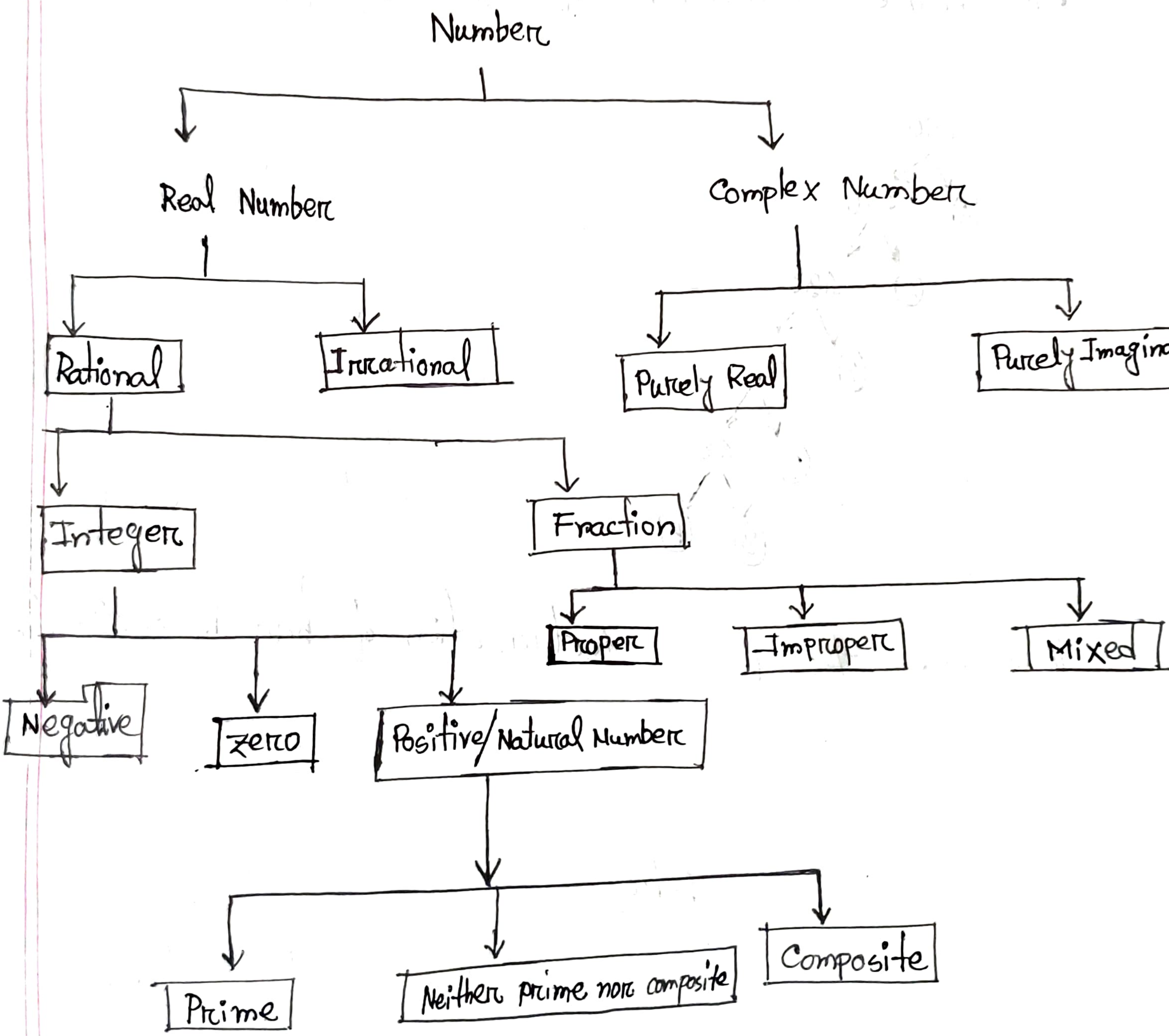
ID: 221-15-5465

1. Write down the classification of Number system.

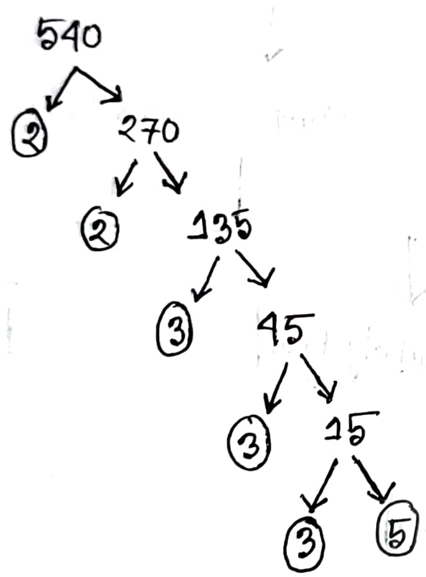
Ans:



