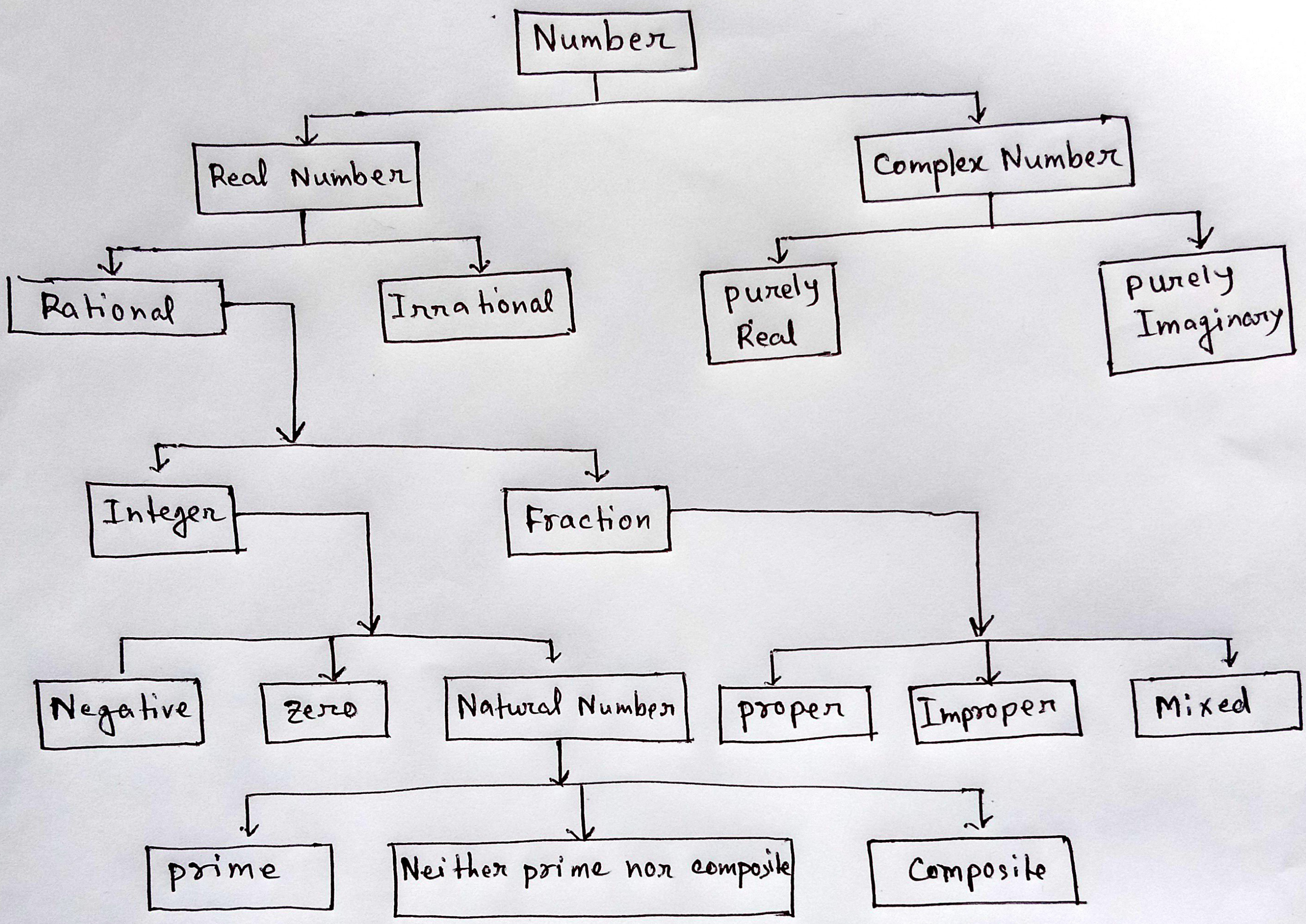
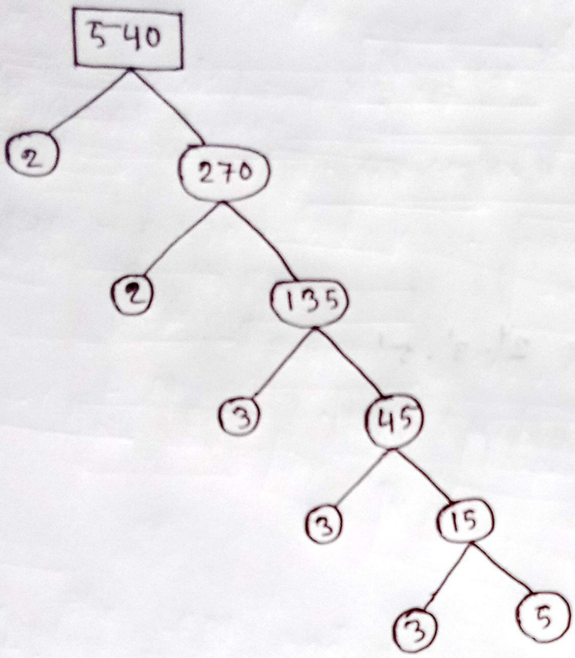
1.

