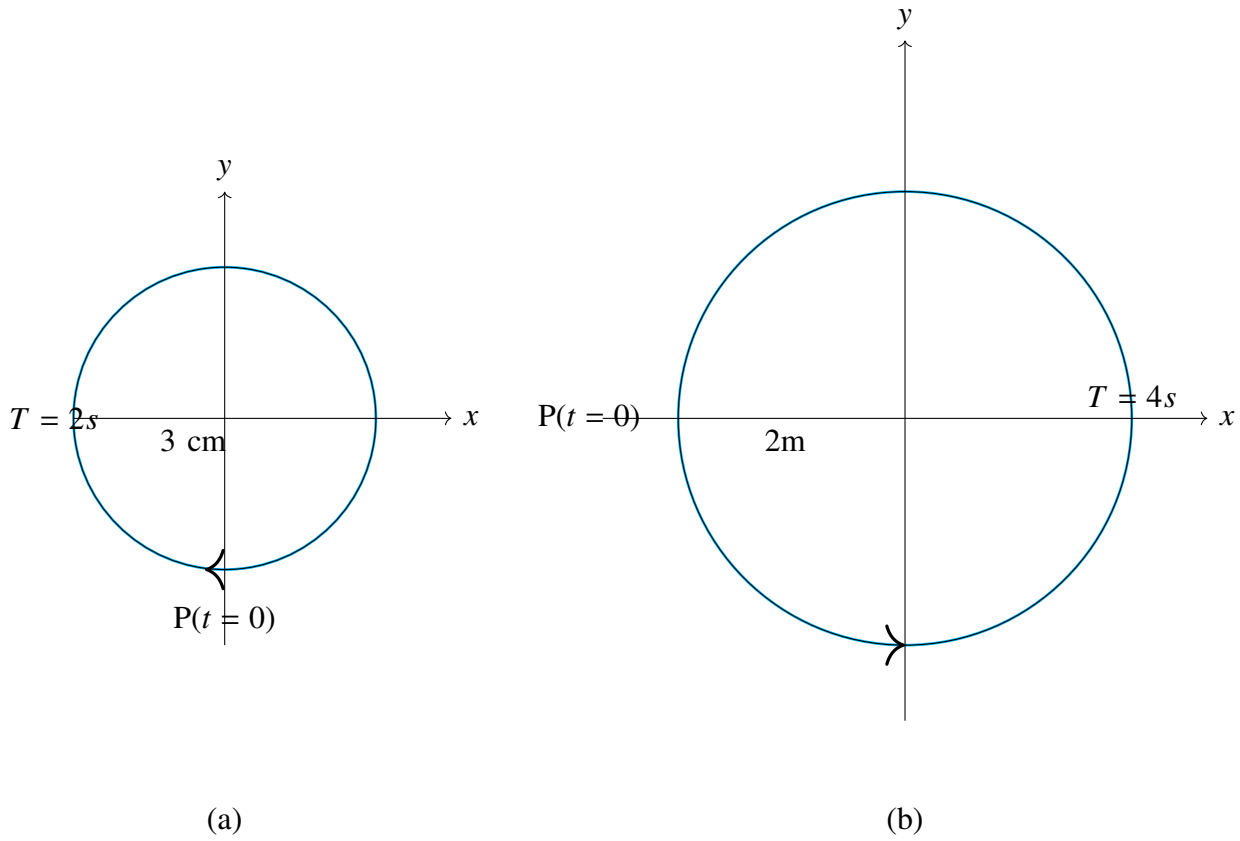
Q: Figures correspond to two circular motions. The radius of the circle, the period of revolution, the initial position and the sense of revolution(i.e. clockwise or anti-clockwise) are indicated on each figure. Obtain the corresponding simple harmonic motions of the x-projections of the radius vector of resolving particle P in each case.



(a) (b)

Solution:

Parameter	(a)	(b)
Radius(r)	$3cm$	2 cm
Time Period(T)	$2sec$	$4sec$
Sense	clockwise	anti-clockwise
Initial Phase(ϕ)	π	$\frac{\pi}{2}$

TABLE I
INPUT PARAMETERS TABLE

a. From Table I, Equation of x-projection of radius:

$$x(t) = r\sin(\frac{2\pi}{T}t + \phi) \tag{1}$$
$$= 3\sin(\frac{2\pi}{2}t + \pi) \tag{2}$$
$$= -3sin(\pi t)cm. \tag{3}$$

b. Similarly,

$$x(t) = r\sin(\frac{2\pi}{T}t + \phi) \tag{4}$$
$$= 2\sin(\frac{2\pi}{4}t + \frac{\pi}{2}) \tag{5}$$
$$= 2\cos(\frac{\pi}{2}t)cm. \tag{6}$$