1. A particle moves around a circle with constant linear speed. This type of motion is called:
   A. Simple harmonic motion
   B. Projectile motion
   C. Uniform circular motion
   D. Non-uniform circular motion (C)

Explanation : Constant speed along a circular path defines uniform circular motion.

2. The change in the angular position of a particle is known as:
   A. Angular velocity
   B. Angular displacement
   C. Angular acceleration
   D. Centripetal displacement (B)

Explanation : Angular displacement measures how much the angle has changed; its unit is the radian.

3. The rate of change of angular displacement with respect to time is called:
   A. Angular acceleration B. Angular velocity
   C. Linear velocity
   D. Frequency (B)

Explanation : Angular velocity $\omega = \Delta\theta/\Delta t$ has unit $rad \cdot s^{-1}$

4. The quantity defined as the rate of change of angular velocity with time is:
   A. Angular displacement
   B. Angular acceleration
   C. Linear acceleration
   D. Centripetal acceleration (B)

Explanation : Angular acceleration $\alpha = \Delta\omega/\Delta t$, unit $rad \cdot s^{-2}$

5. Which relation correctly expresses angular speed?
   A. $\omega = T/(2\pi)$ B. $\omega = 2\pi/T = 2\pi f$
   C. $\omega = 1/(2\pi f)$ D. $\omega = \pi/f$ (B)

Explanation : One complete revolution corresponds to 2π radians, giving $\omega = 2\pi/T = 2\pi f$.

6. For a particle moving in a circle of radius R, the linear speed is related to angular speed by:
   A. $v = \omega/R$ B. $v = \omega R$
   C. $v = R/\omega$ D. $v = \omega^2 R$ (D)

Explanation : Linear speed equals radius times angular speed: $v = \omega R$.

7. In uniform circular motion, the directions of velocity and acceleration are:
   A. Radial outward; tangential
   B. Tangential; toward the center
   C. Toward the center; tangential
   D. Both along the radius toward the center (B)

Explanation : Velocity is tangential, while acceleration is directed radially inward (centripetal).

8. The expression for centripetal acceleration is:
   A. $a = v/R$ B. $a = \omega R$
   C. $a = v^2/R = \omega^2 R$ D. $a = R/v^2$ (C)

Explanation : Centripetal acceleration depends on the square of speed and inversely on radius, or on $\omega^2 R$.

9. The force needed to maintain a particle of mass m in circular motion at speed v and radius r is:
   A. $F = mvr$
   B. $F = mv^2/r = m\omega^2 r = 4\pi^2 mf^2 r$
   C. $F = mr/v^2$ D. $F = m/r^2$ (B)

Explanation : Centripetal force can be expressed in multiple equivalent forms: $F = mv^2/r$, $m\omega^2 r$, or $4\pi^2 mf^2 r$.

10. Two particles of equal mass move with the same speed in circles of radii r_1 and r_2. The ratio of their centripetal forces is:
   A. r_1/r_2 B. r_2/r_1
   C. $(r_1/r_2)^2$ D. $(r_2/r_1)^2$ (B)

Explanation : With equal mass and speed, $F = mv^2/r$. Hence, $F_1/F_2 = r_2/r_1$.