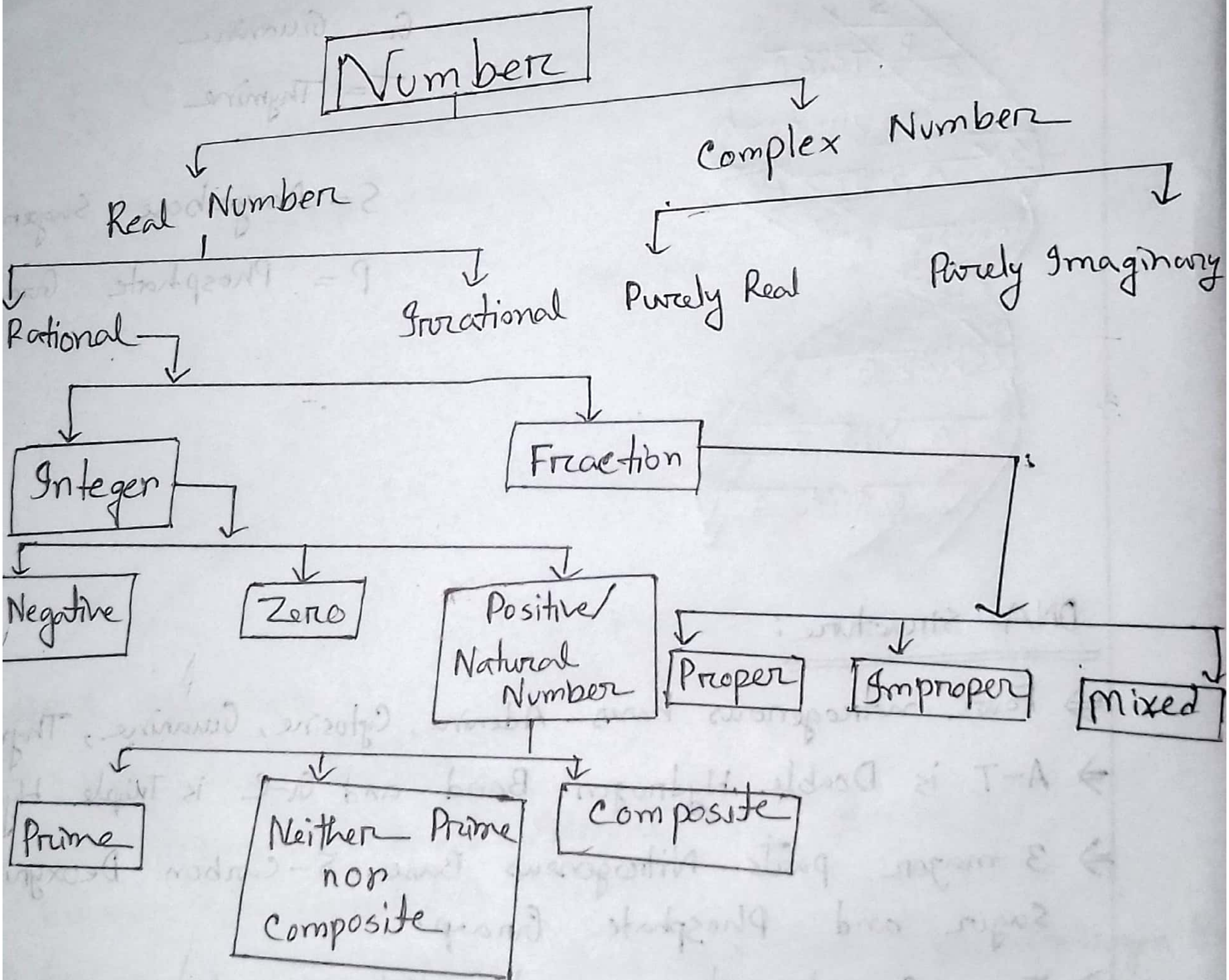
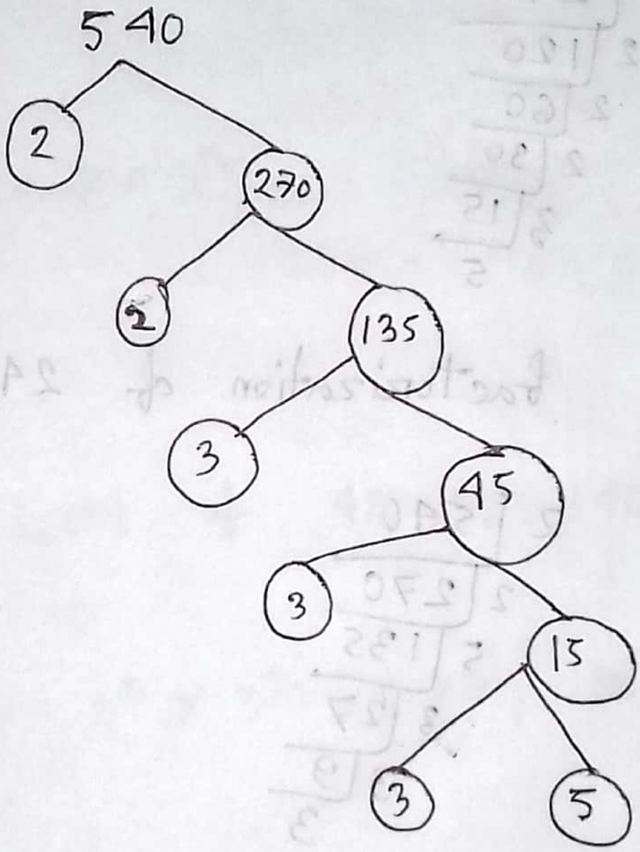
1. Classification :



