 - [(64 - 2\times11)^2 - 2(11)^2]x + 14641 = 0$

$\Rightarrow x^2 - ((42)^2 - 242)x + 14641 = 0$

$\Rightarrow x^2 - (1764 - 242)x + 14641 = 0$

$\Rightarrow x^2 - 1522x + 14641 = 0$

Step 1 :- put $(x-2)=0$

$\Rightarrow x=2$

13. **When $(x^4 - 3x^3 + 2x^2 - 5x + 7)$ is divided by $(x - 2)$, the remainder is –**

जब $(x^4 - 3x^3 + 2x^2 - 5x + 7)$ को $(x - 2)$ से विभाजित किया जाता है, तो ..... शेषफल प्राप्त होता है।

(a) 3 (b) –3

(c) 2 (d) 0

$f(x) = x^4 - 3x^3 + 2x^2 - 5x + 7$

$f(2) = (2)^4 - 3(2)^3 + 2(2)^2 - 5(2) + 7$

$= 16 - 24 + 8 - 10 + 7$

$= -3$

$x^2+4x+4=0$

$\Rightarrow x^2+2x+2x+4=0$

$\Rightarrow x(x+2)+2(x+2)=0$

$\Rightarrow (x+2)(x+2)=0$

$x^2-5x+6=0$

$x^2-2x-3x+6=0$

$\Rightarrow x(x-2)-3(x-2)=0$

$\Rightarrow (x-2)(x-3)=0$

$x-2=0$

$\Rightarrow x=2$

$x-3=0$

$x=3$

put $(3x+2)=0$

$\Rightarrow 3x=-2$

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

$$15\left(\frac{-2}{3}\right)^3-14\left(\frac{-2}{3}\right)^2-4\left(\frac{-2}{3}\right)+10$$

$$=\frac{\cancel{120}^{5}}{\cancel{27}_{9}}\frac{(-8)}{}-14\frac{(4)}{9}+\frac{8}{3}+10$$

$$=-\frac{40}{9}-\frac{56}{9}+\frac{24}{9}+\frac{90}{9}$$

$$=\frac{\cancel{18}}{\cancel{9}}\ 2$$

14. When $f(x) = 15x^3 - 14x^2 - 4x + 10$ is divided by $(3x + 2)$, then the remainder is:

जब $f(x) = 15x^3 - 14x^2 - 4x + 10$ को $(3x + 2)$ से विभाजित किया जाता है, तो ..... शेषफल प्राप्त होता है।

SSC CHSL 27/05/2022 (Shift- 2)

(a) – 1 **(b) 1**

(c) – 2 **(d) 2**

15. If $5x^3 + 5x^2 - 6x + 9$ is divided by $(x + 3)$, the remainder is :

यदि $5x^3 + 5x^2 - 6x + 9$ को $(x + 3)$ से विभाजित किया जाता है तो प्राप्त शेषफल है।

