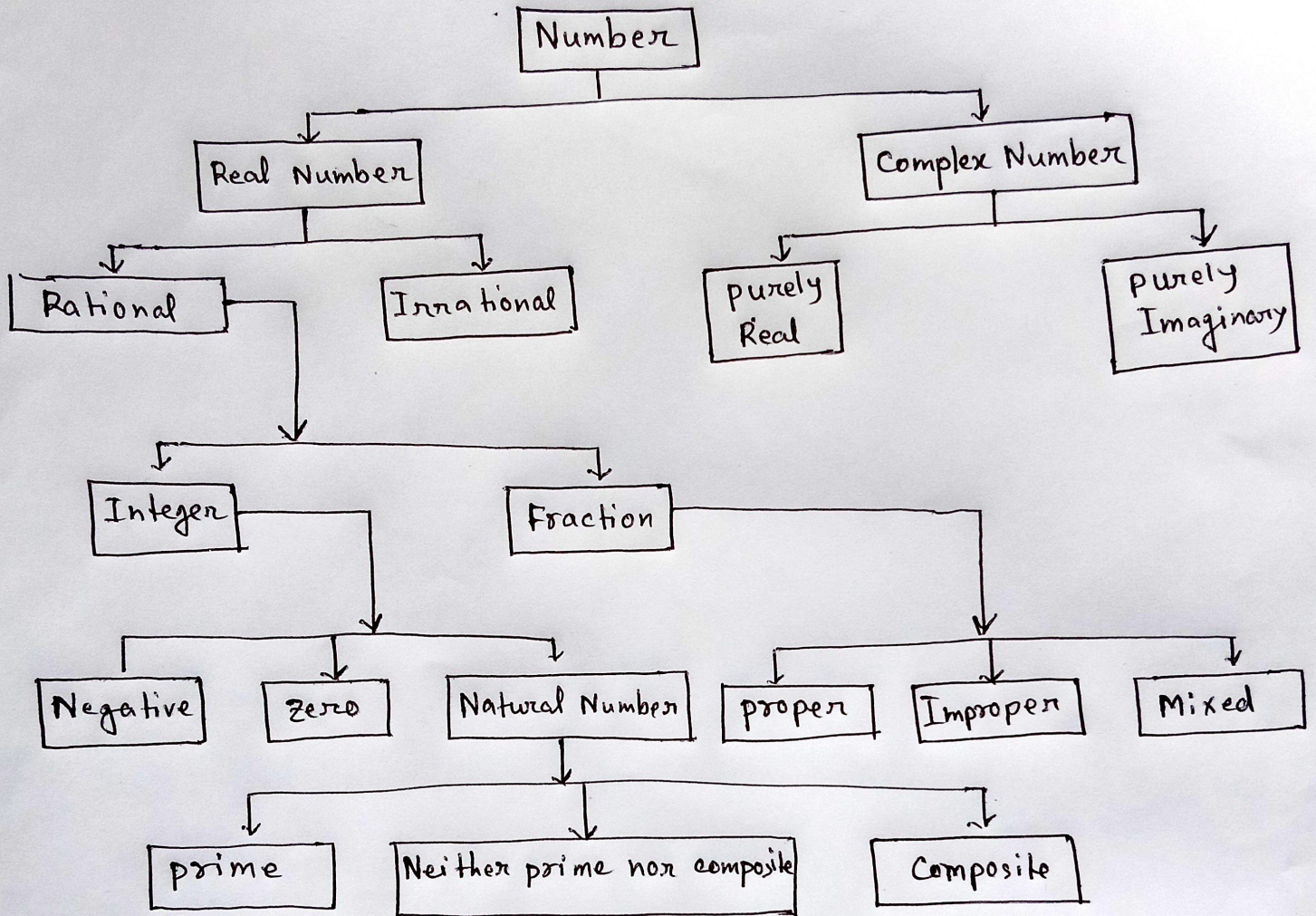


1.

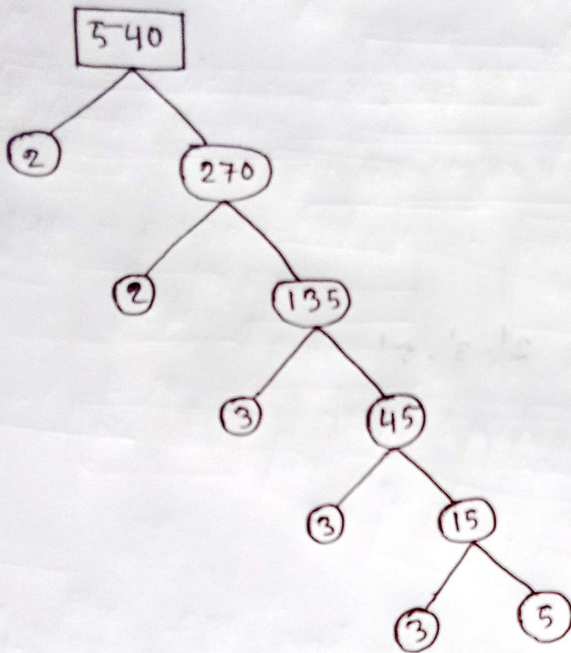
# Classification :





2.

Tree Diagram:-



3.

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

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) Am.



