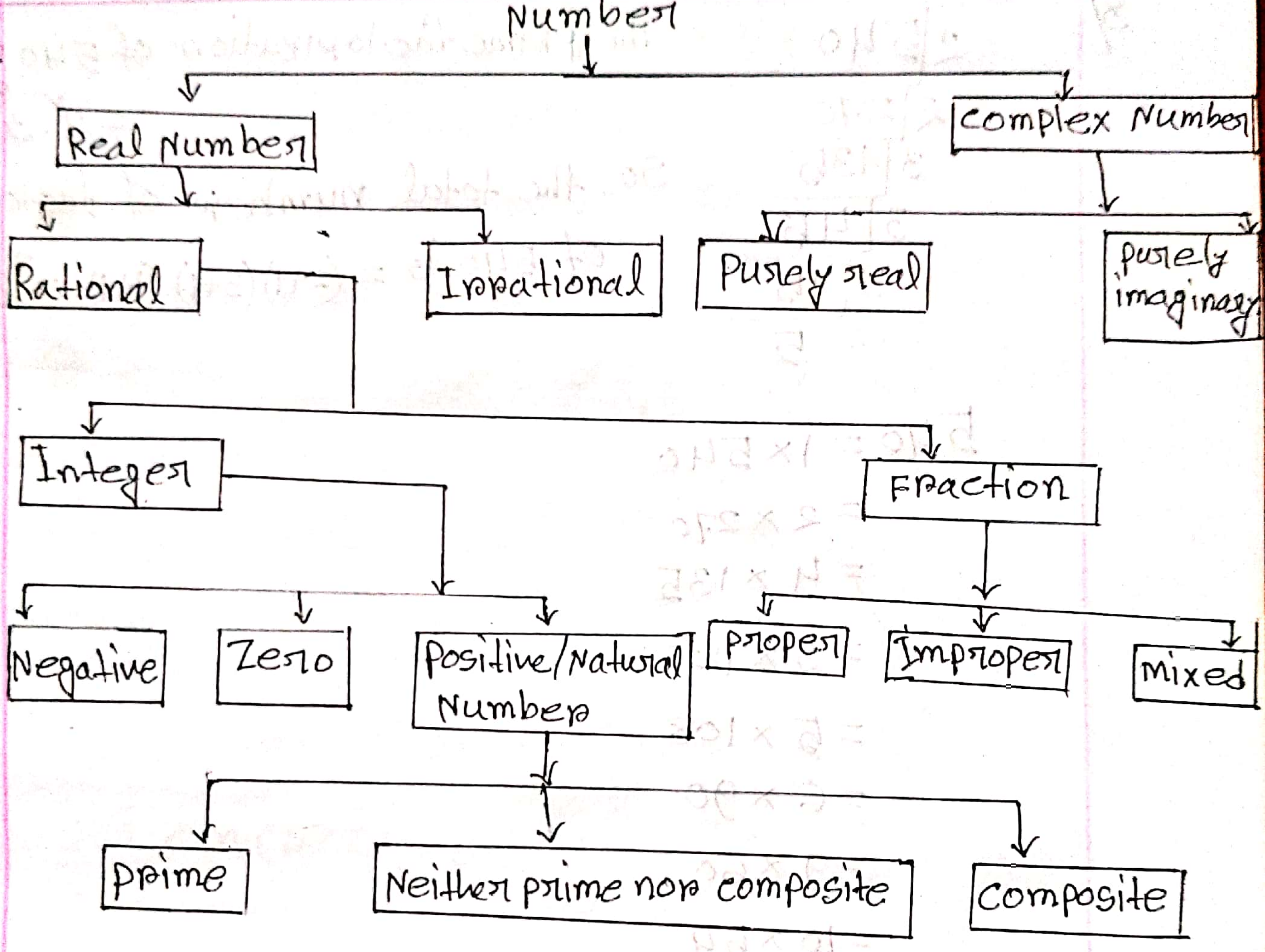
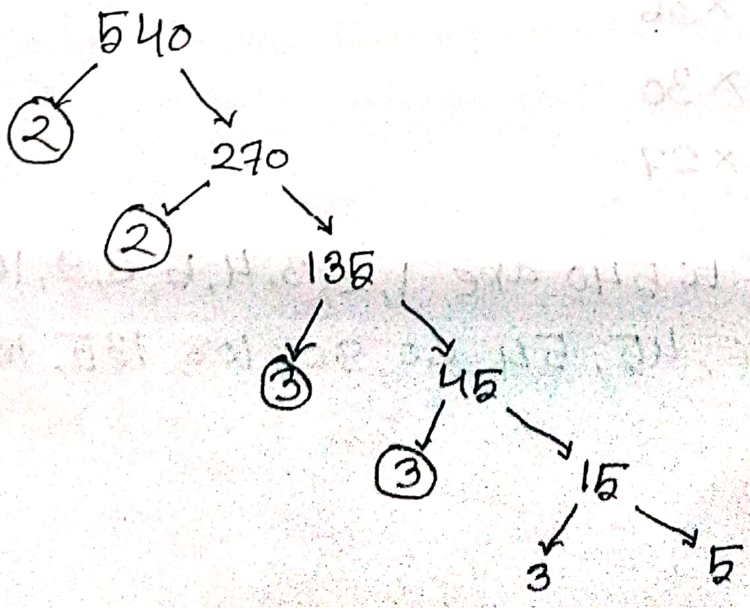
1