(a) 135 (b) 63

(c) –135 (d) –63

$x+3=0$

$\Rightarrow x=-3$

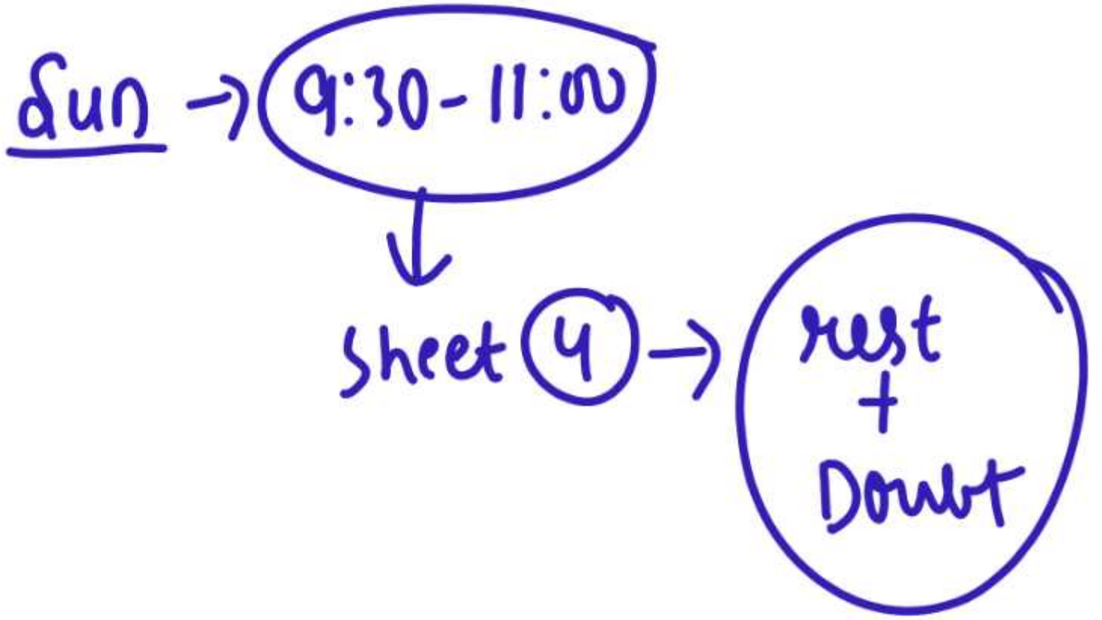
$5x^3+5x^2-6x+9$

$= 5(-27)+5(9)-6(-3)+9$

$= -135+45+18+9$

$= -90+27$

$= -63$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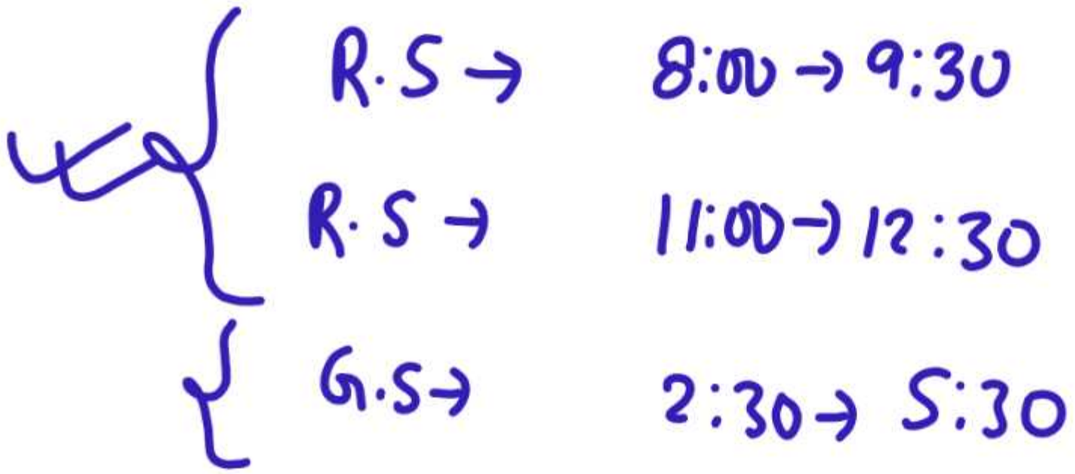
9:30 - 11:00
Sheet 4
rest + Doubt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R.S → 11:00 → 12:30
G.S → 2:30 → 5:30

$x^2 - 1 = 0$

$\Rightarrow x^2 = 1$ $\Rightarrow x = \pm 1$

16. **If $x^3 + 2x^2 - ax - b$ is exactly divisible by $(x^2 - 1)$, then the values of a and b are :**

यदि $x^3 + 2x^2 - ax - b$, $(x^2 - 1)$ से पूर्णत: विभाजित हो जाता हो तो a तथा b का मान ज्ञात कीजिए।

CHSL 2019 21/10/2020 (Shift- 02)

(a) $a = -1$ and $b = 2$

(b) $a = 1$ and $b = -2$

(c) $a = 1$ and $b = 2$

(d) $a = 2$ and $b = 2$

$f(1) = 1^3 + 2(1)^2 - a - b = 0$

$\Rightarrow 1 + 2 - a - b = 0$

$\Rightarrow a + b = 3$

$f(-1) \quad (-1)^3 + 2(-1)^2 - a(-1) - b = 0$

$\Rightarrow -1 + 2 + a - b = 0$

$\Rightarrow a - b = -1$

$a = \frac{3-1}{2}$ $\quad b = \frac{3-(-1)}{2}$

$a = 1$ $\quad b = \frac{3+1}{2} = 2$

$x^2 - 1 = 0$

$\Rightarrow x^2 = 1$ $\Rightarrow x = \pm 1$

16. **If $x^3 + 2x^2 - ax - b$ is exactly divisible by $(x^2 - 1)$, then the values of a and b are :**

