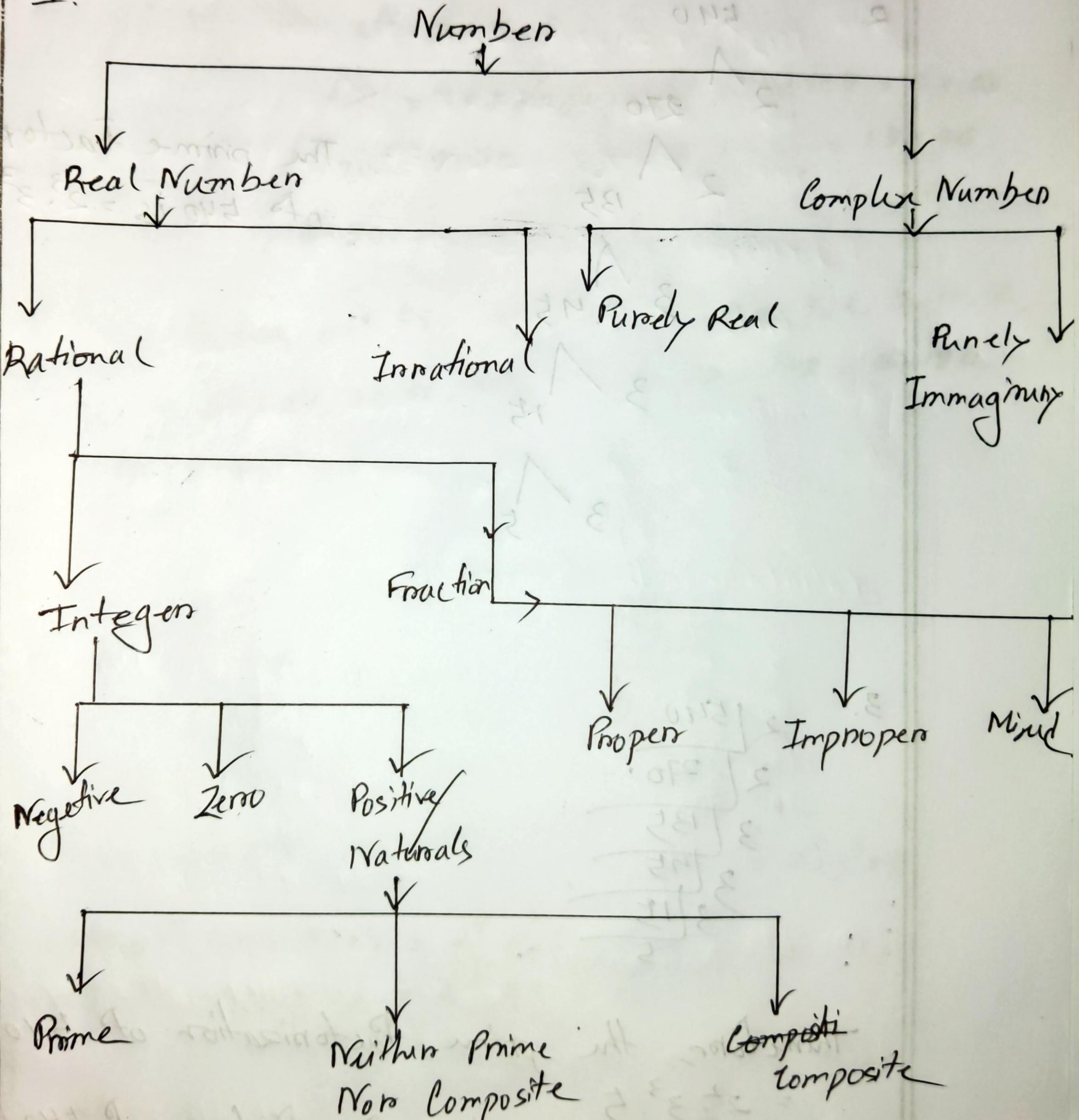
Sub :

Day

Time :

Date : 08/02/22

1.



