1. Number system classification.

There are ~~2~~ two types of number system: ① Real number,
② Complex number.

Two types of Real number: ① Rational.
② Irrational.

There are two types of ~~p~~ rational number: ① Integer.
② Fraction.

The Integer have ~~3~~ three types:
① Negative.
② Zero.
③ Positive.

2. Find the prime factorization of 540 using tree diagram.

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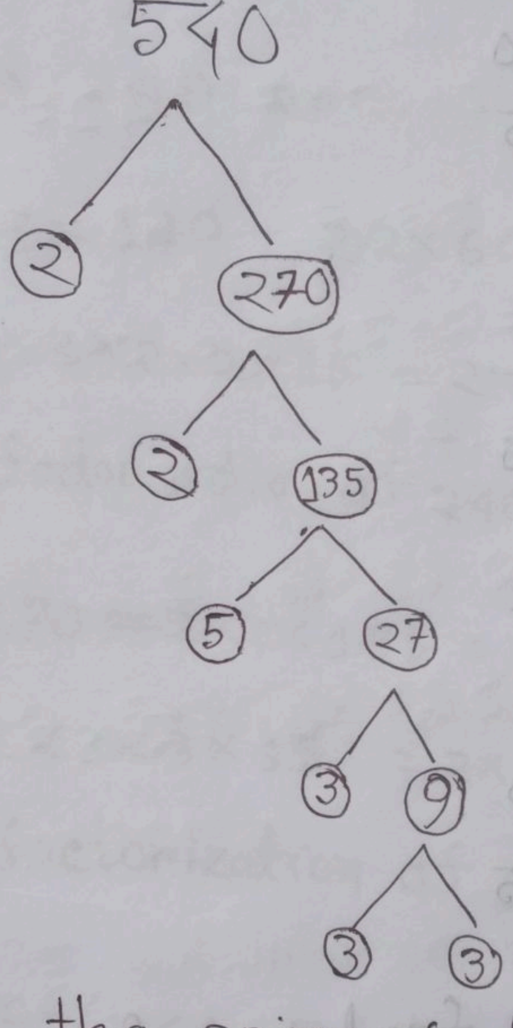

Therefore the prime factozation of

$540 = 2^2 \cdot 5 \cdot 3^3$

$\therefore$ All the prime factors of 540 = 2, 3, 5

3. Find all the factors of 540

$540 = 1 \times 540$

$= 2 \times 270$

$= 4 \times 135$

$= 5 \times 108$

$= 10 \times 54$

$= 20 \times 27$

$= 3 \times 180$

$= 6 \times 90$

$= 12 \times 45$

$= 9 \times 60$

$= 18 \times 30$

$= 36 \times 15$

Now, All the factors of 540 = 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. Given numbers are, 240 and 540

Therefore, the prime factorization of 240 and 540 are,

$240 = 2 \times 120 = 2 \times 2 \times 60 = 2 \times 2 \times 2 \times 30$

$= 2 \times 2 \times 2 \times 2 \times 15 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$

$\therefore$ Prime factorization of $240 = 2^4 \cdot 3 \cdot 5$

$540 = 2 \times 270 = 2 \times 2 \times 135 = 2 \times 2 \times 3 \times 45$

$= 2 \times 2 \times 3 \times 3 \times 15 = 2 \times 2 \times 3 \times 3 \times 3 \times 5$

$\therefore$ Prime factorization of $540 = 2^2 \cdot 3^3 \cdot 5$

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

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

5. Given numbers are; 42, 63 and 140

The prime factorization of 42, 63, and 140 are,

$42 = 2 \times 21 = 2 \times 3 \times 7 \quad \therefore 42 = 2 \cdot 3 \cdot 7$

$63 = 3 \times 21 = 3 \times 3 \times 7 \quad \therefore 63 = 3^2 \cdot 7$

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

$\therefore 140 = 2^2 \cdot 5 \cdot 7$

$\therefore$ HCF of $(42, 63, 140) = 7$

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

$= 1260.$

6. The Given numbers are, $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}, \frac{10}{27}$

~~Calcula~~

Calculation of numerators

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

$10 = 2 \cdot 5$

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

$= 80$

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

Calculation of Denominators,

$3 = 3^1$

$9 = 3^2$

$81 = 3^4$

$27 = 3^3$

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

$\therefore$ HCF of $(3, 9, 81, 27) = 3^1 = 3$

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

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

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

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

7. Given, $z = \frac{1+\sqrt{3}i}{1-\sqrt{3}i}$

Find the modulus of z:

Notation: $|z|$

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

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

$= \frac{\sqrt{4}}{\sqrt{4}}$

$= 1$ Ans.

again,

Suppose $z_1 = 1+\sqrt{3}i$

$z_2 = 1-\sqrt{3}i$

$\therefore z_1$ Argument is $\theta_1 = \tan^{-1}\frac{y}{x}$

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

$= 60^\circ$

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And, Z_2 Argument is $\theta_2 = 360° - \tan^{-1} \frac{y}{x}$

$= 360° - \tan^{-1} \frac{\sqrt{3}}{1}$

$= 360° - 60°$

$= 300°$

$\therefore$ Argument of $Z = \frac{60°}{300°} = 5°$

The polar form of $z = (r, \theta)$

$= (1, 5°)$

8. Given numbers are. $\cancel{\sqrt{6}}$ $\sqrt{-16} \times \sqrt{-4}$ and $\dfrac{\sqrt{-16}}{\sqrt{-4}}$

Evaluate of $\sqrt{-16} \times \sqrt{-4} = \sqrt{-4^2} \times \sqrt{-2^2}$

$= (-4) \times (-2)$

$= 8$ (Ans:)

Evaluate of $\dfrac{\sqrt{-16}}{\sqrt{-4}} = \dfrac{-4}{-2} = 2$

(Ans:)

9. Given, $z = 2 + i$

Now, modulus of $8z - z^2$

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

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

$= 13 + 4i$

$\therefore r = \sqrt{13^2 + 4^2} = \sqrt{169 + 16} = \sqrt{185}$ (Ans:)

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

10. Given, $z = 1 + i\sqrt{3}$

Natation :- $|z|$

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

Now, $|z| = \sqrt{1^2 + (\sqrt{3})^2}$

$= \sqrt{4}$

$= 2$

And, $\theta = \tan^{-1} \frac{\sqrt{3}}{1}$

$= \tan^{-1} \tan 60^\circ$

$= 60^\circ$

$\therefore |z| = (r, \theta)$

$= (2, 60^\circ)$

Ans.

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