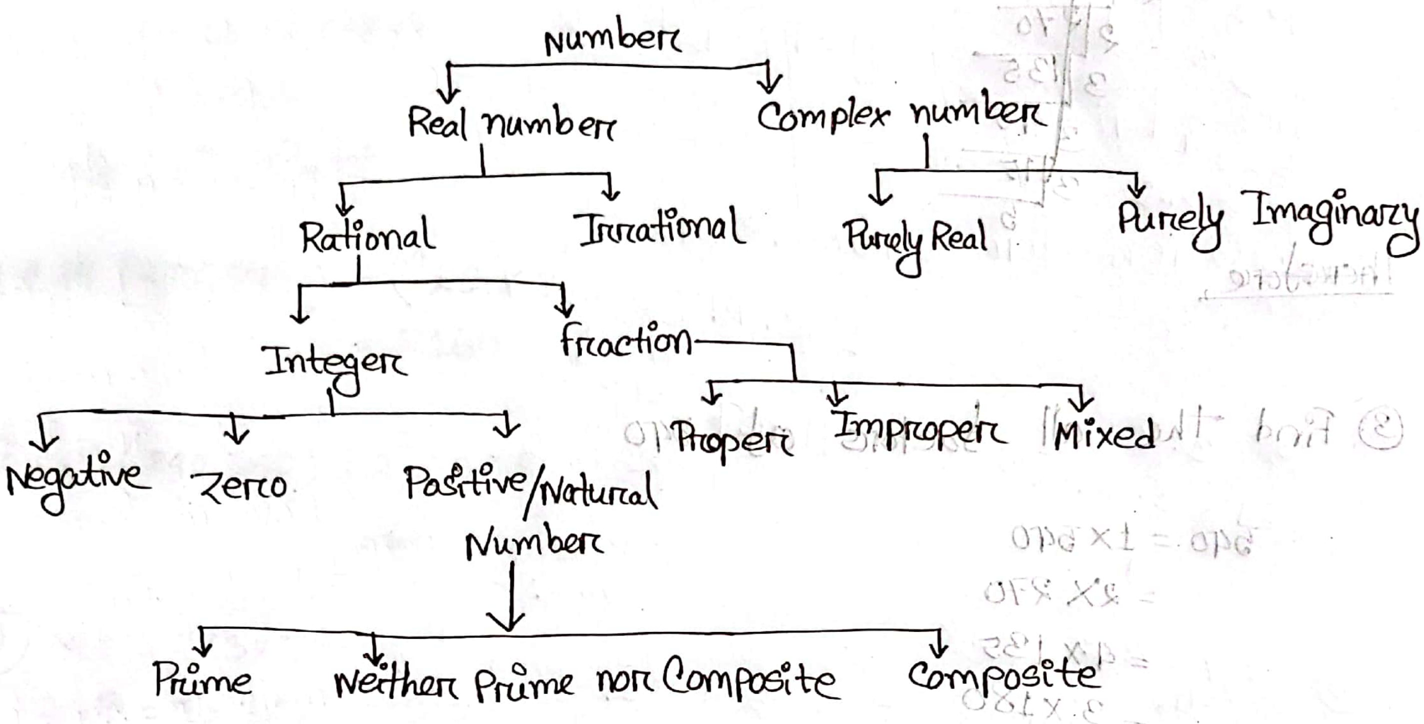
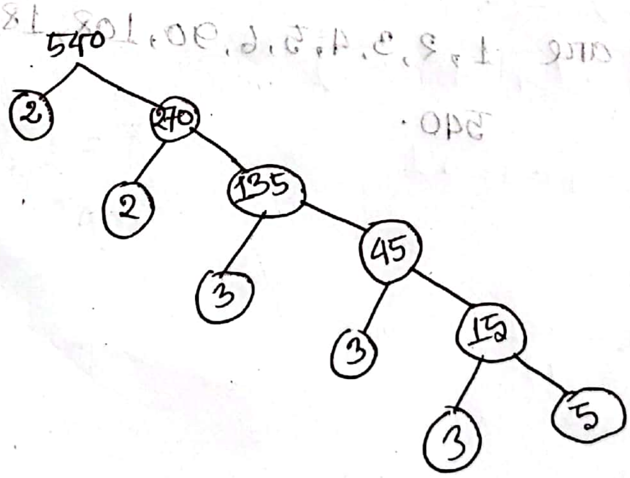
① Classification of number system :



② Find the Prime factorization of 540 with using tree method



Therefore, the Prime factorization of 540 is $= 2^2 . 3^3 . 5^1$

③ Find the all factors of 540

$540 = 1 \times 540$

$= 2 \times 270$

$= 4 \times 135$

$= 3 \times 180$

$= 5 \times 108$

$= 6 \times 90$

The factors of 540 are 1, 2, 3, 4, 5, 6, 90, 108, 180, 135, 270, 540.

(4) $240 = 2 \times 120$

$= 2 \times 2 \times 60$

$= 2 \times 2 \times 2 \times 2 \times 15$

$= 2^4 \times 3 \times 5$

$540 = 2^2 \times 3^3 \times 5^1$

$L.C.M\,(240, 540) = 2^4 \times 3^3 \times 5$

$= 2160$

$G.C.D\,(240, 540) = 2^2 \times 3 \times 5$

$= 60$ Ans:

(5) $42 = 2 \times 3 \times 7$

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

$140 = 2 \times 2 \times 5 \times 7 = 2^2 \times 5 \times 7$

$L.C.M\,(42, 63, 140) = 2^2 \times 3^2 \times 7 \times 5$

$= 1260$

$H.C.F\,(42, 63, 140) = 7$

Ans:.

(6) Calculation for Numerators

$2 = 2^1$ $\qquad$ $L.CM\,(2, 8, 10, 16) = 2^4 . 5 = 80$

$8 = 2^3$ $\qquad$ $HCF = 2^1 = 2$

$16 = 2^4$

$10 = 2.5$

Calculation for Denominators

$L.C.M\,(3, 9, 27, 81) = 3^4 = 81$

$3 = 3^1$

$9 = 3.3$ $\qquad$ $H.C.F = 3^1 = 3$

$81 = 3.3.3.3$

$= 3^4$

$27 = 3.9 = 3.3.3 = 3^3$

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

H.CF $= \frac{2}{3}, \frac{8}{9}, \frac{16}{81}$ and $\frac{10}{27} = \frac{2}{81}$ Ans.

⑦ Finding modulus Argument and Polar;

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

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

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

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

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

$$= \frac{2(-1+\sqrt{3}i)}{2.2}$$

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

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

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

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

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

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

Modulus of z is $= 1$

And Argument of z will

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

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

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

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

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

Exponential form is $z = r.e^{i\theta}$

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

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

⑧ Given,

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

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

$$= 4i \times 2i$$

$$= 8i^2$$

$$= -8$$

Again,

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

$$= \cancel{\frac{4i}{-2i}}$$

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

$$= \sqrt{-4}$$

$$= \sqrt{2 \times 2 \times i^2}$$

$$= -2 \quad \text{Ans:}$$

⑨ Given,

$$z = 2+i$$

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

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

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

$$= 13 + 4i$$

Modulus $r = \sqrt{(13)^2 + (4)^2}$

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

$$= \sqrt{185}$$

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

$$= 17.102 \quad \text{An:}$$

(10)

let, $z = 1 + i\sqrt{3}$

$z = x + iy$

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

we know,

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

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

$= \sqrt{1+3}$

$= \sqrt{4} = 2$

$\therefore r = 2$

Again,

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

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

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

$= \pi/3$

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

Ans;