Section - Y
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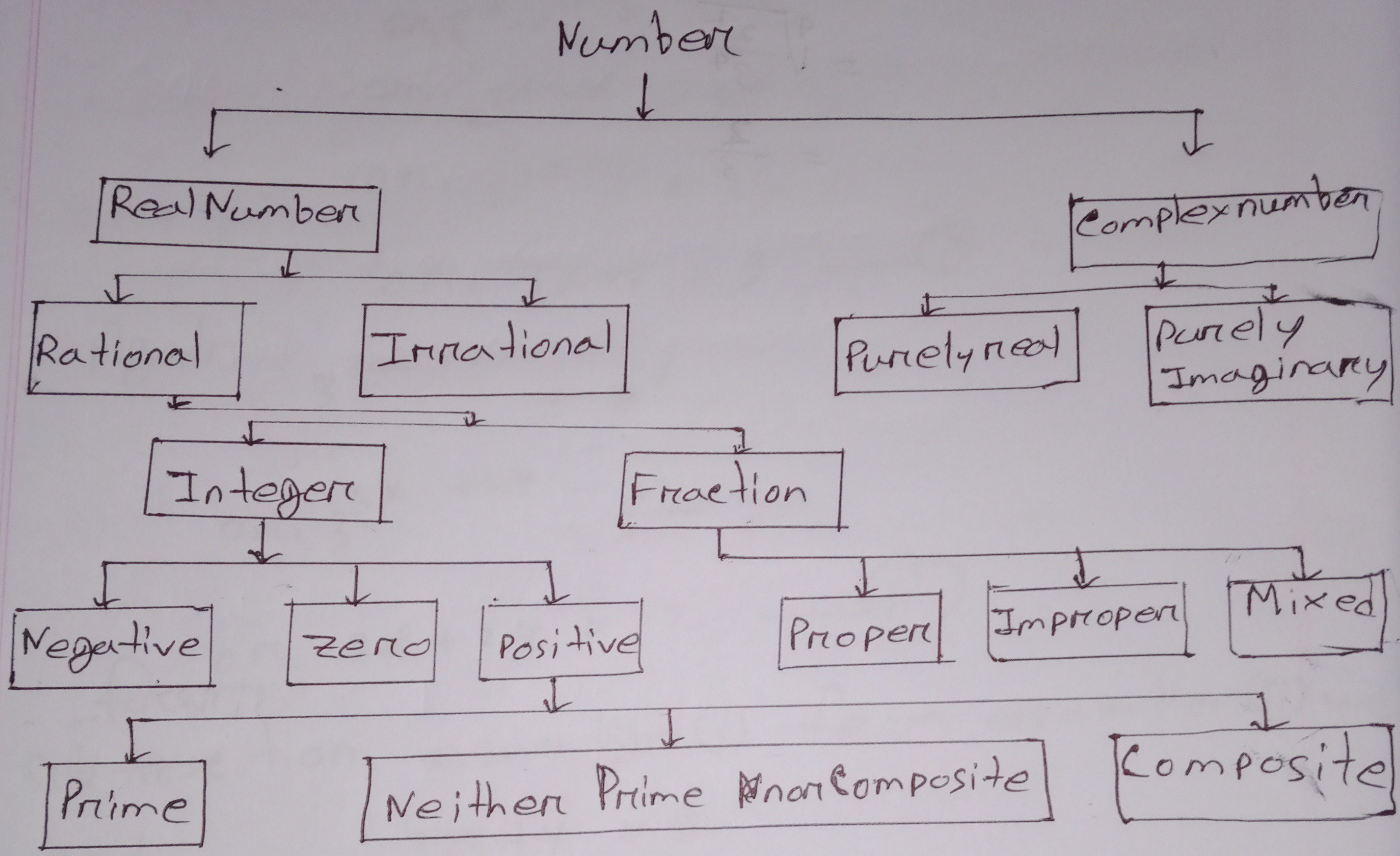
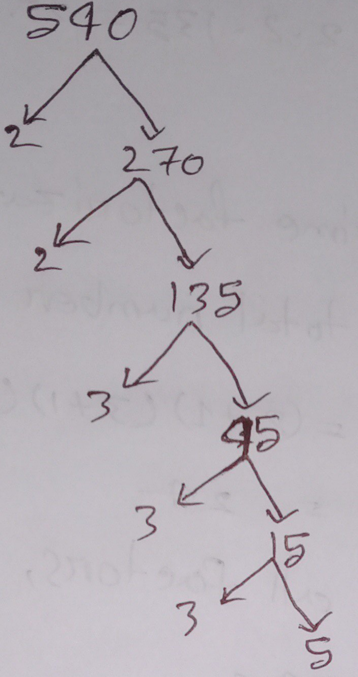
Ans. to the question No - 1

Classification of Number System:



Ans to the question No - 2

Tree Diagram:



Therefore the prime factorization of 540 is $= 2^2 \cdot 3^3 \cdot 5$

Ans to the Question No - 3

Multipallication Method:

$540 = 2 \cdot 270 = 2 \cdot 2 \cdot 135 = 2^2 \cdot 3 \cdot 45 = 2^2 \cdot 3 \cdot 3 \cdot 15 = 2^2 \cdot 3^2 \cdot 3 \cdot 5$

$= 2^2 \cdot 3^3 \cdot 5$

Therefore the prime factorization of 540 is $= 2^2 \cdot 3^3 \cdot 5$

So the ~~all factor~~ total number of factors of 540 is

$= (2+1)(3+1)(1+1)$

$= 24$

calculation for all factors,

$540 = 1 \times 540$
2×270
4×135
12×45
36×15
5×108
3×180
6×90
9×60
10×54
18×30
20×27