4. GCD and LCM of 240 and 540:

$$\begin{array}{r}
 2 \overline{) 240} \\
 2 \overline{) 120} \\
 2 \overline{) 60} \\
 2 \overline{) 30} \\
 3 \overline{) 15} \\
 \quad 5
 \end{array}$$

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

$$\begin{array}{r}
 2 \overline{) 540} \\
 2 \overline{) 270} \\
 5 \overline{) 135} \\
 3 \overline{) 27} \\
 3 \overline{) 9} \\
 \quad 3
 \end{array}$$

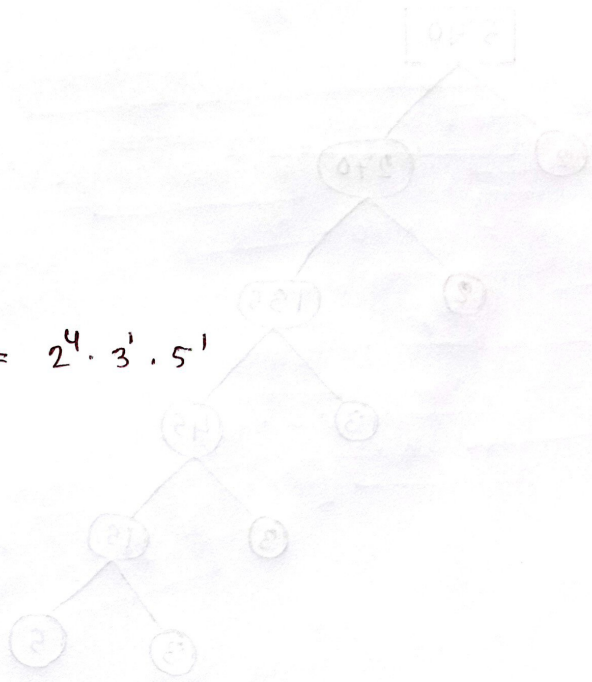
∴ The prime factorization of 540 =  $2^2 \cdot 3^3 \cdot 5^1$

Therefore, GCD and LCM are:-

$$\begin{aligned}
 \text{GCD} &= 2^2 \cdot 3^1 \cdot 5^1 \\
 &= 4 \times 3 \times 5 \\
 &= 60
 \end{aligned}$$

$$\begin{aligned}
 \text{LCM} &= 2^4 \cdot 3^3 \cdot 5^1 \\
 &= 2160
 \end{aligned}$$

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- $240 \times 1 = 240$
- $120 \times 2 = 240$
- $80 \times 3 = 240$
- $60 \times 4 = 240$
- $40 \times 6 = 240$
- $30 \times 8 = 240$
- $24 \times 10 = 240$
- $20 \times 12 = 240$
- $18 \times 15 = 240$
- $15 \times 18 = 240$
- $12 \times 20 = 240$
- $10 \times 24 = 240$
- $8 \times 30 = 240$
- $6 \times 40 = 240$
- $5 \times 48 = 240$
- $4 \times 60 = 240$
- $3 \times 80 = 240$
- $2 \times 120 = 240$

The prime factors of 240 are (1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 30, 40, 60, 120, 240)



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

$$\text{HCF} = 7$$

$$\text{LCM} = 2^2 \cdot 3^2 \cdot 5 \cdot 7 = 1260$$

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

$$2 = 2^1$$

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

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

$$10 = 2 \times 5$$

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

$$\text{HCF} = 2^1 = 2$$

Denominator side,

$$3 = 3^1$$

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

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

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

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

$$\text{HCF} = 3^1 = 3$$

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

$$= \frac{80}{3}$$

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



7.

Finding Modulus, Argument and polar:

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

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

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

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

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

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

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

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

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

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

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

$$= 1$$

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Argument,

$$\begin{aligned}\theta &= \tan^{-1}\left(\frac{y}{x}\right) \\ &= \pi - \tan^{-1}\left(\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}\right) \\ &= \pi - \tan^{-1}(-\sqrt{3}) \\ &= \pi - \tan^{-1}(\sqrt{3}) \\ &= \pi - 60^\circ \\ &= \pi - \frac{\pi}{3} = \frac{2\pi}{3}\end{aligned}$$

polar form,

$$\begin{aligned}z &= r(\cos\theta + i\sin\theta) \\ &= 1\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right) \\ &= \cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3} \text{ Ans.}\end{aligned}$$

8. Evaluate:-

$$\begin{aligned}&\sqrt{-16} \times \sqrt{-4} \\ &= i\sqrt{16} \times i\sqrt{4} \\ &= i4 \times 2i \\ &= 8i^2 \\ &= 8(-1) \\ &= -8\end{aligned}$$

and,

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

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

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



9. Evaluate modulus and Argument :-

$$\begin{aligned}8z - z^2 \\&= 8(2+i) - (2+i)^2 \quad [z = 2+i] \\&= 16 + 8i - z^2 - 2 \cdot 2 \cdot i + (i)^2 \\&= 16 + 8i - 4 - 4i + i^2 \\&= 12 + 4i + 1 \\&= 13 + 4i \quad \text{So, } x = 13 \text{ and } y = 4\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Modulus, } |z| &= \sqrt{x^2 + y^2} \\&= \sqrt{13^2 + 4^2} \\&= \sqrt{169 + 16} \\&= \sqrt{185}\end{aligned}$$

Argument,

$$\begin{aligned}\theta &= \tan^{-1} \left| \frac{y}{x} \right| \\&= \tan^{-1} \frac{4}{13}\end{aligned}$$

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

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

we know,

$$\begin{aligned}\theta &= \tan^{-1} \left| \frac{y}{x} \right| \\&= \tan^{-1} \left| \frac{\sqrt{3}}{1} \right| \\&= \tan^{-1} \sqrt{3} \\&= \tan^{-1} 60^\circ \\&= \frac{\pi}{3}\end{aligned}$$

$$\begin{aligned}\text{So, } z &= r(\cos\theta + i\sin\theta) \\&= 1 \left( \cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right)\end{aligned}$$

Therefore,

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

Ans.