



Complex Numbers Ex 13.3 Q1(vii)

$$\begin{aligned}
 \text{let } z &= 1 + 4\sqrt{-3} \\
 &= 1 + 4\sqrt{3} \times \sqrt{-1} \quad \left(\because \sqrt{-3} = \sqrt{3} \times \sqrt{-1} \right) \\
 \Rightarrow z &= 1 + 4\sqrt{3}i \\
 \therefore |z| &= \sqrt{(1)^2 + (4\sqrt{3})^2} \\
 &= \sqrt{1 + 48} \\
 &= \sqrt{49} \\
 &= 7
 \end{aligned}$$

$$\begin{aligned}
 \text{Hence } \sqrt{1 + 4\sqrt{-3}} &= \pm \left\{ \sqrt{\frac{7+1}{2}} + i \sqrt{\frac{7-1}{2}} \right\} \quad (\because y > 0) \\
 &= \pm \left\{ \sqrt{\frac{8}{2}} + i \sqrt{\frac{6}{2}} \right\} \\
 &= \pm \left\{ \sqrt{4} + i \sqrt{3} \right\} \\
 &= \pm \{ 2 + \sqrt{3}i \}
 \end{aligned}$$

Complex Numbers Ex 13.3 Q1(viii)

$$\text{let } z = 4i$$

$$\begin{aligned}
 \text{then } |z| &= |4i| \\
 &= 4|i| & \left(\because |z_1 z_2| = |z_1| \times |z_2| \right) \\
 &= 4 & \left(\because |i| = 1 \right)
 \end{aligned}$$

$$\begin{aligned}
 \therefore \sqrt{4i} &= \pm \left\{ \sqrt{\frac{4+0}{2}} + i \sqrt{\frac{4-0}{2}} \right\} \quad (\because y > 0) \\
 &= \pm \left\{ \sqrt{2} + i \sqrt{2} \right\} \\
 &= \pm \sqrt{2} (1 + i)
 \end{aligned}$$

Complex Numbers Ex 13.3 Q1(ix)

$$\text{let } z = -i$$

$$\begin{aligned}
 \text{then } |z| &= |-i| \\
 &= |-1| \times |i| & \left(\because |z_1 z_2| = |z_1| \times |z_2| \right) \\
 &= 1 \times i & \left(\because |i| = 1 \right) \\
 &= 1
 \end{aligned}$$

$$\begin{aligned}
 \therefore \sqrt{-i} &= \pm \left\{ \sqrt{\frac{1+0}{2}} - i \sqrt{\frac{1-0}{2}} \right\} \quad (\because y < 0) \\
 &= \pm \left\{ \frac{1}{\sqrt{2}} - \frac{i}{\sqrt{2}} \right\} \\
 &= \pm \frac{1}{\sqrt{2}} (1 - i)
 \end{aligned}$$

***** END *****