Classification:



## 2.

Tree Diagram:-




## 3.

540 = 1 × 540

= 2 × 270

= 3 × 180

= 4 × 135

= 5 × 108

= 6 × 90

= 9 × 60

= 10 × 54

= 12 × 45

= 15 × 36

= 18 × 30

= 20 × 27

= 30 × 18

= 36 × 15

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

4. GCD and LCM of 240 and 540:

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

$\therefore$ prime factorization of 240 $= 2^4 \cdot 3^1 \cdot 5^1$

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

$\therefore$ ~~The~~ prime factorization of 540 $= 2^2 \cdot 3^3 \cdot 5^1$

Therefore,. GCD and LCM are:-

$GCD = 2^2 \cdot 3^1 \cdot 5^1$

$= 4 \times 3 \times 5$

$= 60$

$LCM = 2^4 \cdot 3^3 \cdot 5^1$

$= 2160$

(Next page)

5.

HCF and LCM of 42, 63 and 140

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

$63 = 7 \times 9 = 7 \times 3 \times 3 = 7 \cdot 3^2$

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

Therefore, HCF and LCM of 42, 63, 140

HCF = 7

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

6. Finding the LCM and HCF of $\frac{2}{3}$, $\frac{8}{9}$, $\frac{16}{81}$ and $\frac{10}{27}$ Numerator side,

$2 = 2^1$

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

$16 = 2 \times 8 = 2 \times 2 \times 4 = 2 \times 2 \times 2 \times 2 = 2^4$

$10 = 2 \times 5$

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

HCF $= 2^1 = 2$

Denominator side,

$3 = 3^1$

$9 = 3 \times 3 = 3^2$

$81 = 9 \times 9 = 3 \times 3 \times 3 \times 3 = 3^4$

$27 = 3 \times 9 = 3 \times 3 \times 3 = 3^3$

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

HCF $= 3^1 = 3$

Therefore, 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:

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

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

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

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

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

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

$$= -\frac{1}{2}+\frac{\sqrt{3}i}{2} \quad (x+iy)$$

so, $x = -\frac{1}{2}$ and $y = \frac{\sqrt{3}}{2}$

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

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

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

$$= 1$$

(Next page)

Argument,

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

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

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

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

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

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

polar form,

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

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

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

**8.** Evalute:-

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

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

$$= i4 \times 2i$$

$$= 8i^2$$

$$= 8(-1)$$

$$= -8$$

and, $\dfrac{\sqrt{-16}}{\sqrt{-4}}$

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

$$= \frac{i4}{i2} = 2 \text{ Ans.}$$

9. Evolute modulus and Argument :-

$8z - z^2$

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

$= 16 + 8i - 2^2 - 2\cdot2\cdot i + (i)^2$

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

$= 12 + 4i + 1$

$= 13 + 4i$ So, $x = 13$ and $y = 4$

Therefore,

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

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

$= \sqrt{169+16}$

$= \sqrt{185}$

Argument,

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

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

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

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

we know,

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

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

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

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

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

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

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

Therefore,

~~form~~ from $1 + i\sqrt{3} = (\cos\frac{\pi}{3} + i\sin\frac{\pi}{3})$

Ans.