INFINITY
THINK BEYOND............

AN EDUCATIONAL INSTITUTE

UTS 01 Mathematice -IX

Prepared BY Mohd. Muneeb(Infinity's Brilliant Student)
From Tagore International School

DELTA
Date / /
Pg No.

Answer Key

Q1
Ans $\sqrt[4]{\sqrt[3]{2^2}} = ((2^2)^{1/4})^{1/3} = 2^{1/6}$

$\boxed{\text{Option c}}$

Q2
Ans $\frac{1}{\sqrt{4}-\sqrt{3}} \times \frac{\sqrt{4}+\sqrt{3}}{\sqrt{4}+\sqrt{3}} = \frac{\sqrt{4}+\sqrt{3}}{(\sqrt{4}-\sqrt{3})(\sqrt{4}+\sqrt{3})} = \frac{\sqrt{4}+\sqrt{3}}{(\sqrt{4})^2-(\sqrt{3})^2} = \frac{\sqrt{4}+\sqrt{3}}{4-3}$

$= \sqrt{4}+\sqrt{3}$ $\quad$ $\because a^2-b^2 = (a+b)(a-b)$

$\boxed{\text{Option b}}$

Q3
Ans leading term = highest degree

$3x - 12x^2 + 9x^7 - x^5 + 13x^3$

$\therefore$ 9 is the coefficient

$\boxed{\text{Option C}}$

Q4
Ans Option (c) 2,5

Q5
Ans (b) $\boxed{\text{Every integer is a rational no.}}$

SECTION B

Q6

Ans $\sqrt{2}, \sqrt[3]{3}, \sqrt{7} = 2^{1/2}, 3^{1/3}, 7^{1/2}$

Take lcm

$2^{3/6}, 3^{2/6}, 7^{3/6}$

$3^{2/6} < 2^{3/6} < 7^{3/6}$

$\boxed{\sqrt[3]{3} < \sqrt{2} < \sqrt{7}}$

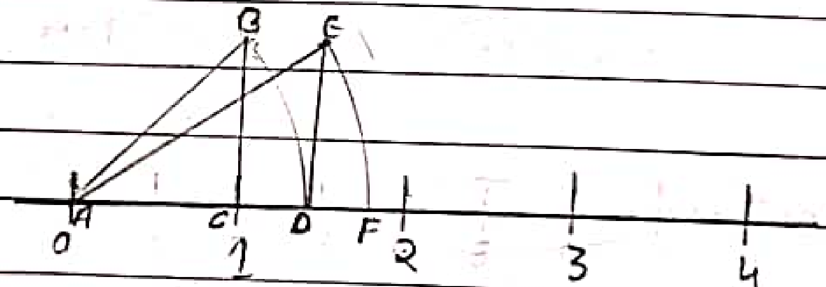
Q7

Ans $\sqrt{7+2\sqrt{10}} = \sqrt{5+2+2\sqrt{10}} = \sqrt{5+2\sqrt{10}+2}$

$= \sqrt{(\sqrt{5})^2 + 2(\sqrt{5})\sqrt{2}) + (\sqrt{2})^2} = \sqrt{(\sqrt{5}+\sqrt{2})^2} = \boxed{\sqrt{5}+\sqrt{2}}$

Or

1unit = 2cm



AB = 1 unit

BC = 1 unit

AD = $\sqrt{2}$

$DE = 1$ unit

$AF = \sqrt{3}$

Q8

Ans $\frac{25}{4}x^2 - \frac{y^2}{9} - \frac{5}{2}x + \frac{y}{3}$

$\left(\frac{5}{2}x\right)^2 - \left(\frac{y}{3}\right)^2 - \left(\frac{5}{2}x\right) + \left(\frac{y}{3}\right)$

$\cancel{\frac{5}{2}x} \times \frac{5}{2}x - \cancel{\frac{y}{3}} \times \frac{y}{3} - \cancel{\frac{5}{2}x} + \cancel{\frac{y}{3}}$

$\boxed{\frac{5}{2}x + \frac{y}{3}}$

SECTION-C

Q9

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

$x^2 = \frac{(\sqrt{3}+\sqrt{2})^2}{(\sqrt{3}-\sqrt{2})^2} = \frac{5+2\sqrt{6}}{5-2\sqrt{6}}$ $(a+b)^2 = a^2+2ab+b^2$

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

$\frac{5+2\sqrt{6}}{5-2\sqrt{6}} \times \frac{5+2\sqrt{6}}{5+2\sqrt{6}} = \frac{(5+2\sqrt{6})^2}{(5)^2-(2\sqrt{6})^2} = \frac{25+24+20\sqrt{6}}{25-24}$

$\boxed{49+20\sqrt{6}}$

Date / /
Pg No.

