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1. There are two types of Number

~~(i) Rational number~~

(i) Real Number

(ii) Complex Number

Again Real numbers are two types.

(a) Rational

(b) Irrational

Rationals are two types.

(i) Integer

(ii) Fraction

Integer has three types

(a) Negative

(b) Zero

(c) Positive or Natural number

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Positive/ Natural number is three types

(i) Prime

(ii) Neither prime nor composit

(iii) Composit

Fraction has three types

(i) Proper

(ii) Improper

(iii) Mixed

Complex numbers are two types

(a) Purely Real

(b) Purely Imaginary

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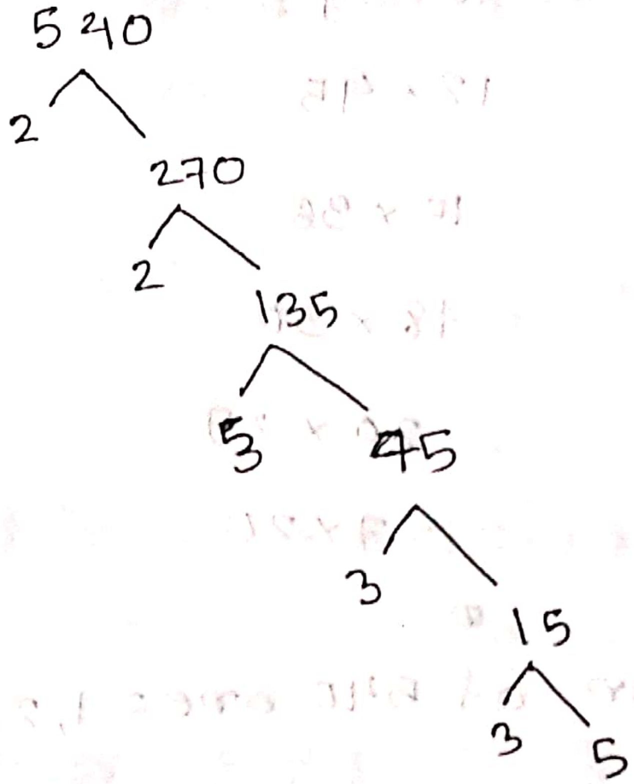
2.



the prime factorization of $540 = 2^2 . 3^3 . 5$ (Ans

3. $540 = 1 \times 540$

$= 2 \times 270$

$= 4 \times 135$

$= 3 \times 180$

$= 5 \times 108$

$= 6 \times 90$

$= 9 \times 60$

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$= 10 \times 54$

$= 12 \times 45$

$= 15 \times 36$

$= 18 \times 30$

$= 20 \times 27$

$= 27 \times 20$

The factor 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.

$$\begin{array}{r|l} 2 & 240 \\ 2 & 120 \\ 2 & 60 \\ 2 & 30 \\ 3 & 15 \\ & 5 \end{array}$$

$\therefore 240 = 2^4 . 3 . 5$

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

$540 = 2^2 . 3^3 . 5$

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Therefore the prime factorization of 240 and 540 are

$240 = 2^4 . 3 . 5$

$540 = 2^2 . 3^3 . 5$

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

and $GCD(240, 540) = 2^2 . 3 . 5$
$= 60$

(Ans)

5. $42 = 2 . 21 = 2 . 3 . 7$

$63 = 3 . 21 = 3 . 3 . 7 = 3^2 . 7$

$140 = 2 . 70 = 2 . 2 . 5 . 7 = 2^2 . 5 . 7$

$\therefore$ $LCM(42, 63, 140) = 2^2 . 3^2 . 5 . 7 = 1260$

$HCF(42, 63, 140) = 7$

(Ans)

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6. Prime factorization of Numerators,

$2 = 2^1$

$8 = 2^3$

$16 = 2^4$

$10 = 2 \times 5$

LCM of Numerators $= 2^4 \times 5$

HCF of Numerators $= 2$

Again Prime factorization of Denominators

$3 = 3^1$

$9 = 3^2$

$27 = 3^3$

$81 = 3^4$

LCM of Denominators $= 3^4$

HCF of Denominators $= 3$

$\therefore$ LCM of Fraction $= \frac{2^4 \times 5}{3} = \frac{80}{3}$

HCF of Fraction $= \frac{2}{3^4} = \frac{2}{81}$

(Ans)

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7. Here $z = \dfrac{1+\sqrt{3}i}{1-\sqrt{3}i}$

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

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

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

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

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

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

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

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

$$= \sqrt{1} = 1$$

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$$Arg(z) = 180° - \tan^{-1} \frac{\sqrt{3}/2}{-\frac{1}{2}}$$

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

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

Polar (z)

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

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

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

exponential of $z = re^{i\theta}$

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

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

(Ans)

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8. $\sqrt{-16} \times \sqrt{-4}$

$= 4i \times 2i$

$= 8i^2$

$= -8$

and $\dfrac{\sqrt{-16}}{\sqrt{-4}} = \dfrac{4i}{2i}$

$= 2$ (Am)

9. Here, $z = 2+i$

$8z - z^2$

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

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

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

$= 13 + 4i$

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Let $x = 13 + 4i$

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

$= \sqrt{169 + 16}$

$= \sqrt{185}$

$Arg(x) = \tan^{-1} \frac{4}{13}$ (Ans)

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

$r = \sqrt{1^2 + (\sqrt{3})^2}$

$= \sqrt{1 + 4}$

$= \sqrt{5}$

$Arg(z) = \tan^{-1} \frac{\sqrt{3}}{1}$

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

So, polar form $= r(\cos\theta + i\sin\theta)$

$= \sqrt{5}(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3})$ (