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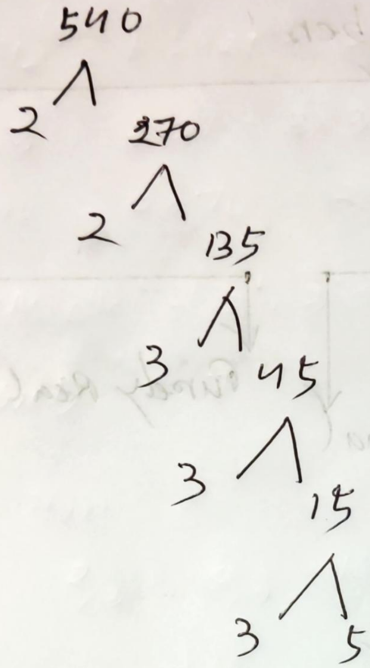
2.



$\therefore$ The prime Factorization of 540 is $= 2^3 \cdot 3^3 \cdot 5$

3.

2	540
2	270
3	135
3	45
3	15
	5

Therefore, the prime factorization of 540 is

$= 2^2 \cdot 3^3 \cdot 5$

so, the total number of factors of 540 is

$= (2+1)(3+1)(1+1)$

$= 2 \cdot 4 \cdot 2$

$= 24$

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Calculating for all factors:

$540 = 1\times540 = 2\times270 = 3\times180 = 4\times135 = 5\times108$

$= 6\times90 = 9\times60 = 10\times54 = 12\times45 = 15\times36$

$= 18\times30 = 20\times27$

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.

$$\begin{array}{r|l} 2 & 240 \\ 2 & 120 \\ 2 & 60 \\ 2 & 30 \\ 3 & 15 \\ & 5 \end{array} \qquad \begin{array}{r|l} 2 & 540 \\ 2 & 270 \\ 3 & 135 \\ 3 & 45 \\ 3 & 15 \\ & 5 \end{array}$$

$\therefore 240 = 2^4\times3\times5$

$\therefore 540 = 2^2\times3^3\times5$

LCM of $(240, 540) = 2^4.3^3.5 = 2160$

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

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 of $= 2^2\cdot3^2\cdot5\cdot7 = 1260$

$\therefore$ GCD $= 7$

6/ $2/3$, $8/9$, $16/81$ and $16/27$

Calculating the Numerator,

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

$10 = 2\times5$

Calculating the Denominator

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

LCM of Numerator $= 2^4\times5$
$= 80$

LCM of Denominator $= 3^4 = 81$

GCD of Numerator $= 2$

GCD of Denominator $= 3$

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

LCF of $2/3, 8/9, 16/81, 1$
$= \frac{80}{3}$

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7/

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

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

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

$$\therefore x = -\frac{1}{2}, \quad y = \frac{\sqrt{3}}{2}$$

$$r = \sqrt{x^2+y^2} = \sqrt{\left(-\frac{1}{2}\right)^2+\left(\frac{\sqrt{3}}{2}\right)^2} = \sqrt{\frac{1}{4}+\frac{3}{4}} = \sqrt{1} = 1$$

$$\theta = \pi - \tan^{-1}\left(\frac{y}{x}\right)$$

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

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

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

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

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

the polar form 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 form $z = e^{i.\frac{2\pi}{3}}$

8) Now,

$$\sqrt{-16} \times \sqrt{-4}$$
$$= \sqrt{16}i \times \sqrt{4}i$$
$$= 4i \times 2i$$
$$= 8i^2$$
$$= -8$$

and,

$$\frac{\sqrt{-16}}{\sqrt{-4}}$$
$$= \frac{4i}{2i}$$
$$= 2$$

9) $z = 2+i$

$$8z - z^2 = 8(2+i) - (2+i)^2$$
$$= 16 + 8i - 4 - 4i + i^2$$
$$= 13 + 4i$$

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

$$= \sqrt{185}$$

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

$= \tan^{-1}\left(-\frac{4}{\sqrt{3}}\right)$

$= 17.1$

10/ $z = x + iy$

$= 1 + i\sqrt{3}$

$x = 1$

$y = \sqrt{3}$

Modulus, $r = \sqrt{x^2+y^2} = \sqrt{1^2+(\sqrt{3})^2} = \sqrt{1+3} = 2$

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

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

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

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

therefore, $r(\cos\theta + i\sin\theta)$ form is

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