MAT111

Numbering system.

01.

Division method :-

$$\begin{array}{r|l} 2 & 1240 \\ \hline 2 & 620 \\ \hline 2 & 310 \\ \hline 5 & 155 \\ \hline & 31 \end{array}$$

Tree dyayagram :-

1240

2 620

2 310

2 155

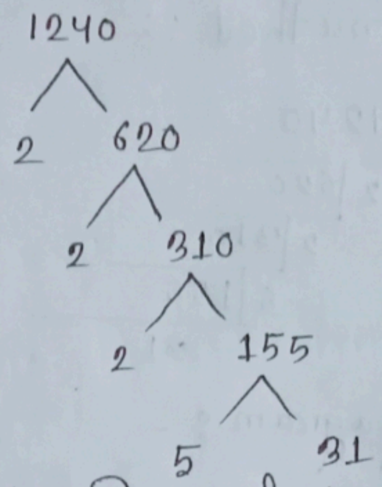
5 31

Multiplication method :-

$$\begin{aligned} 1240 &= 2 \times 620 \\ &= 2 \times 2 \times 310 \\ &= 2 \times 2 \times 2 \times 155 \\ &= 2 \times 2 \times 2 \times 5 \times 31 . \end{aligned}$$

$\therefore$ Thereforce, the factorrization of 1240 = $2^3 \cdot 5 \cdot 31$

02.



therefore, the Prime factorization of 1240

$$= 2^3 \cdot 5 \cdot 31 .$$

the total number of factor are,

$$(3+1)(1+1)(1+1)$$

$$= 4 \cdot 2 \cdot 2$$

$$= 16$$

Here,

calculation for all factors,

$$1240 = 1 \times 1240$$
$$= 2 \times 620$$
$$= 4\cancel{2} \times 310$$
$$= 5 \times 248$$
$$= 8 \times 155$$

$= 10 \times 124$

$= 20 \times 62$

$= 31 \times 40$

$\therefore$ the factorc of 1240 are,

1, 2, 4, 5, 8, 10, 20, 31, 40, 62, 124,

155, 248, 310, 620, 1240.

03. All the Prime factores of 1240 : 2, 5, 31.

04. All the comPossite factores of 12040 : 4, 8, 10,

20, 40, 62, 124, 155, 248,

310, 620, 1240.

05.

$42 = 2 \times 21 = 2 \times 3 \times 7.$

$63 = 3 \times 21 = 3 \times 3 \times 7.$

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

$\therefore$ L.C.M $(42, 63, 140) = 2^2 \cdot 3^2 \cdot 5 \cdot 7 = 1260$

$\therefore$ H.C.F $(42, 63, 140) = 2 \times 7 = 14.$

06. calculation for numerators,

$$2 = 2^1$$
$$8 = 2^3$$
$$16 = 2^4$$
$$10 = 2^1 \times 5^1$$

calculation for Denominators,

$$3 = 3^1$$
$$9 = 3^2$$
$$81 = 3^4$$
$$27 = 3^3$$

$\therefore$ L.C.M $(2, 8, 16, 10) = 2^4 \times 5 = 80$

$\therefore$ H.C.F $(2, 8, 16, 10) = 2$.

$\therefore$ L.C.M $(3, 9, 81, 27) = 3^4 = 81$

$\therefore$ H.C.F $(3, 9, 81, 27) = 3$.

Here,

H.C.F of $2/3$, $8/9$, $16/81$, $10/27$

$$= \frac{\text{HCF}(2, 8, 16, 10)}{\text{L.C.M}(3, 9, 81, 27)}$$

$$= 2/81.$$

P.T.O

L.C.M. of $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}, \frac{10}{27}$

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

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

07. we have,

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

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

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

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

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

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

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

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

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

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

$$= 1.$$

$\therefore$ Modulus of $z = 1$

$\therefore$ Argument of z

$$\theta = \pi - \tan^{-1}\frac{\sqrt{3}/2}{1/2}$$

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

Polare form $1/2 + \sqrt{3}/2\, i$.

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

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

$= e^{2\pi/3\, i}$.

08. We have,

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

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

$= 4i \times 2i$

$= 8i^2$

$= -8$.

and, $\sqrt{-16}/\sqrt{-4}$

$= 4i/2i$

$= 2$.

09. we have,

$$z = 2+i.$$

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

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

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

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

$$= 13 + 4i.$$

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

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

$$= \sqrt{185}.$$

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

$$= 17.102.$$

10. $z = 1 + i\sqrt{3}$. $z = x + iy$ $|z| = \sqrt{x^2 + y^2}$

$\theta = \tan^{-1}|y/x|$

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

$= \sqrt{1+3}$

$= 2$.

$\therefore r = 02$.

Argument of $z = \tan^{-1}|y/x|$

$= \tan^{-1}|\sqrt{3}/1|$

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

$= \pi/3$.

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

$2(\cos \pi/3 + i\sin \pi/3)$.

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