Topic 22: Exercises on Uniform Circular Motion
Level 1

1. 1. A particle P moves with uniform angular speed ω in a circle of radius r. O is the center of the circle, AB is a diameter and at time t, $\angle POB = \theta$. N is the foot of the perpendicular from P to AB. Show that as P moves in the circle, N moves in the diameter AB with simple harmonic motion.

2. The pendulum of a clock beats seconds (each half-oscillation takes one second) at a place where $g = 9.812 \ ms^{-2}$. Find the length of the pendulum.

$$\boxed{0.994 \ m}$$

3. Find the length of the pendulum of a clock which is to register correctly at a place where $g = 9.921 \ ms^{-2}$.

$$\boxed{1.005 \ m}$$

4. The pendulum of a clock which beats seconds (each half-oscillation takes one second) at a place where $g = 9.812 \, ms^{-2}$. The clock is moved to a place where $g = 9.921 \, ms^{-2}$. Find by how much it will gain or lose during one day.

476 s

5. At ground level, where $g = 9.81 \ ms^{-2}$, a simple pendulum beats exact seconds (each half-oscillation takes one second). If it is taken up a mountain to a place where $g = 9.80 \ ms^{-2}$, find by how many seconds per day it will be wrong.

44 s

6. A particle of mass m kg is travelling at constant speed v ms^{-1} round a circle of radius r m. If $v = 8$ and $r = 2$, find the magnitude of the linear acceleration.

$$\boxed{32 \ ms^{-2}}$$