Q10

Ans $0.\overline{4} + 0.\overline{18}$

let $0.\overline{4}$ be x

$0.\overline{4} = 0.444\ldots$

$x = 0.444\ldots$ — ①

Multiply both sides by 10

$10x = 4.444\ldots$ — ②

Subtract ① from ②

$$\begin{aligned} 10x &= 4.444\ldots \\ - \quad x &= 0.444\ldots \\ \hline 9x &= 4 \\ x &= \frac{4}{9} \end{aligned}$$

$0.\overline{18}$

let $0.\overline{18}$ be x

$0.\overline{18} = 0.181818\ldots$

$x = 0.181818\ldots$ — ①

Multiply both sides by 100

$100x = 18.181818\ldots$ — ②

Subtract ① from ②

$$\begin{aligned} 100x &= 18.181818 \\ - \quad x &= 0.181818 \\ \hline 99x &= 18 \end{aligned}$$

Pg No.

$x = \frac{18}{9}$

$0.\overline{4} + 0.\overline{18}$

$\frac{18}{9} + \frac{4}{9} = \frac{22}{9}$

Q11

Ans $x = \frac{2+\sqrt{3}}{2-\sqrt{3}}, y = \frac{2-\sqrt{3}}{2+\sqrt{3}}$

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

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

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

$x^2 - y^2 = \frac{(2+\sqrt{3})^2}{(2-\sqrt{3})^2} - \frac{(2-\sqrt{3})^2}{(2+\sqrt{3})^2}$

$x^2 = \frac{(2)^2+(\sqrt{3})^2+2(2)(\sqrt{3})}{(2)^2+(\sqrt{3})^2-2(2)(\sqrt{3})} = \frac{4+3+4\sqrt{3}}{4+3-4\sqrt{3}} = \frac{7+4\sqrt{3}}{7-4\sqrt{3}}$

$\frac{7+4\sqrt{3}}{7-4\sqrt{3}} \times \frac{7+4\sqrt{3}}{7+4\sqrt{3}} = \frac{(7+4\sqrt{3})^2}{(7+4\sqrt{3})(7-4\sqrt{3})} = \frac{(7)^2+(4\sqrt{3})^2+2(7)(4\sqrt{3})}{(7)^2-(4\sqrt{3})^2}$

$\frac{49+48+56\sqrt{3}}{49-48} = \boxed{97+56\sqrt{3}}$

$y^2 = \frac{(2^2)+(\sqrt{3})^2-2(2)(\sqrt{3})}{(2)^2+(\sqrt{3})^2+2(2)(\sqrt{3})} = \frac{4+3-4\sqrt{3}}{4+3+4\sqrt{3}} = \frac{7-4\sqrt{3}}{7+4\sqrt{3}}$

$\frac{7-4\sqrt{3}}{7+4\sqrt{3}} \times \frac{7-4\sqrt{3}}{7-4\sqrt{3}} = \frac{(7-4\sqrt{3})^2}{(7+4\sqrt{3})(7-4\sqrt{3})} = \frac{(7)^2+(4\sqrt{3})^2-2(7)(4\sqrt{3})}{(7)^2-(4\sqrt{3})^2}$

$\frac{49+48-56\sqrt{3}}{49-48} = \boxed{97-56\sqrt{3}}$

$x^2 - y^2 = 97 + 56\sqrt{3} - 97 - 56\sqrt{3}$

$\boxed{x^2 - y^2 = 0}$

OR

$$\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + 7\sqrt{5}b$$

$$\frac{7+\sqrt{5}}{7-\sqrt{5}} \times \frac{7+\sqrt{5}}{7+\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} \times \frac{7-\sqrt{5}}{7-\sqrt{5}} = a + 7\sqrt{5}b$$

