NCERT 11.14 12Q

EE23BTECH11012 - Chavan Dinesh*

Question: Plot the corresponding reference circle for each of the following simple harmonic motions. Indicate the initial (t = 0) position of the particle, the radius of the circle,and the angular speed of the rotating particle. For simplicity, the sense of rotation may be fixed to be anticlockwise in every case: (x is in cm and t is in s)

a) $x = -2\sin(3t + \frac{\pi}{3})$
b) $x = \cos(\frac{\pi}{6} - t)$
c) $x = 3\sin(2\pi t + \frac{\pi}{4})$
d) $x = 2\cos(\pi t)$

Solution:

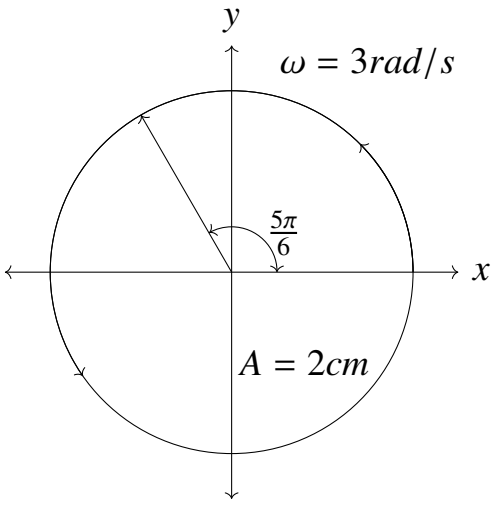
S.No	ω(in rad/s)	A(in cm)
1.	3	2
2.	-1	1
3.	2π	3
4.	π	1

TABLE 1: Input table

i)

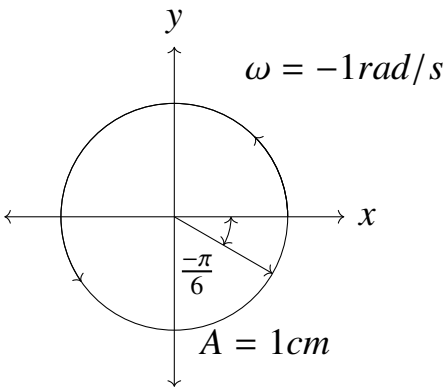
$$x = -2\sin\left(3t + \frac{\pi}{3}\right) \tag{1}$$

$$x = 2\cos\left(3t + \frac{5\pi}{6}\right) \tag{2}$$



ii)

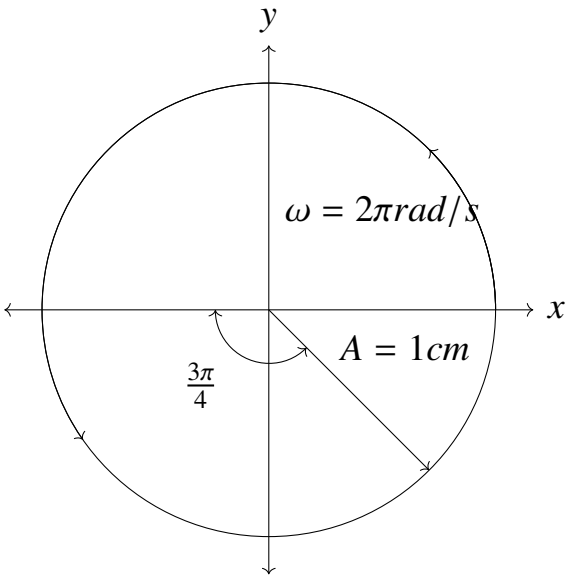
$$x = \cos\left(\frac{\pi}{6} - t\right) \tag{3}$$



iii)

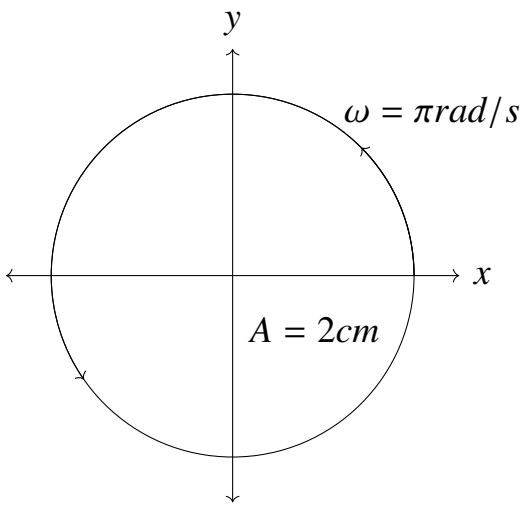
$$x = 3\sin\left(2\pi t + \frac{\pi}{4}\right) \tag{4}$$

$$x = -3\cos\left(2\pi t + \frac{3\pi}{4}\right) \tag{5}$$



iv)

$$x = 2\cos(\pi t) \tag{6}$$


y
$\omega = \pi rad/s$
x
$A = 2cm$