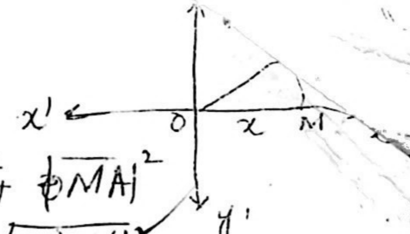
Modulus of Complex Number:-




In right angle triangle OMA, by ~~Pat~~ Pythagoras theorem $|\overline{OA}|^2 = |\overline{OM}|^2 + |\overline{MA}|^2$

$\therefore |\overline{OA}|^2 = x^2+y^2 \Rightarrow |\overline{OA}| = \sqrt{x^2+y^2}$

Modulus of complex $z = (x+iy)$ is denoted by

$$z = (x+iy) = (x,y) \Rightarrow |z| = \sqrt{x^2+y^2}$$

Find moduli of complex Numbers:-

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

$|z| = \sqrt{(1)^2+(-\sqrt{3})^2} = \sqrt{1+3} = \sqrt{4} = 2$

2) Let $z = -5i$, $z = 0+(-5)i$, $|z| = \sqrt{(0)^2+(-5)^2} =$

(3) 3 (4) $3+4i$

Properties:- $\forall\, z_1, z_2, z_3 \in C$ $\Rightarrow z = a+ib$, $\bar{z} = a-ib$

$\Rightarrow -z = -a-ib$, $-\bar{z} = a+ib$

i) $|-z| = |z| = |\bar{z}| = |-\bar{z}|$

(ii) $\bar{\bar{z}} = z$, $z = a+ib$, $\bar{z} = a-ib$, $\bar{\bar{z}} = a+ib = z$

(iii) $z\bar{z} = |z|^2$

iv) $\overline{z_1+z_2} = \bar{z}_1+\bar{z}_2$

v) $\overline{\left(\frac{z_1}{z_2}\right)} = \frac{\bar{z}_1}{\bar{z}_2}$, $z_2 \neq 0$

(vi) $|z_1 \cdot z_2| = |z_1| \cdot |z_2|$

Question:- if $z_1 = 2+i$, $z_2 = 3-2i$, $z_3 = 1+3i$, then express $\frac{\bar{z}_1 \bar{z}_3}{z_2}$ in the form of $a+ib$.

Solution:- $\frac{\bar{z}_1\bar{z}_3}{z_2} = \frac{\overline{(2+i)}\,\overline{(1+3i)}}{3-2i} = \frac{(2-i)(1-3i)}{3-2i}$