$$\frac{(7+\sqrt{5})^2}{(7-\sqrt{5})(7+\sqrt{5})} - \frac{(7-\sqrt{5})^2}{(7+\sqrt{5})(7-\sqrt{5})} = a + 7\sqrt{5}b$$

$$\frac{(7)^2 + (\sqrt{5})^2 + 2(7)(\sqrt{5})}{(7)^2 - (\sqrt{5})^2} - \frac{(7)^2 + (\sqrt{5})^2 - 2(7)(\sqrt{5})}{(7)^2 - (\sqrt{5})^2} = a + 7\sqrt{5}b$$

$$\frac{49 + 5 + 14\sqrt{5}}{49 - 5} - \frac{(49 + 5 - 14\sqrt{5})}{49 - 5} = a + 7\sqrt{5}b$$

Date / /
Pg No.

$$\frac{14\sqrt{5}+14\sqrt{5}}{44} = \frac{\cancel{2}^{1} \times 14\sqrt{5}}{\cancel{44}\,22} = \frac{14\sqrt{5}}{22} = \frac{7\sqrt{5}}{11}$$

$a = 0$

$b = \frac{1}{11}$

Q12
Ans

$h(y) = y^2 - 4y + 4$

$h(2) = (2)^2 - 4(2) + 4$

$h(2) = 4 - 8 + 4$

$h(2) = 0$

$h(-2) = (-2)^2 - 4(-2) + 4$

$h(-2) = 4 + 8 + 4$

$h(-2) = 16$

$h(1) = (1)^2 - 4(1) + 4$

$h(1) = 1 - 4 + 4$

$h(1) = 1$

$h(2) + h(-2) + h(1) = 0 + 16 + 1 = \boxed{17}$

Q13
Ans

$$\frac{4}{(216)^{-2/3}} + \frac{1}{(256)^{-3/4}} + \frac{2}{(243)^{-1/5}}$$

$$\frac{4}{(6^{\cancel{3}})^{-2/\cancel{3}}} + \frac{1}{(4^{\cancel{4}})^{-3/\cancel{4}}} + \frac{2}{(3^{\cancel{5}})^{-1/\cancel{5}}} = \frac{4}{6^{-2}} + \frac{1}{4^{-3}} + \frac{2}{3^{-1}}$$

$4 + 6^2 + 4^3 + 2 + 3 = \boxed{109}$

Q14

Ans(a) x^2+6x+9 degree is 2

$x^2+2(3)(x)+(3)^2$

$(x+3)^2$

(b) price of lab manual and notebook

x^2+6x+9

$x^2+2(3)(x)+3^2$

$x+3$ – lab manual

$x+3$ – ~~lab~~ notebook

(c) $x^2+6x+9 = h(x)$

$h(-3) = (-3)^2 + 6(-3)+9$

$= 9 - 18 + 9$

$= 0$

$x-2=0$

$x=2$

$h(x) = x^2+6x+9$

$h(2) = (2)^2 + 6(2) + 9$

$= 4 + 12 + 9$

$= 25$

$\therefore$ $x-2$ is not a factor

SECTION - E

Q15

Ans $x = \frac{1}{2+\sqrt{3}}, y = \frac{1}{2-\sqrt{3}}$

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

$x^2+y^2-xy = \frac{1}{(2+\sqrt{3})^2} + \frac{1}{(2-\sqrt{3})^2} - \frac{1}{2+\sqrt{3}} \times \frac{1}{2-\sqrt{3}}$ $(a-b)^2 = a^2+b^2-2ab$

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

$\frac{1}{4+3+4\sqrt{3}} + \frac{1}{4+3-4\sqrt{3}} - \frac{1}{2^2-(\sqrt{3})^2} = \frac{1}{7+4\sqrt{3}} + \frac{1}{7-4\sqrt{3}} - \frac{1}{4-3}$

$\frac{1}{7+4\sqrt{3}} \times \frac{7-4\sqrt{3}}{7-4\sqrt{3}} = \frac{7-4\sqrt{3}}{(7+4\sqrt{3})(7-4\sqrt{3})} = \frac{7-4\sqrt{3}}{(7)^2-(4\sqrt{3})^2} = \frac{7-4\sqrt{3}}{49-48}$