यदि $x^3 + 2x^2 - ax - b$, $(x^2 - 1)$ से पूर्णत: विभाजित हो जाता हो तो **a** तथा **b** का मान ज्ञात कीजिए।

CHSL 2019 21/10/2020 (Shift- 02)

$1 + 2 - a - b = 0$

$\Rightarrow a + b = 3$

(a) $a = -1$ and $b = 2$

(b) $a = 1$ and $b = -2$

(c) $a = 1$ and $b = 2$

(d) $a = 2$ and $b = 2$

put $x=2$ $8p+4+6+q=0$

$\Rightarrow 8p+q=-10$

use option

17. If $px^3 + x^2 + 3x + q$ is exactly divisible by $(x + 2)$ and $(x - 2)$, then the values of p and q are:

यदि $px^3 + x^2 + 3x + q$, $(x + 2)$ और $(x - 2)$ से पूर्णत: विभाज्य है तो p और q के मान है:

SSC CHSL 08/06/2022 (Shift- 03)

(a) $p = -\frac{3}{4}$ and $q = 4$

(b) $p = \frac{3}{4}$ and $q = 4$

(c) $p = \frac{3}{4}$ and $q = -4$

(d) $p = -\frac{3}{4}$ and $q = -4$

18. Let $f(x) = x^3 - 6x^2 + 11x - 6$, then which one of the following is not a factor of $f(x)$?

यदि $f(x) = x^3 - 6x^2 + 11x - 6$ है, तो निम्न में से कौन-सा f(x) का गुणनखंड नहीं है?

(a) $(x - 1) = 0$ (b) $(x - 2)$

(c) $(x + 3)$ (d) $(x - 3)$

$9 + 3k_1 + k_2 = 0$

$\Rightarrow 3k_1 + k_2 = -9$

19. If (x + 2) and (x – 3) are the factors of $x^2 + k_1x + k_2$, then:

यदि (x + 2) और (x – 3), $x^2 + k_1x + k_2$ के गुणज है, तो:

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(a) $k_1 = 1$ and $k_2 = -6$

(b) $k_1 = -1$ and $k_2 = -6$

(c) $k_1 = -1$ and $k_2 = 6$

(d) $k_1 = 1$ and $k_2 = 6$

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

$2 \times 3 \times x$

$x^2 + 6x + 9$

$a^2 + 2ab + b^2$

$2 \times x \times 4$

$x^2 + 8x + 16$

$a^2 + 2ab + b^2$

$4x^2 + 8x + 4$

$a^2 + 2ab + b^2$

$2 \times 2x \times 2$

$a^2 = 4x^2$

$a = 2x$

$x + 4\sqrt{x} + 4$

$a^2 + 2ab + b^2$

$2 \times \sqrt{x} \times 2$

$a^2 = x$

$a = \sqrt{x}$

$p+\frac{1}{9}\sqrt{p}+k^2$ $\left(\frac{1}{18^2}\right)$

$a^2+2ab+b^2$

$2\times\sqrt{p}\times b$

$k^2=\left(\frac{1}{18}\right)^2$

$k=\pm\frac{1}{18}$

$a^2=p$

$a=\sqrt{p}$

$2\sqrt{p}\,b=\frac{1}{9}\sqrt{p}$

$b=\frac{1}{18}$

20. For what value(s) of k will the expression $p+\frac{1}{9}\sqrt{p}+k^2$ be a perfect square ?

K के किस मान/किन मानों के लिए व्यंजक $p+\frac{1}{9}\sqrt{p}+k^2$ एक पूर्ण वर्ग होगा?

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(a) $k=\pm\frac{1}{8}$ **(b)** $k=\pm\frac{1}{9}$

(c) $k=\pm\frac{1}{21}$ **(d)** $k=\pm\frac{1}{18}$