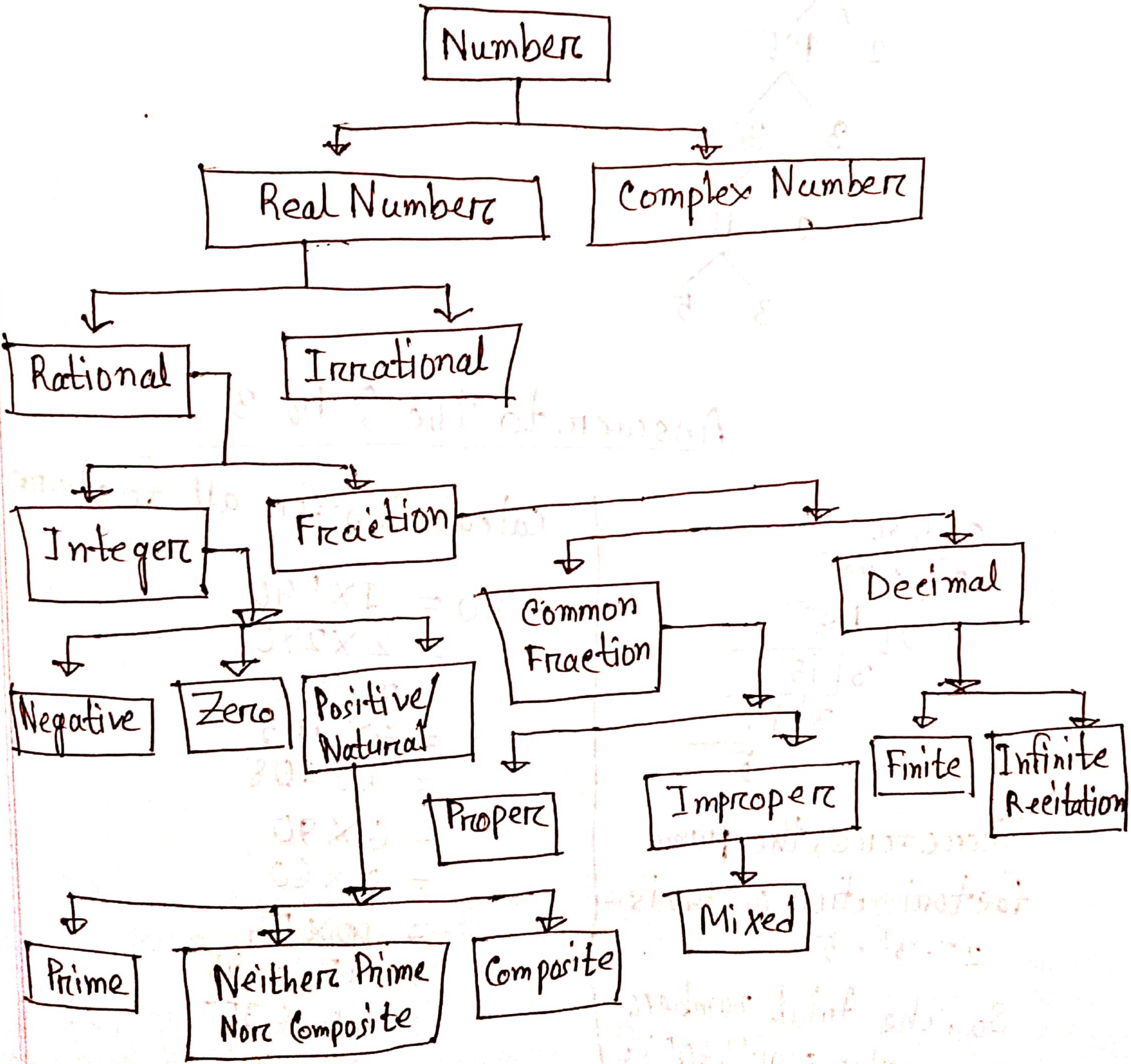
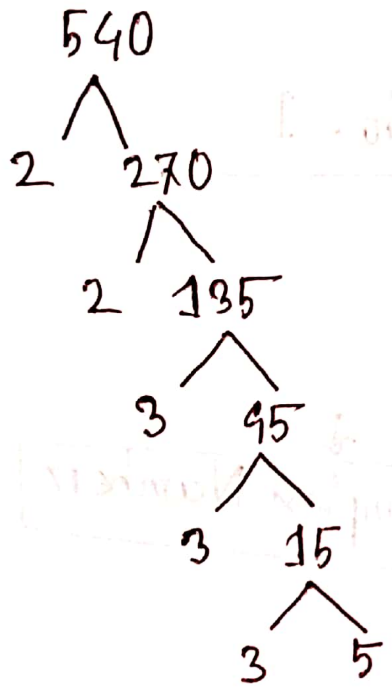
Answer to the Q. No. 1



Answer to the Q. No: 2



Therefore, the prime ~~Fact~~ Factorization of 540 is =

$(2^2 \cdot 3^3 \cdot 5)$

Answer to the Q. No 3

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

Therefore, the prime factorization of 540 is =

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

So, the total number of factors of '540' is

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

$= 3 \times 4 \times 2$

$= 24$

Calculation for all factors -

$540 = 1 \times 540$
$= 2 \times 270$
$= 3 \times 180$
$= 4 \times 135$
$= 5 \times 108$
$= 6 \times 90$
$= 9 \times 60$
$= 10 \times 54$
$= 12 \times 45$
$= 15 \times 35$
$= 18 \times 30$
$= 20 \times 27$

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.

Answer to the Q. No: 4

$240 = 2\times120 = 2\times2\times60 = 2\times2\times2\times30 = 2\times2\times2\times2\times15$

$= 2^4\times3\times5$

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

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

$\therefore$ LCM $(240, 540) = 2^4\times3^3\times5 = 2160$

And HCF OR GCD $(240, 540) = 2\times3\times5 = 30$.

Answer to the Q 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 $(42, 63, 140) = 2^2\times3^2\times5\times7 = 1260$

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

Answer to the Q. No : 6

Calculation for Numerators

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

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

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

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

Calculation for Denominators

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

$LCM\,(3, 9, 81, 27) =$

$3^4 = 81$

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

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

$$= \frac{2}{81}$$

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

$$= \frac{80}{3}$$ Ans.

Ans to the Q.No : 7

We have, $\frac{1+\sqrt{3}i}{1-\sqrt{3}i}$

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

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

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

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

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

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

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

~~$-2+\sqrt{2}$~~

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 $= \underline{1}$

And Argument of z will -

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

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

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

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

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

$\therefore$ ~~z~~

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

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

Ans to the Q No 8

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

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

$= 4i \times 2i$

$= 8i^2$

$= -8$

And, $\frac{\sqrt{-16}}{\sqrt{-4}} = \frac{\sqrt{16}\, i}{\sqrt{4}\, i}$

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

$= 2$

Ans to the Q No 9

We have, $z = 2+i$

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

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

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

$= 13 + 4i$

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

$= \sqrt{169+16}$

$= \sqrt{185}$

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

$= 17 \cdot 102^{0}$

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Ans to the Q No : 10

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

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

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 =

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