$\frac{1}{7-4\sqrt{3}} \times \frac{7+4\sqrt{3}}{7+4\sqrt{3}} = \frac{7+4\sqrt{3}}{(7-4\sqrt{3})(7+4\sqrt{3})} = \frac{7+4\sqrt{3}}{(7)^2-(4\sqrt{3})^2} = \frac{7+4\sqrt{3}}{49-48}$

$7-\cancel{4\sqrt{3}}+7+\cancel{4\sqrt{3}}-1$

$8-1$

$= \boxed{7}$

OR

$\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5$

Rationalising each number seprately.

$$\frac{1}{3-\sqrt{8}} \times \frac{3+\sqrt{8}}{3+\sqrt{8}} = \frac{3+\sqrt{8}}{(3-\sqrt{8})(3+\sqrt{8})} = \frac{3+\sqrt{8}}{(3)^2-(\sqrt{8})^2} = \frac{3+\sqrt{8}}{9-8} = \boxed{\frac{3+\sqrt{8}}{1}}$$

$$\frac{1}{\sqrt{8}-\sqrt{7}} \times \frac{\sqrt{8}+\sqrt{7}}{\sqrt{8}+\sqrt{7}} = \frac{\sqrt{8}+\sqrt{7}}{(\sqrt{8}-\sqrt{7})(\sqrt{8}+\sqrt{7})} = \frac{\sqrt{8}+\sqrt{7}}{(\sqrt{8})^2-(\sqrt{7})^2} = \frac{\sqrt{8}+\sqrt{7}}{8-7} = \boxed{\frac{\sqrt{8}+\sqrt{7}}{1}}$$

$$\frac{1}{\sqrt{7}-\sqrt{6}} \times \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}+\sqrt{6}} = \frac{\sqrt{7}+\sqrt{6}}{(\sqrt{7}-\sqrt{6})(\sqrt{7}+\sqrt{6})} = \frac{\sqrt{7}+\sqrt{6}}{(\sqrt{7})^2-(\sqrt{6})^2} = \frac{\sqrt{7}+\sqrt{6}}{7-6} = \boxed{\frac{\sqrt{7}+\sqrt{6}}{1}}$$

$$\frac{1}{\sqrt{6}-\sqrt{5}} \times \frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}+\sqrt{5}} = \frac{\sqrt{6}+\sqrt{5}}{(\sqrt{6})^2-(\sqrt{5})^2} = \frac{\sqrt{6}+\sqrt{5}}{6-5} = \boxed{\frac{\sqrt{6}+\sqrt{5}}{1}}$$

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

$$\frac{1}{\sqrt{5}-2} \times \frac{\sqrt{5}+2}{\sqrt{5}+2} = \frac{\sqrt{5}+2}{(\sqrt{5}-2)(\sqrt{5}+2)} = \frac{\sqrt{5}+2}{(\sqrt{5})^2-(2)^2} = \frac{\sqrt{5}+2}{5-4} = \boxed{\frac{\sqrt{5}+2}{1}}$$

$3+\sqrt{8}-(\sqrt{8}+\sqrt{7})+(\sqrt{7}+\sqrt{6})-(\sqrt{6}+\sqrt{5})+(\cancel{\sqrt{7}+\sqrt{6}})+\sqrt{5}+2$

$3+\cancel{\sqrt{8}}-\cancel{\sqrt{8}}-\cancel{\sqrt{7}}+\cancel{\sqrt{7}}+\cancel{\sqrt{6}}-\cancel{\sqrt{6}}-\cancel{\sqrt{5}}+\cancel{\sqrt{7}+\sqrt{6}}+\cancel{\sqrt{5}}+2=5$

$5=5$

$\therefore$ Hence Proved

Q16

Ans (i) $4x^2+9y^2+16z^2+12xy+24yz+16xz$ $\quad (a+b+c)^2=a^2+b^2+c^2+2ab+2bc+2ac$

$(2x)^2+(3y)^2+(4z)^2+2(2x)(3y)+2(3y)(4z)+2(2x)(4z)$

$(2x+3y+4z)^2$

(ii) $27p^3-\frac{1}{216}-\frac{9}{2}p^3+\frac{1}{4}p$

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

$(3p)^3-\left(\frac{1}{6}\right)^3-3(3p)\left(\frac{1}{6}\right)\left(3p-\frac{1}{6}\right)$

$\left(3p-\frac{1}{6}\right)^3$