2. Tree Diagram:



3. $540 = 1 \times 540$

$= 2 \times 270$

$= 4 \times 135$

$= 12 \times 45$

$= 3 \times 180$

$= 5 \times 108$

$= 6 \times 90$

$= 9 \times 60$

$= 10 \times 54$

$= 15 \times 36$

$= 18 \times 30$

$= 20 \times 27$

$= 30 \times 18$

$= 36 \times 15$

The prime factors are -

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

4. GCD and LCM of 240 and 540 $\Rightarrow$

$$\begin{array}{r|l} 2 & 240 \\ \hline 2 & 120 \\ \hline 2 & 60 \\ \hline 2 & 30 \\ \hline 3 & 15 \\ \hline & 5 \end{array}$$

$\therefore$ Prime factorization of $240 = 2^4 . 3 . 5$

$$\begin{array}{r|l} 2 & 540 \\ \hline 2 & 270 \\ \hline 5 & 135 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline & 3 \end{array}$$

$\therefore$ Prime factorization of $540 = 2^2 \cdot 5 . 3^3$

So, GCD and LCM are $\Rightarrow$

$GCD = 2^2 . 3^1 . 5^1$

$= 4 . 15$

$= 60$

$LCM = 2^4 . 3^3 . 5^1$

$= 2160$

5. HCF and LCM of 42, 63 and 140 $\Rightarrow$

$42 = 2 \times 21$

$= 2 \times 3 \times 7$

$63 = 7 \times 9$

$= 7 \times 3 \times 3 = 7 \times 3^2$

$140 = 2 \times 70$

$= 2 \times 2 \times 35$

$= 2^2 \times 5 \times 7$

So, HCF and LCM of 42, 63, 140

HCF = 7

LCM $= 2^2 \times 3^2 \times 5 \times 7 = 1260$

6. Finding the LCM and HCF of $\frac{2}{3}, \frac{8}{9}, \frac{16}{8}$

Numerator Side,

$2 = 2^1$

$8 = 2 \cdot 4 = 2 \cdot 2 \cdot 2 = 2^3$

$16 = 2^4$

$10 = 2 \cdot 5$

$\therefore$ LCM $= 2^4 \times 5 = 80$

$\therefore$ HCF = 2

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Denominator Side,

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

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

$\therefore$ HCF $= 3$

So, LCM of $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}, \frac{10}{27} = \frac{80}{3}$

HCF of $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}, \frac{10}{27} = \frac{2}{81}$

7. Finding Modulus, Argument and Polar:

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

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

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

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

$$= \frac{1+2\sqrt{3}i-3}{4}$$

$$= \frac{-2+2\sqrt{3}i}{4}$$

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

So, $x = -\frac{1}{2}$ $\quad y = \frac{\sqrt{3}}{2}$

$\therefore$ Modulus, $|z| = \sqrt{x^2+y^2}$

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

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

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

$$= 1$$

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

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

$$= \pi - \tan^{-1}\left(\frac{\sqrt{3}}{2} \times -\frac{2}{}\right.$$

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

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

$$= \pi - 60^\circ$$

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

Polar from, $z = r(\cos\theta + i\sin\theta)$

$$= 1\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)$$

$$= \cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}$$

8. Evalute :-

$$\sqrt{-16} \times \sqrt{-4}$$

$$\Rightarrow i\sqrt{16} \times i\sqrt{4}$$

$$\Rightarrow 4i \times 2i$$

$$\Rightarrow 8i^2$$

$$\Rightarrow 8 \times (-1)$$

$$= -8$$

And $\Rightarrow$

$$\frac{\sqrt{-16}}{\sqrt{-4}}$$

$$\Rightarrow \frac{i\sqrt{16}}{i\sqrt{4}}$$

$$\Rightarrow \frac{4i}{2i}$$

$$\Rightarrow 2$$

9) Evolute modulus and Argument :—

$$8z - z^2$$

$$\Rightarrow 8(2+i) - (2+i)^2 \quad [z = 2+i]$$

$$\Rightarrow 16 + 8i - 2^2 - 2.2.i - i^2$$

$$\Rightarrow 12\cancel{8} + 4i + 1$$

$$\Rightarrow 13 + 4i$$

So, $x = 13$ $\quad y = 4$

Therefore,

Modulus, $|z| = \sqrt{x^2+y^2}$

$$= \sqrt{13^2 + 4^2}$$

$$= \sqrt{169+16}$$

$$= \sqrt{185}$$

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

$$= \tan^{-1}\frac{4}{13}$$

10.

Express :- $r(\cos\theta + i\sin\theta)$ From, $1+\sqrt{3}i$

So, $x = 1$ $y = \sqrt{3}$

We know,

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

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

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

$$= \tan^{-1} 60$$

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

So, $z = r(\cos\theta + i\sin\theta)$

$$= \cos \pi/3 + i\sin \pi/3$$

So,

from of $1+i\sqrt{3} = \cos \pi/3 + i\sin \pi/3$