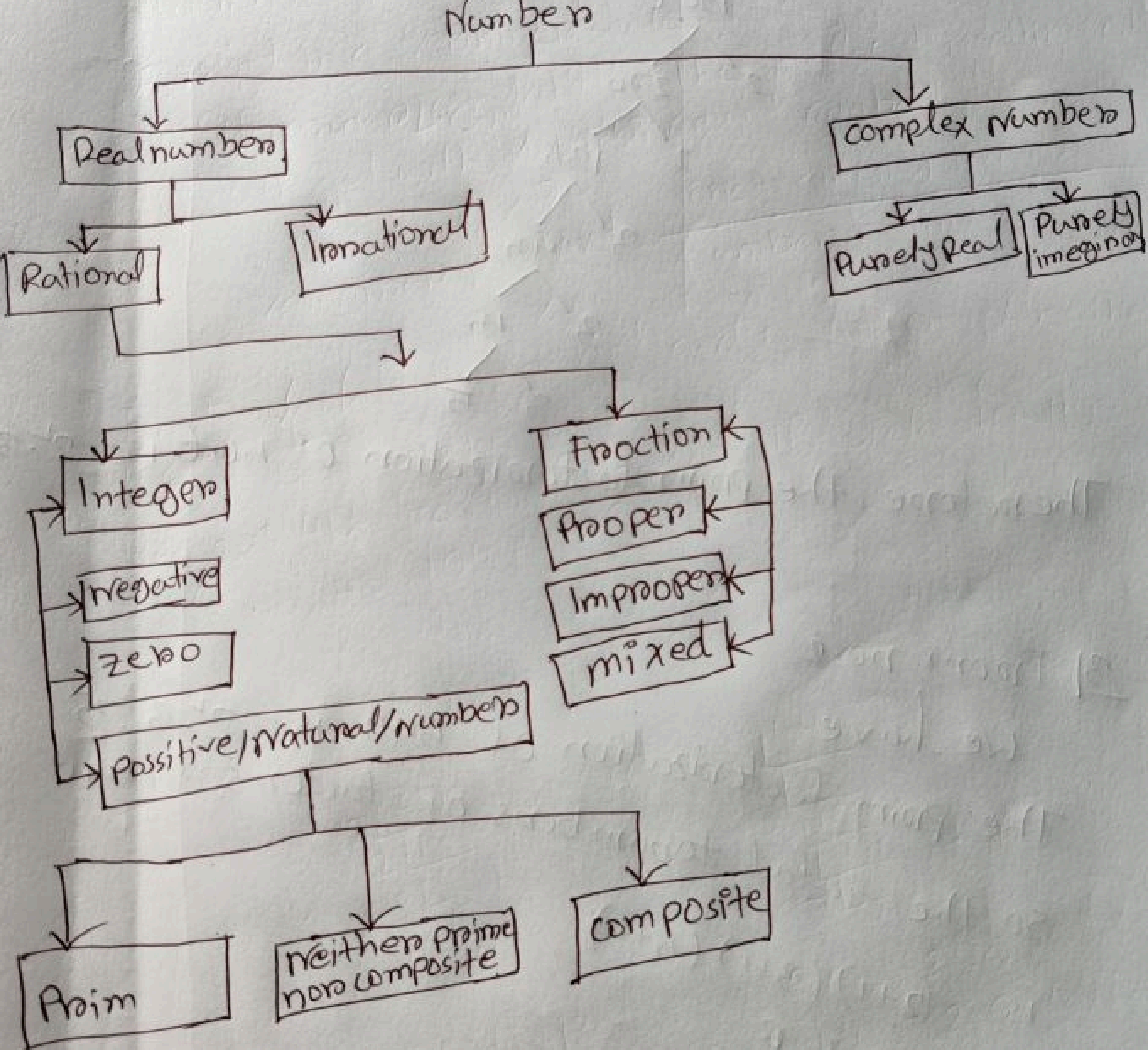
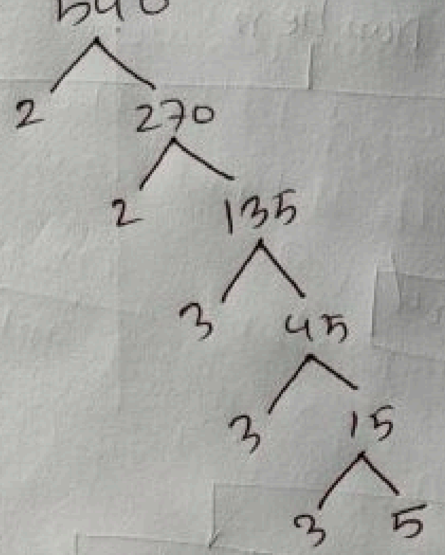
1. classification of numbers system



