Complex Numbers Ex 13.3 Q1(vii)

let $z = 1 + 4\sqrt{-3}$

$\quad = 1 + 4\sqrt{3} \times \sqrt{-1} \quad \left(\because \sqrt{-3} = \sqrt{3} \times \sqrt{-1} \right)$

$\Rightarrow z = 1 + 4\sqrt{3}i$

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

$\quad = \sqrt{1 + 48}$

$\quad = \sqrt{49}$

$\quad = 7$

Hence $\sqrt{1 + 4\sqrt{-3}} = \pm \left\{ \sqrt{\dfrac{7+1}{2}} + i\sqrt{\dfrac{7-1}{2}} \right\} \quad (\because y > 0)$

$\quad = \pm \left\{ \sqrt{\dfrac{8}{2}} + i\sqrt{\dfrac{6}{2}} \right\}$

$\quad = \pm \left\{ \sqrt{4} + i\sqrt{3} \right\}$

$\quad = \pm \left\{ 2 + \sqrt{3}i \right\}$

Complex Numbers Ex 13.3 Q1(viii)

let $z = 4i$

then $|z| = |4i|$

$\quad = 4\,|i| \qquad\qquad\qquad \left(\because |z_1 z_2| = |z_1| \times |z_2| \right)$

$\quad = 4 \qquad\qquad\qquad\quad \left(\because |i| = 1 \right)$

$\therefore \sqrt{4i} = \pm \left\{ \sqrt{\dfrac{4+0}{2}} + i\sqrt{\dfrac{4-0}{2}} \right\} \qquad (\because y > 0)$

$\quad = \pm \left\{ \sqrt{2} + i\sqrt{2} \right\}$

$\quad = \pm\sqrt{2}\,(1 + i)$

Complex Numbers Ex 13.3 Q1(ix)

let $z = -i$

then $|z| = |-i|$

$\quad = |-1| \times |i| \qquad\qquad \left(\because |z_1 z_2| = |z_1| \times |z_2| \right)$

$\quad = 1 \times i \qquad\qquad\qquad \left(\because |i| = 1 \right)$

$\quad = 1$

$\therefore \sqrt{-i} = \pm \left\{ \sqrt{\dfrac{1+0}{2}} - i\sqrt{\dfrac{1-0}{2}} \right\} \qquad (\because y < 0)$

$\quad = \pm \left\{ \dfrac{1}{\sqrt{2}} - \dfrac{i}{\sqrt{2}} \right\}$

$\quad = \pm \dfrac{1}{\sqrt{2}}\,(1 - i)$

********** END *********