The factors of 540 are: 1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 27, 30, 36, 45, 54, 60, 90, 108, 135, 180, 270, 540

Ans to the ques No -4

Given numbers are 240 & 540

$240 = 2 \cdot 120 = 2 \cdot 2 \cdot 60 = 2^2 \cdot 2 \cdot 30 = 2^3 \cdot 2 \cdot 15 = 2^4 \cdot 3 \cdot 5$

$540 = 2 \cdot 270 = 2 \cdot 2 \cdot 135 = 2^2 \cdot 3 \cdot 45 = 2^2 \cdot 3 \cdot 3 \cdot 15 = 2^2 \cdot 3^2 \cdot 3 \cdot 5$

$= 2^2 \cdot 3^3 \cdot 5$

$\therefore$ LCM $(240, 540) = 2^4 \cdot 3^3 \cdot 5 = 2160$

& HCF $(240, 540) = 2^2 \cdot 3 \cdot 5 = 60$

Ans to the question No-5

Given numbers are 42, 63 & 140

$42 = 2 \cdot 21 = 2 \cdot 3 \cdot 7$

$63 = 3 \cdot 21 = 3 \cdot 3 \cdot 7 = 3^2 \cdot 7$

$140 = 2 \cdot 70 = 2 \cdot 2 \cdot 35 = 2^2 \cdot 5 \cdot 7$

$\therefore$ LCM $(42, 63, 140) = 2^2 \cdot 3^2 \cdot 5 \cdot 7 = 1260$

HCF $(42, 63, 140) = 7$

Ans to the question No-6

Given numbers are, $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}$ & $\frac{10}{27}$

Calculation of Numerators

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

$10 = 2^1 \cdot 5^1$

$LCM(2,8,16,10) = 2^4 \cdot 5 = 80$

$HCF(2,8,16,10) = 2$

Calculation of Denumerators

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

$LCM(3,9,81,27) = 3^4 = 81$

$HCF(3,9,81,27) = 3$

LCM of $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}$ & $\frac{10}{27}$ = $\frac{\text{LCM of Numerators}}{\text{HCF of Deminators}}$

$= \frac{80}{3}$

HCF of $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}$ & $\frac{10}{27}$ = $\frac{\text{HCF of Numerators}}{\text{LCM of Denuminatory}}$

$= \frac{2}{81}$

Ans to the question No - 7

We have $\dfrac{1+\sqrt{3}i}{1-\sqrt{3}i}$

$= \dfrac{(1+\sqrt{3}i)(1+\sqrt{3}i)}{(1-\sqrt{3}i)(1+\sqrt{3}i)}$

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

$= \dfrac{-2+2\sqrt{3}i}{1+3}$

$= \dfrac{2(-1+\sqrt{3}i)}{4}$

$= \dfrac{-1+\sqrt{3}i}{2}$

$= -\frac{1}{2} + \frac{\sqrt{3}i}{2}$

Let $z = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$

$|z| = \sqrt{\left(-\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2}$

$r = \sqrt{\frac{1}{4} + \frac{3}{4}}$

$r = \sqrt{\frac{1+3}{4}}$

$r = \sqrt{\frac{4}{4}}$

$r = 1$

$\therefore$ modulas of z is $= 1$

And Argument of z will

$\theta = \pi - \tan^{-1}\left|\dfrac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}\right|$

$= \pi - \tan^{-1}|\sqrt{3}|$

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

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

Polar from $-\frac{1}{2} + \frac{\sqrt{3}}{2}i$

Exponential Form is $z = re^{i\theta}$

$= 1.e^{i\frac{2\pi}{3}}$

$= e^{\frac{2\pi}{3}i}$

Ans to the ques No : 8

We have, $\sqrt{-16} \times \sqrt{-4}$ and $\dfrac{\sqrt{-16}}{\sqrt{-4}}$

$= 4i \times 2i$ $\qquad = \dfrac{4i}{2i}$

$= 8i^2$ $\qquad = 2$

$= -8$

Ans to the ques No ÷ 9

We have, $z = 2 + i$

$\therefore 8z - z^2 = 8(2+i) - (2+i)^2$

$= 16 + 8i - (4 + 4i + i^2)$

$= 16 + 8i - 4 - 4i + 1$

$= 13 + 4i$

Modulas $r = \sqrt{(13)^2 + (4\cancel{i})^2}$

$= \sqrt{169 + 16}$

$= \sqrt{185}$

$\theta = \tan^{-1}\left(\frac{4}{13}\right)$

$= 17.102$

Ans to the question No: 10

let $z = 1 + i\sqrt{3}$ $\quad z = x + iy \quad |z| = \sqrt{x^2+y^2}$

$\theta = \tan^{-1}\left(\frac{y}{x}\right)$

$\therefore$ Modulus of $z = \sqrt{(1)^2 + (\sqrt{3})^2}$

$= \sqrt{1+3}$

$= \sqrt{4}$

$= 2$

$\therefore r = 2$

Argument of $z = \tan^{-1}\left(\frac{y}{x}\right)$

$= \tan^{-1}\left(\frac{\sqrt{3}}{1}\right)$

$= \tan^{-1} \tan\frac{\pi}{3}$

$= \frac{\pi}{3}$

Therefore, $r(\cos\theta + i\sin\theta)$ form is $= 2\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)$