2. The prime factorization of 540 using tree is



3)

$$
\begin{array}{r|l}
2 & 540 \\ \hline
2 & 270 \\ \hline
3 & 135 \\ \hline
3 & 45 \\ \hline
3 & 15 \\ \hline
 & 5
\end{array}
$$

The prime factorization of 540 is $= 2^2 . 3^3 . 5$

So, the total number of factors of 540 is $= (2+1)(3+1)(1+1) = 24$

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

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. Given numbers are 240 & 540.

$240 = 2.120 = 2^2.60 = 2^3.30 = 2^4.15 = 2^4.3.5$

$540 = 2.270 = 2^2.135 = 2^2.3.45 = 2^2 3^3.5$

$\therefore$ LCM $(240 \& 540) = 2^4.3^3.5 = 2160$

& GCD $(240, 540) = 2^2.3.5 = 60$

5. Given numbers are 42, 63, 140

$42 = 2.21 = 2.3.7$

$63 = 3.21 = 3^2.7$

$140 = 2.70 = 2^2.35 = 2^2.5.7$

$\therefore$ LCM$(42, 63, 140) = 2^2.3^2.5.7 = 1260$

& HCF$(42, 63, 140) = 7$

6. Given numbers are $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}$ and $\frac{10}{27}$

Calculation for Numerators

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

$10 = 2.5$

LCM$(2, 8, 16, 10) = 2^4.5 = 80$

HCF $= 2$

Calculation for Denominators

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

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

HCF $= 3$

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

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

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

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

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

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

$= a+ib$ where $a = -\frac{1}{2}$ and $b = \frac{\sqrt{3}}{2}$

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

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

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

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

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

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

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

Exponential of $z = e^{i\theta}$

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

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

$= \sqrt{16} \cdot \sqrt{-1} \times \sqrt{4} \cdot \sqrt{-1}$

$= 4i \times 2i$

$= -8$

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

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

$= 2$

9/ Given the value of $z = 2+i$

$8z - z^2$

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

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

$= 13 + 4i$

Modulus $r = \sqrt{169+16} = \sqrt{185}$

Argument $\theta = \tan^{-1}\left(\frac{4}{13}\right) = 17.10$

10 $1 + i\sqrt{3}$

Modulus $r = \sqrt{1+3} = \sqrt{4} = 2$

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

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

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

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