

Q) $[3 + 2i \sin(\theta)] / [1 - 2i \sin(\theta)]$ will be purely imaginary if $\theta =$

Solution:

$[3 + 2i \sin(\theta)] / [1 - 2i \sin(\theta)]$ will be purely imaginary, if the real part vanishes, i.e.,

$$[3 - 4 \sin^2 \theta] / [1 + 4 \sin^2 \theta] = 0$$

$$3 - 4 \sin^2 \theta \text{ (only if } \theta \text{ be real)}$$

$$\sin(\theta) = \pm\sqrt{3} / 2$$

$$= \sin (\pm \pi / 3)$$

$$\theta = n\pi + (-1)^n (\pm \pi / 3)$$

$$= n\pi \pm \pi / 3$$