Complex Numbers Ex 13.3 Q1(vii)

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

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

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

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

$= \sqrt{1 + 48}$

$= \sqrt{49}$

$= 7$

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

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

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

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

Complex Numbers Ex 13.3 Q1(viii)

let $z = 4i$

then $|z| = |4i|$

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

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

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

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

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

Complex Numbers Ex 13.3 Q1(ix)

let $z = -i$

then $|z| = |-i|$

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

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

$= 1$

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

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

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

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