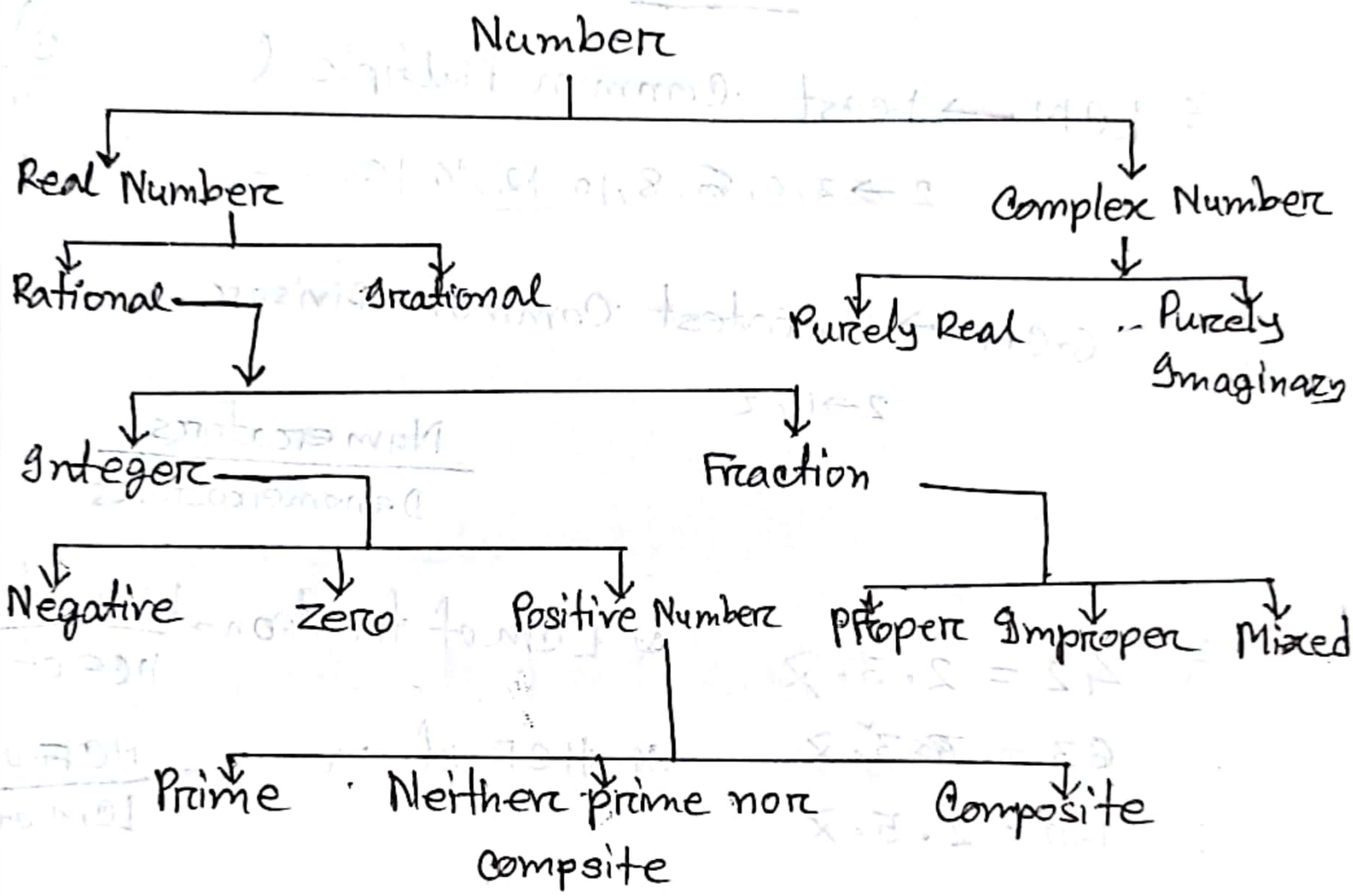
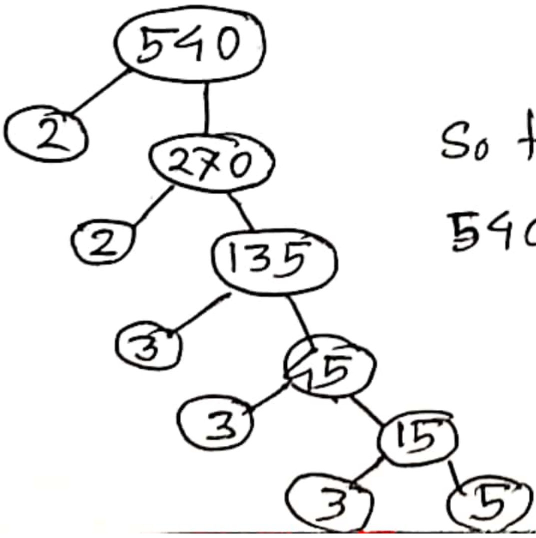
Math

01



02



So the prime factorization of 540 is $= 2^2 \cdot 3^3 \cdot 5$

03

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

So the all factors of 540 is = (1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 27, 30, 36, 45, 54, 60, 90, 108, 135, 180, 270, 270, 540)

04

$240 = 2^4 . 3 . 5$

$540 = 2^2 . 3^3 . 5$

$\therefore$ L.C.M of $240, 540 = 2^4 . 3^3 . 5$

$= 2160$

$\therefore$ G.C.D of $240, 540 = 2 . 3 . 5$

$= 30$

05

$42 = 2 \cdot 3 \cdot 7$

$63 = 3^2 \cdot 7$

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

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

$= 1260$

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

$= 7$

06

* Calculation of Numarators

$2 = 2$

$8 = 2^3$

$16 = 2^4$

$10 = 2 \cdot 5$

* Calculation of denomarators

$3 = 3$

$9 = 3^2$

$81 = 3^4$

$27 = 3^2$

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

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

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Other side

H.C.F of $(3, 9, 81, 27) = 3$

L.C.m of $(3, 9, 81, 27) = 3^4 = 81$

so, the L.C.m of $\left(\frac{2}{3}, \frac{8}{9}, \frac{16}{81}, \frac{10}{27}\right) = \frac{80}{3}$

and, the H.C.F of $\left(\frac{2}{3}, \frac{8}{9}, \frac{16}{81}, \frac{10}{27}\right) = \frac{2}{81}$

07

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

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

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

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

So, palar form $-\frac{1}{2}+\frac{\sqrt{3}}{2}i$

~~ans:~~

Now,

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

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

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

So modulas of z is $= 1$

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

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

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

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

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

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

08

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

$= 4i \times 2i$

$= 8i^2$

$= -8$

and

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

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

$= 2$

09

* $8z - z^2$

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

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

$= 13 + 4i$

So, Modulus $= \sqrt{13^2 + 4^2}$

$= \sqrt{185}$

$= 13.60$

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

$= 17.10°$

* $z = 1 + i\sqrt{3}$

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

$= \sqrt{9}$

$= 2$

and,

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

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

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

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

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