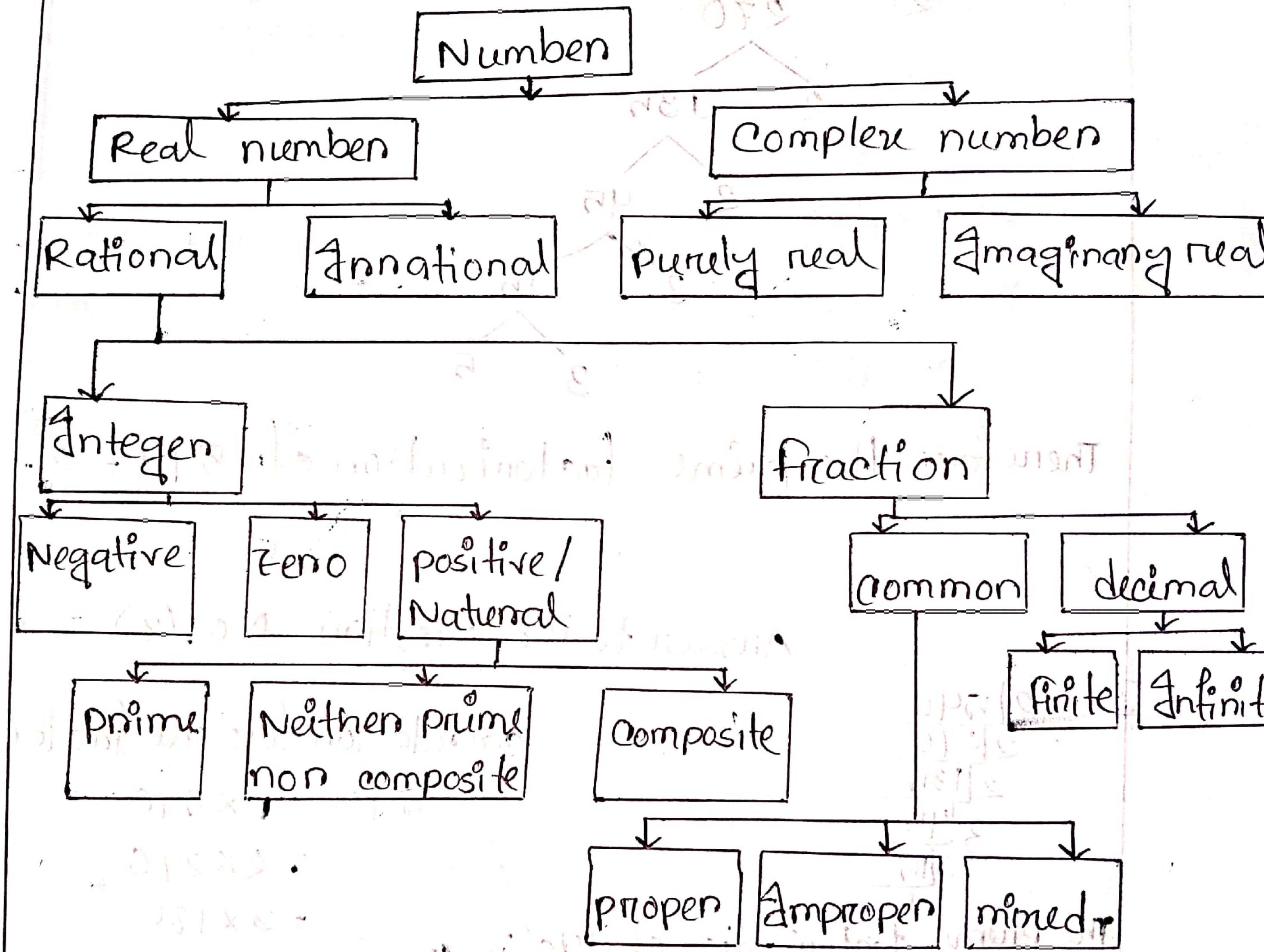
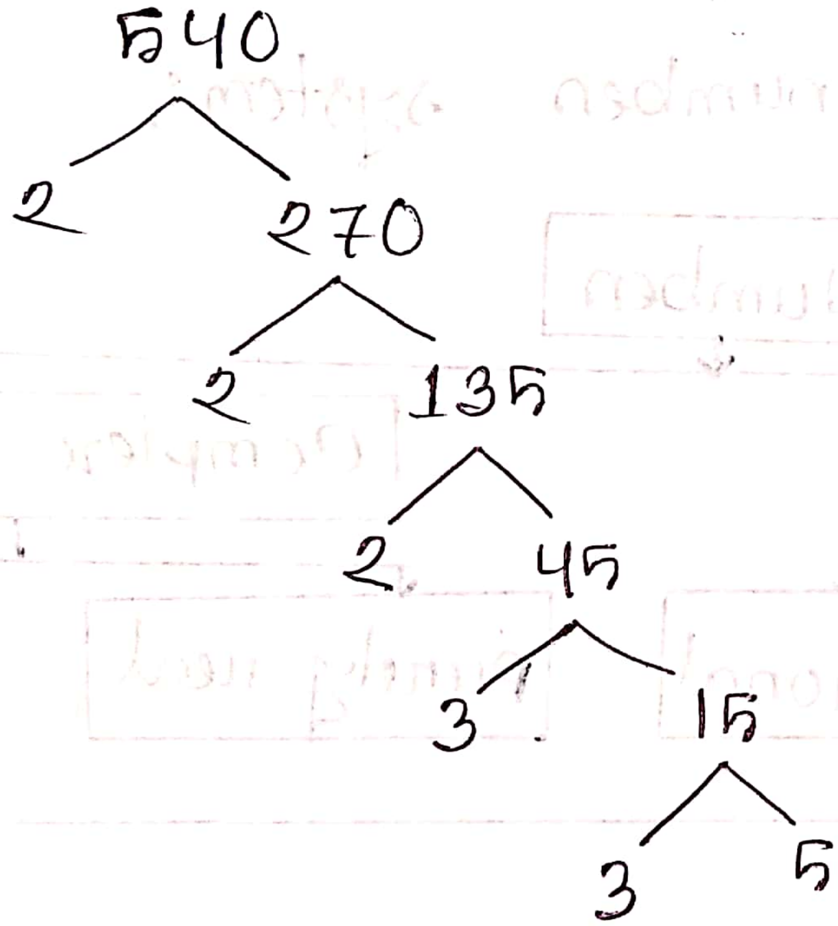
Answer to the question NO(1):

