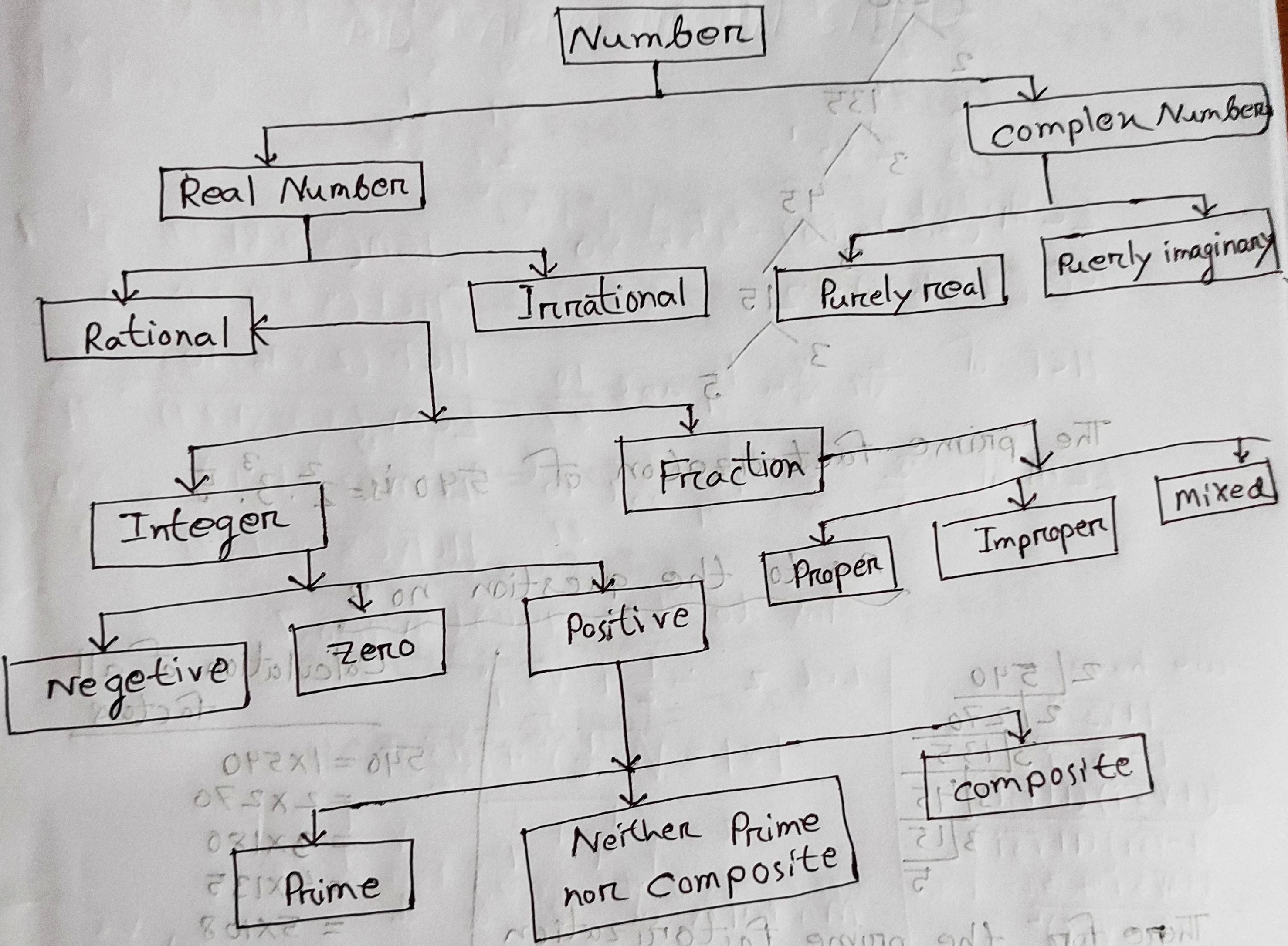
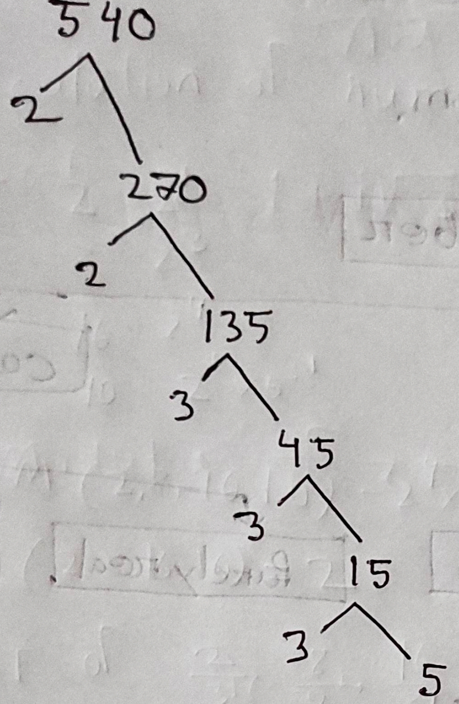
Ans to the question no 1

classification of number system.



Ans to the question no 2



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

Ans to the question no 3

2 | 540
2 | 270
3 | 135
3 | 45
3 | 15
5

There for the prime factorization of 540 is $= 2^2 . 3^3 . 5$

so, the total number of factors of 540 is $= (2+1)(3+1)(1+1) = 3.4.2 = 24$

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

Calculation of all factors

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

Ans to the question no 4

$240 = 2\times120 = 2\times2\times60 = 2\times2\times2\times30 = 2\times2\times2\times2\times15$
$= 2^4\times3\times5$

$540 = 2\times270 = 2\times2\times135 = 2\times2\times3\times45 = 2\times2\times3\times3\times15$
$= 2^2\times3^3\times5$

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

and $HCF(240, 540) = 2^2 . 3 . \cancel{5} = 60$

Ans to the question no 5

$42 = 2\times21 = 2\times3\times7$

$63 = 3\times21 = 3\times3\times7 = 3^2\times7$

$140 = 2\times70 = 2\times2\times35 = 2^2\times5\times7$

$\therefore LCM(42, 63, 140) = 2^2\times3^2\times5\times7 = 1260$

$HCF(42, 63, 140) = 2\times7 = 14$

Ans to the question no 6

Calculation of numerators.

$2 = 2^1$
$8 = 2^3$
$16 = 2^4$
$10 = 2^1 \times 5^1$

Calculation of Denominators

$3 = 3^1$
$9 = 3^2$
$81 = 3^4$
$27 = 3^3$

$LCM(2, 8, 16, 10) = 2^4 \times 5 = 80$ $\quad LCM(3, 9, 81, 27) = 3^4 = 81$

$HCF(2, 8, 16, 10) = 2$ $\quad HCF(3, 9, 81, 27) = 3$

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

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

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

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

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

Modulus of z is 1

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

Exponetial Form is $z = re^{i\theta} = 1 . e^{i\frac{2\pi}{3}}$

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

Ans to the question no 8

we have, $\sqrt{-16} \times \sqrt{-4}$ and $\frac{\sqrt{-16}}{\sqrt{-4}}$

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

$= 4i \times 2i$

$= 8i^2$

$= -8$

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

$= 2$

Ans to the question no 9

we have, $z = 2+i$

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

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

$= 13+4i$

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

$= \sqrt{169+16}$

$= \sqrt{185}$

Argument of z, $\theta = \tan^{-1} \frac{4}{13} = 17.102$.

Ans to the question no 10

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

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

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

$= \sqrt{1+3} = 2$

$\therefore r = 2$

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

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