2) Prim factorization of 540:



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

3) From no. 2
we have
The prim factorization of 540 is $= 2^2 \cdot 3^3 \cdot 5$
so, the total ~~to~~ numbers of factors of 540

is $= (2+1)(3+1)(5+1)$
$= 3 \cdot 4 \cdot 6$
$= 24$

Calculation for all factors:

$540 = 1 \times 540$
$= 2 \times 270$
$= 3 \times 180$
$= 4 \times 135$
$= 5 \times 108$
$= 6 \times 90$
$= 9 \times 60$
$= 10 \times 60$

$= 12 \times 45$
$= 15 \times 36$
$= 18 \times 30$
$= 20 \times 27$

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

4) GCD and LCM of 240 and 540:

$$\begin{array}{r|l} 2 & 240 \\ \hline 2 & 120 \\ \hline 2 & 60 \\ \hline 2 & 30 \\ \hline 3 & 15 \\ \hline & 5 \end{array} \quad \text{and} \quad \begin{array}{r|l} 2 & 540 \\ \hline 2 & 270 \\ \hline 3 & 135 \\ \hline 3 & 45 \\ \hline 3 & 15 \\ \hline & 5 \end{array}$$

$\therefore$ Prime factorization of $240 = 2^4 . 3^1 . 5^1$
and Prime fatorization of $540 = 2^2 . 3^3 . 5^1$

$\therefore$ GCD of $(240, 540) = 2^2 \times 3 \times 5$
$= 4 \times 3 \times 5$
$= 60$

LCM of $(240, 540) = 2^4 \times 3^3 \times 5$
$= 16 \times 27 \times 5 = 2160$

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5. H.C.F and L.C.m of 42, 63

$2\,\underline{|\,42}$
$3\,\underline{|\,21}$
$\quad 7$

$= 2 \times 3 \times 7$

$3\,\underline{|\,63}$
$3\,\underline{|\,21}$
$\quad 7$

$= 3^2 \times 7$

$2\,\underline{|\,140}$
$2\,\underline{|\,70}$
$3\,\underline{|\,35}$
$\quad 7$

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

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

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

= 1260

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06. calculation for numerators.

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

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

calculation for Denominators

$3 = 3^1$

$9 = 3^2$.

$81 = 3^4$

$27 = 3^3$

$\therefore$ L.C.M $(2, 8, 16, 10) = 2^4 \times 5 = 80$

$\therefore$ H.C.F $(2, 8, 16, 10) = 2$

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

$\therefore$ H.C.M $(3, 9, 81, 27) = 3$

Here,– H.C.F of $2/3$, $8/9$, $16/81$, $10/27$

$$= \frac{\text{HCF}(2, 8, 16, 10)}{\text{L.C.M}(3, 9, 81, 27)}$$

$= 2/81$

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L.C.M of $2/3, 8/9, 16/81, 10/27$

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

$$= 80/3$$

07. We have

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

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

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

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

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

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

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

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

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

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

$$= 1$$

$\therefore$ modulus of $z = 1$

$\therefore$ Argument of z

$$\theta = \pi - \tan^{-1}\frac{\sqrt{3}/2}{1/2}$$

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

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polor from $1/2 + \frac{\sqrt{3}}{2} i$.

Exponerntial from is $z = re^{i}$

$= 1 \cdot e^{i\, 2\pi/3}$

$= e^{2\pi/3\, i}$

<u>08.</u> we have

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

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

$= 4i \times 2i$

$= 8i^2$

and $\sqrt{-16}/\sqrt{-4}$

$= 4i/2i$

$= 2$

<u>09.</u> we have

$z = 2+i$

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

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

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

$= 13 + 4i$

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

$= \sqrt{169 + 16}$

$= \sqrt{185}$

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

$= 17.102$

10. we have

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

$\theta = \tan^{-1} y/x$

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

$= \sqrt{1+3}$

$= 2$

$\therefore r = 2$

Argument of $z = \tan^{-1}(\sqrt{3}/1)$

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

$= \pi/3$

$\therefore$ therefore, $r(\cos\theta + i\sin\theta)$ from is

$2(\cos \pi/3 + i \sin \pi/3)$.