Classification of number system:



Answer to the question No: (2)



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

Answer to the question No: (3)

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

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

So, the total number of factors of 540 is =

$(2+1).(3+1).(1+1)$

$= 3.4.2$

$= 24$

Calculation for all factors:

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

The factors of ~~240~~ 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.

Answer to the question No: (4)

$240 = 2 \times 120 = 2 \times 2 \times 60 = 2 \times 2 \times 2 \times 30 = 2 \times 2 \times 2 \times 2 \times 15$
$= 2^4 \times 3 \times 5$

$540 = 2 \times 270 = 2 \times 2 \times 135 = 2 \times 2 \times 3 \times 45 = 2 \times 2 \times 3 \times 3 \times 15$
$= 2^2 \times 3^3 \times 5$

$\therefore$ LCM $(240; 540) = 2^4 . 3^3 . 5 = 2160$

HCF or GCD $(240, 540) = 2.3.5 = 30$

Answer to the question No: (5)

$42 = 2 \times 21 = 2 \times 3 \times 7$

$63 = 3 \times 21 = 3 \times 3 \times 7 = 3^2 \times 7$

$140 = 2 \times 70 = 2 \times 2 \times 35 = 2^2 \times 5 \times 7$

$\therefore$ LCM $(42, 63, 140) = 2^2 \times 3^2 \times 5 \times 7 = 1260$

HCF $(42, 63, 140) = 2 \times 7 = 14$

Answer to the question No:(6)

Calculation for numarators

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

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

$LCM(2,8,16,10) = 2^4 \times 5$
$= 80$

$HCF(2,8,16,10) = 2$

Calculation for Denominators

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

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

$HCF(3,9,81,27) = 3$

$$LCM \text{ of } \frac{2}{3}, \frac{8}{9}, \frac{16}{81}, \frac{10}{27} = \frac{LCM(2,8,10,16)}{HCF(3,9,81,27)} = \frac{80}{3}$$

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

Answer to the question No: (7)

We have,

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

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

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

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

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

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

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

Let:

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

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

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

$\therefore$ Modulas of $z = 1$

And,

Argument of z

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

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

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

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

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

Exponential form is $z = re^{i\theta}$

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

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

Answer to the question NO: (8)

We have, $\sqrt{-16} \times \sqrt{-4}$

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

$= 4i \times 2i$

$= 8i^2$

$= -8$

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

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

$= 2$

Answer to the question NO: (9)

We have, $z = 2+i$

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

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

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

$= 13 + 4i$

P. T. O

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

$= \sqrt{169+16}$

$= \sqrt{185}$

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

$= 17.102$

Answer to the question No: (10)

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

$z = x + iy$

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

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

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

$= \sqrt{1+3}$

$= \sqrt{4}$

$= 2$

$\therefore r = 2$

P.T.O

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

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

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

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

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