3: Find the prime factorization of 540 using tree

Ans:

- The prime factorization of 540 using the tree method:



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

p.t.o

3. Find out the all factors of 540

Ans:

- 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 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

1. What is the GCD & LCM of 240 & 540

Ans:

Given numbers are 240 & 540

$240 = 2 \times 120$

$= 2 \times 2 \times 60$

$= 2 \times 2 \times 2 \times 30$

$= 2 \times 2 \times 2 \times 2 \times 15$

$= 2 \times 2 \times 2 \times 2 \times 3 \times 5$

$= 2^4 \times 3 \times 5$

$540 = 2 \times 270$

$= 2 \times 2 \times 135$

$= 2 \times 2 \times 3 \times 45$

$= 2 \times 2 \times 3 \times 3 \times 15$

$= 2 \times 2 \times 3 \times 3 \times 3 \times 5$

$= 2^2 \times 3^3 \times 5$

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

GCD of (240 & 540) $= 2^2 \times 3 \times 5 = 60$

5. Find the H.C.F & L.C.M of 42, 63 & 140

Ans:

Given numbers are 42, 63 & 140

$42 = 2 \times 3 \times 7$

$63 = 3 \times 3 \times 7$

$140 = 2 \times 2 \times 5 \times 7$

L.C.M of $(42, 63 \& 140) = 2^2 \times 3^2 \times 5 \times 7$
$= 1260$

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

6. Find the H.C.F & L.C.M of $\frac{2}{3}, \frac{8}{9}, \frac{16}{81} \& \frac{10}{27}$

Ans:

Calculation for Numerator

$2 = 2^1$
$8 = 2^3$

$16 = 2^4$

$10 = 2 \times 5$

$\therefore$ L.C.M $= 2^4 \times 5 = 80$

H.C.F $= 2$

Calculation for Denominator.

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

$\therefore$ L.C.M $= 3^4 = 81$

H.C.F $= 3$

$\therefore$ LCM $\left(\frac{2}{3}, \frac{8}{9}, \frac{16}{81} \& \frac{10}{27}\right) = \dfrac{\text{LCM of } 2, 8, 16, 10}{\text{H.C.F of } 3, 9, 81, 27}$

$= \dfrac{80}{3}$

$\therefore$ HCF $\left(\frac{2}{3}, \frac{8}{9}, \frac{16}{81} \& \frac{10}{27}\right) = \dfrac{\text{HCF of } 2, 8, 16, 10}{\text{Lcm of } 3, 9, 81, 27}$

$= \dfrac{2}{81}$

7. Find the modulus and Argument of $z = \dfrac{1+\sqrt{3}i}{1-\sqrt{3}i}$ and also its polar, exponential form.

Ans: Given,

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

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

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

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

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

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

$\therefore r = |z| = \sqrt{(-\frac{1}{2})^2 + (\frac{\sqrt{3}}{2})^2} = \sqrt{\frac{1}{4} + \frac{3}{4}} = \sqrt{\frac{4}{4}} = 1$ (Ans)

Arg (z), $\theta = \pi - \tan^{-1}\left|\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}\right| = \pi - \tan^{-1}|-\sqrt{3}|$

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

$= \frac{2\pi}{3}$ (Ans)

Polar from of $z = r(\cos\theta + i\sin\theta)$

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

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

Exponential from of $z = re^{i\theta}$

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

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

8.

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

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

$= 4i \times 2i$

$= 8i^2$

$= -8$

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

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

$= 2$

9. Evalute Modulus & Argument of $8z - z^2$ by replacing $z = 2+i$

Ans:

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

$$= \sqrt{169 + 16}$$

$$= \sqrt{185}$$

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

$$= 17.1$$

10.

Let,

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

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

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

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

$= \sqrt{1+3}$

$\therefore r = 2$

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

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

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

$= \pi/3$

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

Ans

— x —